การบริบาลทางเภสัชกรรมแก่ผู้ป่วยจิตเภทที่มีภาวะอ้วนที่สถาบันจิตเวชศาสตร์สมเด็จเจ้าพระยา

นางสาวจินตนา ปรัชญาสันติ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาเภสัชศาสตรมหาบัณฑิต
สาขาวิชาเภสัชกรรมคลินิก ภาควิชาเภสัชกรรม
คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2547
ISBN 974-53-1905-8

PHARMACEUTICAL CARE FOR OBESE SCHIZOPHRENIC PATIENTS AT SOMDET CHAOPRAYA INSTITUTE OF PSYCHIATRY

Miss Jintana Pratyasanti

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Pharmacy in Clinical Pharmacy

Department of Pharmacy
Faculty of Pharmaceutical Sciences
Chulalongkorn University

Academic Year 2004
ISBN 974-53-1905-8

Thesis Title	PHARMACEUTICAL CARE FOR OBESE SCHIZOPHRENIC PATIENTS AT SOMDET CHAOPRAYA INSTITUTE OF PSYCHIATRY
By	Miss Jintana Pratyasanti
Field of Study	Clinical Pharmacy
Thesis Advisor	Associate Professor Prapapuck Silapachote, M.Sc.in Pharm.
Thesis Co-advisor	Associate Professor Chuthamanee Suthisisang, Ph.D.
	Thanand Piyasirisilp, M.D., Diplomate, Thai Board of Psychiatry.

Accepted by the Faculty of Pharmaceutical Sciences, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

…… Dean of the Faculty of Pharmaceutical Sciences

(Associate Professor Boonyong Tantisira, Ph.D.)

THESIS COMMITTEE

…….. Chairman

(Associate Professor Achara Utiswannakul, M.Sc.in Pharm.)

……..……. Thesis Advisor

(Associate Professor Prapapuck Silapachote, M.Sc.in Pharm.)

…….. Thesis Co-advisor

(Associate Professor Chuthamanee Suthisisang, Ph.D.)

……..Member

(Assistant Professor Aphirudee Hemachudha, M.Sc.in Pharm.)

…… Member

(Weerapon Unaharassamee, M.D., Diplomate, Thai Board of Psychiatry.)

จินตนา ปรัชญาสันติ: การบริบาลทางเภสัชกรรมแก่ผู้ป่วยจิตเภทที่มีภาวะอ้วนที่สถาบันจิตเวชศาสตร์สมเด็จเจ้าพระยา (PHARMACEUTICAL CARE FOR OBESE SCHIZOPHRENIC PATIENTS AT SOMDET CHAOPRAYA INSTITUTE OF PSYCHIATRY) อาจารย์ที่ปรึกษา: รศ.ประภาพักตร์ ศิลปโชติ, อาจารย์ที่ปรึกษาร่วม: รศ.ดร.จุฑามณี สุทธิสีสังข์, นพ.ฐานันดร์ ปิยะศิริศิลป์ : 195 หน้า. ISBN 974-53-1905-8

การศึกษานี้มีวัตถุประสงค์เพื่อประเมินผลการให้บริบาลทางเภสัชกรรมแก่ผู้ป่วยจิตเภทที่มีภาวะอ้วน โดยเปรียบเทียบน้ำหนักตัว ค่าดัชนีมวลกาย (Body mass index) เส้นรอบเอว และค่าผลตรวจทางห้องปฏิบัติการก่อนและหลังการให้บริบาลทางเภสัชกรรม การศึกษานี้เป็นการศึกษาแบบไปข้างหน้าโดยคัดเลือกผู้ป่วยจิตเภทที่มีภาวะอ้วน (ค่าดัชนีมวลกาย $\geq$ 25 กิโลกรัม/เมตร^2) ที่พักรักษาตัวในสถาบันจิตเวชศาสตร์สมเด็จเจ้าพระยา จำนวน 58 คน โดยติดตามผู้ป่วยติดต่อกัน 5 ครั้ง ห่างกันครั้งละ 1 เดือน การบริบาลเภสัชกรรมที่ผู้ป่วยได้รับได้แก่ (1) การค้นหาปัญหาเกี่ยวกับน้ำหนักตัวที่มากเกินไปและปัญหาทางเมตาบอลิก (metabolic problems) โดยการติดตามค่าน้ำหนักตัว เส้นรอบเอว คำนวณค่าดัชนีมวลกาย ติดตามค่าผลตรวจทางห้องปฏิบัติการ ได้แก่ ระดับน้ำตาลในเลือด (Fasting plasma glucose) ระดับฮีโมโกบิลเอวันซี (HbA_{1c}) ระดับโคเลสเตอรอล (Cholesterol) ระดับไตรกลีเซอไรด์ (Triglyceride) ระดับเอชดีแอลโคเลสเตอรอล (HDL-C) และระดับแอลดีแอลโคเลสเตอรอล (LDL-C) สัมภาษณ์ผู้ป่วยและญาติเกี่ยวกับการรับประทานอาหารและการออกกำลังกายของผู้ป่วย 2) การแก้ไขและป้องกันปัญหาเกี่ยวกับน้ำหนักตัวที่มากเกินไปและปัญหาทางเมตาบอลิก โดยการแนะนำผู้ป่วยและญาติเกี่ยวกับ การควบคุมอาหารและการออกกำลังกาย ประสานกับโภชนากรในการจัดอาหาร 1,800 กิโลแคลอรี่ต่อวัน แก่ผู้ป่วยในประสานกับพยาบาลในการดูแลการรับประทานอาหารของผู้ป่วยใน และเสนอการแก้ไขปัญหาทางเมตาบอลิกแก่จิตแพทย์

ผลการศึกษาพบว่า ผู้ป่วยมีน้ำหนักตัวลดลงคิดเป็นจำนวนร้อยละ 62.1 (36 คนใน 58 คน) โดยผู้ป่วยร้อยละ 29.3 (17 คนใน 58 คน) มีน้ำหนักลดลงมากกว่าร้อยละ 5 ของน้ำหนักตัวเริ่มต้น ผู้ป่วยในมีอัตราในการลดน้ำหนักตัวสูงกว่าผู้ป่วยนอก กล่าวคือผู้ป่วยในจำนวน 14 คนใน 18 คน (ร้อยละ77.8) มีน้ำหนักตัวลดลง ส่วนผู้ป่วยนอกจำนวน 22 คนใน 40 คน (ร้อยละ55.0) มีน้ำหนักตัวลดลง ผู้ป่วยที่มีภาวะเมตาบอลิกซินโดรม (Metabolic syndrome)ขณะเริ่มต้นการวิจัยมีจำนวน 13 คน หลังได้รับการบริบาลทางเภสัชกรรมพบว่า ผู้ป่วยจำนวน 9 คน (ร้อยละ69.2) ภาวะนี้หายไป

จากผลการศึกษาสรุปว่าการให้บริบาลทางเภสัชกรรมแก่ผู้ป่วยจิตเภทที่มีภาวะอ้วนนั้นสามารถลดน้ำหนักตัวของผู้ป่วยลง และลดความเสี่ยงในการเกิดโรคแทรกซ้อนที่เกิดจากภาวะอ้วนได้

ภาควิชา……เภสัชกรรม……...ลายมือชื่อนิสิต……

สาขาวิชา……เภสัชกรรมคลินิก……ลายมือชื่ออาจารย์ที่ปรึกษา……

ปีการศึกษา……..2547…...……ลายมือชื่ออาจารย์ที่ปรึกษาร่วม……

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม……

4576555133: MAJOR CLINICAL PHARMACY

KEY WORD: OBESITY, SCHIZOPHRENIA, PHARMACEUTICAL CARE.

JINTANA PRATYASANTI: PHARMACEUTICAL CARE FOR OBESE SCHIZOPHRENIC PATIENTS AT SOMDET CHAOPRAYA INSTITUTE OF PSYCHIATRY. THESIS ADVISOR: ASSOCIATE PROFESSOR PRAPAPUCK SILAPACHOTE, M.Sc. in Pharm. THESIS CO-ADVISOR: ASSOCIATE PROFESSOR CHUTHAMANEE SUTHISISANG, Ph.D., THANAND PIYASIRISILP, M.D., Diplomate, Thai Board of Psychiatry. 195 PP. ISBN 974-53-1905-8

The objective of this study was to assess the effects of pharmaceutical care process provided to obese schizophrenic patients. Parameters used to evaluate the effectiveness of this process were body weight, body mass index (BMI), waist circumference and laboratory tests. This study was designed as a before-after experiment with no control group. The study was conducted in 58 obese (BMI $\geq$ 25 kg/m^2) schizophrenic patients at Somdet Chaopraya Institute of Psychiatry and were followed up for 5 visits with a one-month interval. The patients were provided with pharmaceutical care via the pharmacist activities including 1) identifying excess weight problems and metabolic problems by monitoring of weight, height, BMI, waist circumference and laboratory tests, which included FPG, HbA_{1c} and lipid profile (cholesterol, triglyceride, HDL-C and LDL-C), interviewing the patients and their relatives about the patient's eating pattern and physical activity 2) resolving and preventing excess weight problems and metabolic problems by advising patients and their relatives to control diet and exercise, discussing with dietitian to adjust caloric intake to 1,800 kcal per day, asking nurses to take care of patient's diet and intervention the metabolic problems to the psychiatrists.

The results of this study showed that 62.1% (36 of 58) of the patients could lose their weight at the end of the 4-month study. Furthermore, 29.3% (17 of 58) of the patients could lose their weight more than or equal to 5% of the baseline body weight. Inpatients could achieve their weight reduction for 14 of 18 (77.8%), whereas outpatients could achieve their weight reduction for only 22 of 40 (55%). Thirteen patients were diagnosed as having metabolic syndrome (defined by ATP III) at baseline evaluation. At the end of the study, 9 of 13 were without metabolic syndrome.

In conclusion, the pharmaceutical care for obese schizophrenic patients could reduce body weight, BMI and the risk of metabolic complications.

Department……...Pharmacy……..…...Student's signature…….

Field of study ……Clinical Pharmacy…….Advisor's signature…….

Academic year……..2004…….....Co-advisor's signature……

Co-advisor's signature……

Acknowledgements

First, I would like to express my sincere gratitude to Associate Professor Prapapuck Silapachote, my major advisor for her invaluable advice, continual guidance, kindness, enthusiastic encouragement throughout my study.

As for my co-advisor, Associate Professor Chuthamanee Suthisisang. I express my deep appreciation for her wonderful vision which helps sharpen my focus and the time she devoted to our discussion and her suggestions. My sincere and grateful appreciation also goes to Doctor Weerapon Unaharassamee and Doctor Thanand Piyasirisilp, for their kindness, special care, understanding and support throughout my study at Somdet Chaopraya Institute of Psychiatry. I am grateful to Doctor Noppawan Kittiwat, the endocrinologist, for her constructive comment concerning the medical treatment of the metabolic complications.

I wish to thank the psychiatrists, all staffs of inpatient department, outpatient department, clinical pathology department and pharmacy department of Somdet Chaopraya Institute of Psychiatry for their helpful co-operation and support in providing many facilities. I also wish to thank Ms. Pichitar Predarat, nutritionist, and P.Srikrit Company, Limited for their patients' dietary preparation and dietary suggestions. My honest thanks are extended to all patients and their relatives in my study for their generous co-operation and encouragement.

Unforgettably, I would like to thank Ms.Chandpen Tangtrakul, Associate Professor Titinun Auamnoy, Miss Atchara Thamtakerngkit and Miss Saisamorn Yenphasuk for all their encouragement and help throughout my study. My grateful appreciation to Mr. Ekarat Jantratid for his kindness, revision of this thesis and advice regarding English grammar.

Thanks also go to Somdet Chaopraya Institute of Psychiatry, Chulalongkorn University, AstraZeneca (Thailand), B L Hua & Co. Ltd, Novartis (Thailand) Ltd, Pfizer (Thailand) Ltd and Pharmina Co. Ltd for providing financial support.

Finally, I am most grateful to my beloved family for their love, understanding, encouragement and all supports through out my life.

CONTENTS

Page

Page

LIST OF TABLES

Table **Page**

Table **Page**

LIST OF FIGURES

Figure **Page**

LIST OF ABBREVIATIONS

5-HT	5-hydroxytryptamine (serotonin)
BMI	body mass index
BP	blood pressure
CHD	coronary heart disease
cm	centimeter
CNS	central nervous system
CT	computed tomography
DM	diabetes mellitus
FPG	fasting plasma glucose
H	histamine
HbA_{1c}	glucosylated hemoglobin
HDL-C	high density lipoprotein cholesterol
HMG-CoA	hydroxymethylglutaryl coenzyme A
IAF	intra-abdominal fat
IFG	impaired fasting glucose
IL-6	interleukin 6
IPD	inpatient department
kg/m^2	kilogram per square meter
LDL-C	low density lipoprotein cholesterol
mg/dl	miligram per deciliter
OPD	outpatient department
SSRIs	selective serotonin reuptake inhibitors
TG	triglyceride
TNF-α	tumor necrosis factor - α
VAT	visceral adipose tissue
WHR	waist to hip ratio

CHAPTER I

INTRODUCTION

Background and rational

Obesity refers to an excess of body fat **(1,2)**. The operational definition of obesity is based on body mass index (BMI) which is closely correlated with body fat **(3)**. BMI is defined as body weight in kilograms divided by height in meter squared (kg/m^2) **(4)**. Based on the WHO criteria, obesity is defined as a BMI of 30 or more **(2)**, while the Asia-Pacific criteria define the cut offs for obesity as a BMI of 25 or more **(3)**. The distribution of fat determines the risk associated with obesity. Abdominal or visceral fat (android obesity) is associated with type 2 diabetes mellitus (type 2 DM), hypertension and the cardiovascular risk factors of the metabolic syndrome. The simple clinical measure of visceral fat mass is waist circumference **(3)**. For Caucasians waist circumference of more than 102 cm in men and more than 88 cm in women increase cardiovascular risks **(2)**. However, for Asians, waist circumference of more than 90 cm in men and more than 80 cm in women is a marker for increase disease risks **(3)**.

For patients with schizophrenia, antipsychotic is the effective means of relieving psychotic symptoms and improving the quality of life. However, one of the undesired effects of many antipsychotic drugs is weight gain. Weight gain associated with drug use is quite common. Nearly 25% of all cases of obesity are drug-related **(5)**. The prevalence of obesity in pharmacologically treated psychiatric patients is 2 to 5 times greater than that in the general population **(6)**. This prevalence has been attributed to medication induced changes in appetite and increased consumption of sugars and consequent weight gain **(6)**. Weight gain has been reported during treatment with many of the conventional antipsychotic drugs, in particular thioridazine and chlorpromazine **(5)**, and most of

the novel atypical antipsychotic drugs including clozapine, olanzapine, risperidone and quetiapine **(5,7-9)**. Among them, clozapine and olanzapine appear to have the greatest potential to induce weight gain. Allison et al. reported that clozapine and olanzapine caused the greatest mean weight gain as 4.45 kg and 4.15 kg, respectively, after 10 weeks of treatment at a standard dose **(10)**. Importantly, excessive weight gain has adverse implication for schizophrenic patients' health through its effect on medication compliance **(11)**. In addition, obesity and weight gain have been associated with hypertension, type 2 DM, coronary heart disease, stroke, gallbladder disease, sleep apnea, osteoarthritis and some types of cancer (endometrial, breast, prostate and colon) **(10,12)**.

In a preliminary study performed in inpatients at Somdet Chaopraya Institute of Psychiatry during 19 May to 30 June 2003 **(13)**, it was found that 45 of 159 (28.3%) schizophrenic inpatients were obese. However, obese schizophrenic patients have a chance of noncompliance and have an elevated risk from all cause mortality. Therefore, these patients should obtain appropriate monitoring of BMI, waist circumference, FPG and lipid profile. In other words, pharmaceutical care should be provided in the hospital to increase the quality of care to these patients. Pharmaceutical care has been defined as the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life **(14)**.

Thus, in this study the assessment of the pharmaceutical care process was performed at Somdet Chaopraya Institute of Psychiatry. We hypothesized that patients who received pharmaceutical care process will lose their excess weight and improve their metabolic complications. The patients will receive pharmaceutical care process including 1) identifying excess weight problems and metabolic problems by measuring weight, height, waist circumference, blood pressure, calculating BMI, monitoring for laboratory test including FPG, HbA_{1c} and lipid profile (cholesterol, triglyceride, HDL-C, LDL-C), assessing CHD risk and interviewing the patients and

their relatives about the eating pattern and physical activity. 2) resolving and preventing excess weight problems and metabolic problems by educating patients and relatives about diet control and exercise, controlling caloric diet during admission in the hospital, asking nurses to take care of patients' diet besides hospital diet and intervening the metabolic problems to the psychiatrists. Finally, we expected that implementation of these pharmaceutical care process would raise the effectiveness of quality of care for patients in Somdet Chaopraya Institute of Psychiatry and it can also be used as a prototype for schizophrenic care.

Objective

To assess the effects of pharmaceutical care process provided to obese schizophrenic patients at Somdet Chaopraya Institute of Psychiatry by comparing their weight, BMI, waist circumference and laboratory tests before and after the pharmaceutical care process.

Benefits

1. Obese schizophrenic patients were taken care for excess weight and metabolic problems.
2. The model of pharmaceutical care process for obese schizophrenic patients is developed and can be further implemented in Somdet Chaopraya Institute of Psychiatry.

CHAPTER 2

LITERATURE REVIEW

Obesity

Obesity refers to an excess of body fat **(1,2,4)**. The operational definition of obesity is based on body mass index (BMI) value **(3)**. BMI is defined as weight in kilograms divided by height in meter squared (kg/m^2) **(4)**. The World Health Organization (WHO) **(2)** consultation on obesity proposed a system of classification base on BMI as presented in table 1, which obesity is defined as BMI $\geq$ 30 kg/m^2. However, the Asia-Pacific region **(3)** has different ranges for classification of BMI as presented in table 2. The cut off for Asian obese person is in general defined as BMI $\geq$ 25 kg/m^2. The distribution of fat regionally in the body has an important effect on the mortality of obese individuals **(4)**. Central or android distribution of body fat is associated with the cardiovascular risk factors of the metabolic syndrome **(3)**. These risk factors include impaired glucose tolerance, type 2 DM, hypertension and dyslipidemia (high triglyceride, low HDL-C) **(3)**. In contrast, a gynoid (gluteofemoral) distribution of fat has a lower risk of mortality for the same degree of adiposity **(3)**. The simple clinical measuring of visceral fat mass is waist circumference **(3)**. Abdominal obesity for Europeans, determined by waist circumference is equal or more than 102 cm in men and 88 cm in women **(2)**. For the abdominal obesity in Asians, waist circumference is equal or more than 90 cm in men and 80 cm in women **(3)**. The co-morbidities risks in adult Europeans and Asians for different level of BMI and waist circumference are presented in table 3 and table 4.

Table 1 Classification of weight by BMI in adult Europeans **(2)**

Classification	**BMI (kg/m^2)**
Underweight	< 18.5
Normal	18.5-24.9
Overweight	25-29.9
Obesity	
• Obese I	30-34.9
• Obese II	35-39.9
• Obese III	≥ 40

Table 2 Classification of weight by BMI in adult Asians **(3)**

Classification	**BMI (kg/m^2)**
Underweight	< 18.5
Normal	18.5-22.9
Overweight	23-24.9
Obesity	
• Obese I	25-29.9
• Obese II	≥ 30

Table 3 Classification of weight and obesity by BMI, waist circumference and associated disease risks* in adult Europeans **(2)**

Classification	**BMI (kg/m^2)**	**Disease risks***	
		Waist circumference	
		< 102 cm. (men) **< 88 cm. (women)**	**≥ 102 cm. (men)** **≥ 88 cm. (women)**
Underweight	< 18.5	-	-
Normal	18.5-24.9	-	-
Overweight	25-29.9	Increased	High
Obesity			
• Obese I	30-34.9	High	Very high
• Obese II	35-39.9	Very high	Very high
• Obese III	≥ 40	Extremely high	Extremely high

Disease risks* for type 2 DM, hypertension and CVD

Table 4 Classification of weight and obesity by BMI, waist circumference and associated disease risks* in adult Asians **(3)**

Classification	**BMI** (kg/m^2)	**Disease risks***	
		Waist circumference	
		< 90 cm. (men) < 80 cm. (women)	**≥ 90 cm. (men)** ≥ 80 cm. (women)
Underweight	< 18.5	Low	Average
Normal	18.5-22.9	Average	Increased
Overweight	23-24.9	Increased	Moderate
Obesity			
• Obese I	25-29.9	Moderate	Severe
• Obese II	≥ 30	Severe	Very severe

Disease risks* for type 2 DM, hypertension and CVD

Obesity-associated diseases

Obese patients generally have elevated risks that possibly cause mortality. The risk of 1.9 was reported among both men and women who were more than 40% of the average weight in a large-scale prospective study of 750,000 individuals **(3)**. Most evidence suggests a J-shaped relationship between BMI and mortality **(3,4)** as shown in figure 1. The relative risks between BMI and the incidence of type 2 DM, hypertension, coronary heart disease and choletithiasis **(15)** were presented in figure 2. In addition, approximate relative risks among the obese for several health problems have recently been reported by WHO **(3)** as shown in table 5.

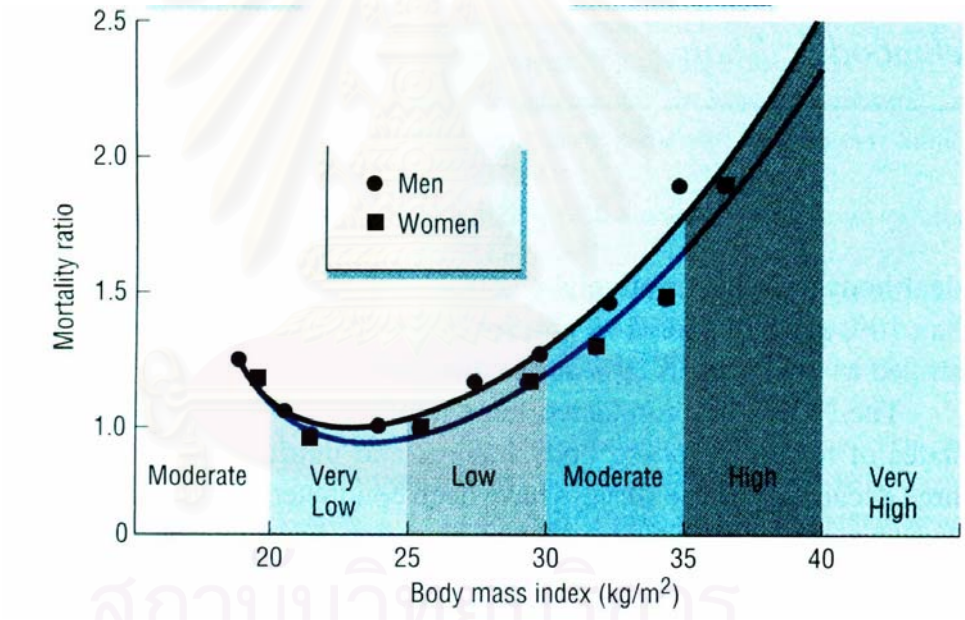

Figure 1 Mortality ratio and body mass index **(4)**

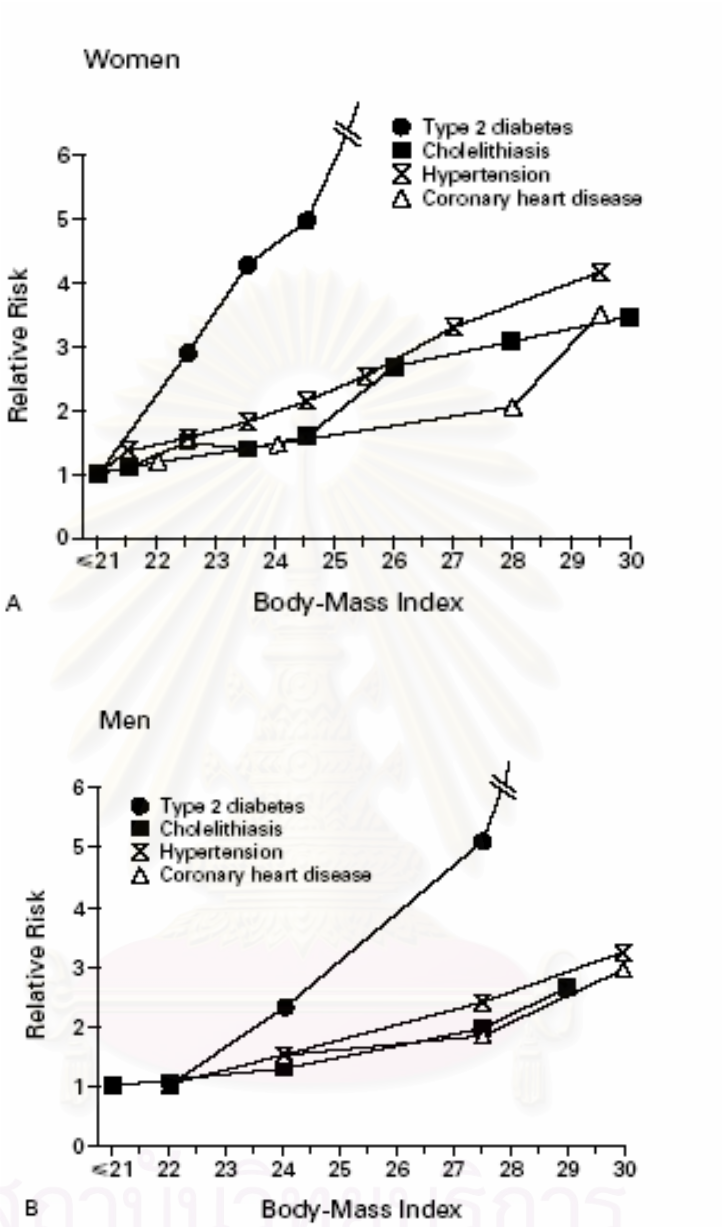

Figure 2 Relation between body mass index and the relative risks of type 2 DM, hypertension, coronary heart disease and cholelithiasis **(15)**

Table 5 Health risks associated with obesity **(3)**

Greatly increased (RR*>>3)	**Moderately increased (RR* 2-3)**	**Mildly increased (RR* 1-2)**
- Type 2 DM - Gallbladder diseases - Dyslipidaemia - Metabolic Syndrome - Breathlessness - Sleep apnea	- Coronary heart disease - Hypertension - Osteoarthritis (knees and hips) - Hyperuricaemia and gout	- Cancer (breast cancer in postmenopausal women, endometrial cancer, colon cancer) - Reproductive hormone abnormalities - Polycystic ovary syndrome - Impaired fertility - Low back pain

RR*= relative risks are approximate

Metabolic syndrome

The metabolic syndrome, a concurrence of disturbed glucose and insulin metabolism, overweight and abdominal fat distribution, mild dyslipidemia and hypertension, is one of the most important morbid conditions because of its association with subsequent development of type 2 DM and cardiovascular diseases (CVD) **(3,16)**. The pathogenesis of this syndrome has multiple origins. Obesity and sedentary lifestyle coupled with diet and still largely unknown genetic factors clearly interact to produce the syndrome **(16)**. The metabolic syndrome as defined by the Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High blood Cholesterol in Adults (Adult Treatment Panel III, or ATP III) is three or more of risk factors as shown in table 6. The Adult Treatment Panel III (ATP III) recognizes the metabolic syndrome as a secondary target of risk-reduction therapy, after the primary target, LDL-C **(17)**. From prospective cohort study of 1,209 Finnish men aged 42 to 60 years at baseline, the median follow-up for survivors was 11.6 years **(16)**. It was found that the metabolic syndrome was associated with 2.4 to 3.4 folds higher mortality from CHD than normal population **(16)**. Another large Finnish and Swedish study found that cardiovascular mortality was markedly increased in subjects with the metabolic syndrome (12.0 VS 2.2%, $p<0.001$). In addition, the risk for coronary heart disease and stroke was increased 3 folds in subjects with metabolic syndrome ($p<0.001$) **(18)**.

Table 6 Clinical identification of the metabolic syndrome* **(19)**

Risk factor	Defining level
1) Waist circumference	
- Men	> 102 cm
- Women	> 88 cm
2) Triglyceride	≥ 150 mg/dl
3) HDL-C	
- Men	< 40 mg/dl
- Women	< 50 mg/dl
4) Blood pressure	≥ 130/85 mmHg
5) Fasting glucose	≥ 110 mg/dl

* Diagnosis is established when ≥ 3 of these risk factors are presented.

Schizophrenic patients and weight gain

1) Antipsychotic drugs-induced weight gain

There were many reports of weight gain induced by conventional antipsychotic drugs, in particular thioridazine and chlorpromazine **(20)** and by most of the novel atypical antipsychotic drugs including clozapine, olanzapine, risperidone and quetiapine **(5,7-9)**. Some key studies were shown in table 7. Clozapine and olanzapine appeared to have the greatest potential to induce weight gain for short term and long term treatment **(10,21-26)**. Allison et al.**(10)** meta-analyzed 81 treatment trials of at least 10 weeks in duration, they found that clozapine and olanzapine caused the greatest mean weight gain of 4.45 kg and 4.15 kg, respectively, while risperidone, haloperidol, ziprasidone and placebo caused mean weight gain of 2.1 kg, 1.08 kg, 0.04 kg and -0.74 kg, respectively. Similarly, Simpson et al. **(21)** reported that olanzapine, clozapine induced weight gain of 0.76 kg/week and

0.22 kg/week, respectively. In addition, Bobes J et al. **(22)** showed that proportion of patients with clinically relevant weight gain ($\geq$ 7% increase versus initial weight) was also higher with olanzapine (102 of 223; 45.7%) than with risperidone (70 of 229; 30.6%) and haloperidol (28 of 125; 22.4%) when patients received a single antipsychotic drug for at least 4 weeks. For long term treatment, clozapine and olanzapine also caused the greatest weight gain **(23-25)**. Meyer et al.**(24)** found that patients who treated with olanzapine gained weight 8 kg from baseline body weight while patients who treated with risperidone gained weight 4.9 kg from baseline body weight at 1 year treatment. Likewise, Kinon et al. **(25)** showed that mean weight gain for olanzapine treated patients was 6.26 kg within approximately 2.54 years. This was significantly higher than that for haloperidol treated patients, whose mean weight gain was 0.69 kg after 1.15 years ($p<0.001$). In addition, olanzapine- and clozapine-treated patients continued to gain weight over a longer period (about 20 weeks for olanzapine and clozapine **(23)**, 39 weeks for olanzapine **(25)**). However, risperidone-treated subjects reached a weight plateau after a comparatively short initial time period (about 10 weeks) **(23)**.

In addition, some schizophrenic patients also received concurrent medication including mood stabilizers (lithium, valproate, carbamazepine) and selective serotonin reuptake inhibitors (SSRIs). These medication were capable of increasing body weight **(27-34)**. Body weight gain is one of the most common adverse effects of long term lithium therapy **(27)**. Vestergaard P et al. **(28)** reported that three-fourth of the patients who received lithium treatment gained weight. The average weight gain was about 4 kg. Some studies showed that up to one half of patients gained weight (average, 5 to 10 kg) **(29)**. A weight gain of 10 kg or more was observed in 21% of patients, of 20 kg or more in 2% **(28)**. The same frequency was found in previous study **(30)**, in which the patients weighed themselves in their homes. 20% of the patients reported weight gain exceeding 10 kg during lithium treatment.

The body weight increased most within the first 1 to 2 years of the lithium treatment **(28)**. Valproate induced body weight gain is often clinically relevant **(31)**. The reported incidence in consecutive studies varied from 4 to 71% of the different patient populations **(31)**. After 32 weeks of treatment with valproate, 28 of 45 (62%) adult patients treated with valproate gained weight (defined as weight gain of $\geq$ 4 kg) **(32)** and mean weight gain among valproate-treated patients was 5.8±4.2 kg. In addition, weight gain associated with valproate was significant within 10 weeks after initiating therapy and it continued throughout the study **(32)**. Isojarvi et al. showed that 59% of the women on valproate were obese and in a retrospective analysis weight gain (mean, 21 kg; range, 8-49 kg) was found in 50% of the women taking valproate **(32)**. Body weight gain during carbamazepine therapy has been reported in very few studies: 2% in a study of 300 patients; 9% in a study of 480 patients and 14% in a study of 300 patients **(31)**. In addition, Isojarvi et al.**(33)** reported obesity in 28% of the patients taking carbamazepine. Interestingly, selective serotonin reuptake inhibitors (SSRIs) caused more weight loss during short-term treatment but led to more weight gain during long-term treatment **(34)**. Retrospectively analyzed data from clinical trials showed that SSRIs-treated patients gained 17.9% of baseline body weight for long term treatment of 16-46 weeks **(34)**. Ameringen et al. **(35)** found that the mean weight gain on SSRIs treatment was 13.0±8.4 kg with a range of 4.5 to 30 kg. In addition, the mean duration of the SSRIs treatment that induced weight gain was 12.9±14.0 months **(35)**.

Besides, the psychotropic drugs that induce weight gain in schizophrenic patients, schizophrenia it self can also induce weight gain in these patients. Schizophrenic patients usually prefer diet that is higher in fat and lower in fiber than normal population and take less exercise **(36,37)**. The negative symptoms of the illness itself embrace reduced motivation and social withdrawal. This could also result in weight gain in schizophrenic patients **(37)**.

Table 7 Comparative weight gain liability

Study	Sample	Method	Treatment	Duration	Finding
Allison and others (10)	Not reported by authors	Meta-analysis	81 trails of conventional and atypical antipsychotic drugs	10 weeks	Mean weight increased from baseline: Clozapine 4.45 kg, olanzapine 4.15 kg risperidone 2.10 kg, haloperidol 1.08 kg ziprasidone 0.04 kg, molindone -0.39 kg placebo -0.74 kg
Simpson and others (21)	121 schizophrenia	Retrospective	- Antipsychotic drugs free - Typical antipsychotic drugs - Atypical antipsychotic drugs 1) Olanzapine 2) Clozapine 3) Risperidone	≥ 2 weeks	Mean weight increased from baseline: - Atypical antipsychotic drugs 0.4 kg/week 1) Olanzapine 0.76 kg/week 2) Clozapine 0.22 kg/week 3) Risperidone 0.15 kg/week - Typical antipsychotic drugs 0.27 kg/week - Antipsychotic drugs free 0.09 kg/week - Treatment with both olanzapine and clozapine caused significantly higher weekly weight gain than antipsychotic drugs free treatment (p= 0.001 and p= 0.036, respectively
Bobes and others (22)	636 schizophrenia	Cross-sectional	- Risperidone - Olanzapine - Quetiapine - Haloperidol	≥ 4 months	Clinically relevant weight gain (≥ 7% increase versus initial weight) - Olanzapine 45.7% - Risperidone 30.6% - Haloperidol 22.4% (Data for quetiapine were not conclusive because of the short duration of treatment)
Wirshing and others (23)	92 male schizophrenic patients	Retrospective	- 5 antipsychotic drugs	6 years	Olanzapine, clozapine > risperidone > haloperidol > sertindone
Meyer (24)	94 patients who were treated during July and August 1999 with either risperidone or olanzapine	Retrospective	- Risperidone - Olanzapine	1 years	Olanzapine patients gained 8 kg from baseline body weight. Risperidone patients gained 4.9 kg from baseline body weight.
Kinon (25)	676 schizophrenic patients, schizophreniform disorder	Retrospective	- Olanzapine - Haloperidol	2.5-3 years 1.9 years	Mean weight increased from baseline: - Olanzapine 6.26 kg - Haloperidol 0.69 kg
Lee and other (26)	48 patients who were treated during May and June 2002 with either olanzapine or risperidone	Retrospective	- Olanzapine - Risperidone	2 years	Mean weight increased from baseline: - Olanzapine 8.34 ± 5.97 kg - Risperidone 2.74 ± 8.09 kg

2) Mechanisms of antipsychotic drugs-induced weight gain

Antipsychotic drugs-induced weight gain has been associated with the interferences of various neurotransmitters and hormones in the brain such as dopamine, serotonin, histamine and prolactin **(23,38-41)**. It is generally accepted that antagonism at central dopaminergic D_2 receptors is a key factor in the treatment of schizophrenia by conventional antipsychotic drugs **(42)**. Atypical antipsychotic drugs tend to be characterized by having combined antagonist activity at both D_2 and 5-HT_{2A} receptors **(42)**. The summary of the relative receptor activities of various antipsychotic drugs is presented in table 8 **(23)**. The possible relationships of the various neurotransmitter receptor activities of antipsychotic drugs to weight gain and to other potential side effects are summarized in table 9 **(42)**. From animal models, it was shown that 5-HT_{1A} agonists and 5-$HT_{2C/2A}$ antagonists caused a marked increase in feeding **(23,43)**. Clozapine and olanzapine are potent 5-HT_{2C} and 5-HT_{2A} antagonists **(23,38)** and these two drugs can cause marked increase in body weight **(39,40)**. Histamine H_1 receptor antagonism also increased feeding and weight gain **(40)**. Wirshing et al. **(23)** found that the weight gain liabilities of antipsychotic drugs appeared to be correlated with their relative affinities for the histamine H_1 receptor. Antipsychotic drugs with the maximum weight gain liabilities (i.e. clozapine and olanzapine) had the greatest affinities for the H_1 receptor, while those with the least amount of weight gain (i.e. haloperidol) had the weakest affinity **(23)**. Elevated prolactin levels associated with the treatment with conventional antipsychotic drugs and risperidone may promote weight gain **(44)**. Baptista et al. reported a significant positive correlation between serum prolactin levels and BMI in psychotic men under long-term antipsychotic treatment ($p=0.04$) and marginally significant correlation in women ($p=0.08$) **(41)**. In women, they could be related to an increase in the androgenic index because hyperprolactinaemia decreases gonadal steroid synthesis and increases adrenal androgen production **(41)**.

Interestingly, some patients gain weight while other do not when being treated with clozapine and other antipsychotic drugs. Reynolds et al. found that patients with -759 T variant allele of 5-HT_{2C} receptor had significantly less weight gain than in those without this allele **(45)**. Basile et al. **(43)** investigated the common cysteine to serine amino acid substitution at position 23 of the 5-HT_{2C} protein (Cys23Ser), and it was found that receptors with the serine variant showed higher in vitro affinity for m-chlorophenylpiperazine (m-CCP), a 5-HT_{2C} selective agonist. There was a trend for patients carrying only the serine variant to have higher mean weight gain following treatment with clozapine **(43)**.

Table 8 Binding affinity in vitro of antipsychotic drugs for neurotransmitter receptor subtypes **(23)**.

Drug	**5-HT_{2A}**	**5-HT_{2C}**	**D_{2L}**	**D_{2S}**	**α_1**	**H_1**
Clozapine	9.6	13	192	147	23	0.23
Olanzapine	2.5	7.1	31	21	60	0.65
Risperidone	0.52	48	5.9	6.2	2.3	20
Haloperidol	196	> 10,000	2.2	1.8	19	790

Binding affinity (K_i) values are shown in n mol/L.
K_i values determined by competition with radioligrands for binding to the indicated receptors

Table 9 Clinical implications of various receptor activities of antipsychotic drugs*

Receptor Activity	Possible Clinical Effects
D_2 receptor antagonist	Antipsychotic activity (positive symptoms), EPS, endocrine effects
5-HT_{2A} receptor antagonist	Antipsychotic activity (negative symptoms), reduced EPS
5-HT_{2C} receptor antagonist	Improved antipsychotic efficacy (positive Symptoms), body weight gain
α_1-adrenoceptor antagonist	Sedative and hypotension, effect on body weight gain
H_1-Histamine receptor Antagonist	Sedative and body weight gain

*Adapt from ref **(42)**

Non-pharmacologic management of weight gain

Weight gain are frequently cited as major causes of noncompliance **(11,46)** and it increases the risk of metabolic syndrome **(47)** and other medical problems including osteoarthritis, sleep apnea and cancers (endometrial, breast, prostate and colon cancers) **(10,12)**. Early intervention is the key for preventing significant drug-related weight gain and treating obesity if it occurs **(47)**. A reasonable weight loss is to achieve a 5-10% reduction in baseline body weight because at this level of weight loss there will be at least 30% of visceral adipose tissue loss **(48)** and will have approximately 12% decrease in mortality **(49)**. In addition, glycemic control, blood pressure, lipid profile and insulin sensitivity will also be improved **(48,49)**.

Weight management strategies should combine with modification of diet, physical activity and behavior modification **(3,47)**.

1) Modification of diet

Among patients taking psychotropic drugs, weight gain normally results from too many high fat, high calorie foods intake **(47)**. Therefore, the first step in losing weight is to restrict the amount of high fat and high calorie foods. The diet should be restricted for fats, oils, sweets, soft drink, alcohol and emphasize fruits, vegetables and fiber-rich foods **(3,47)**. The second step, distribution of food intake should be as even as possible throughout the day and meals should not be skipped **(3)**. The third step, meals should be adequately sized so that snacks are not needed between meals **(3)**. The fourth step, it is typically recommended that 55% of calories of food intakes should be from carbohydrates, about 15% to 20% from protein and roughly 25% to 30% from fat **(3)**. Many studies demonstrated that obese adults can lose about 0.5 kg per week by decreasing their daily intake for 500 to 1000 kcal below the calorie intake required in order to maintain their current weight **(50)**.

2) Physical activity

Physical activity is the most important modality for weight control. It is a powerful predictor of weight control success **(47)**. Physical activity can be divided into two types **(51)**.

2.1) Programmed activity

Programmed activity is typically planned, aerobic and completed in a single bout (e.g. biking and aerobics classes) **(51)**.

2.2) Lifestyle activity

Lifestyle activity involves increasing energy expenditure throughout the day by methods such as using stairs rather than escalators **(51)**, walking to the shop or office instead of taking a bus or driving, finding some household task to do instead of watching television **(52)**. Walking is one of the best and easiest physical activities for patients to do **(47)**. Even if patients walk for only 20 to 30 minutes 3 times a week, they will still benefit **(47)**.

3) Behavior modification

Behavior modification is required to change eating habits **(47)**. The behavior modification technique involves identifying the eating or related lifestyle behavior to be modified, setting specific goals, modifying determinants of the behavior to be changed and reinforcing the desired behavior **(47,51)**.

Pharmaceutical care

Pharmaceutical care is a practice in which the practitioner takes responsibility for a patient's drug-related needs and is held accountable for this commitment **(53)**. Pharmaceutical care involves the process through which a pharmacist cooperates with a patient and other professionals in designing, implementing and monitoring a therapeutic plan that will produce specific therapeutic outcomes for the patients **(14)**. This in turn involves three major functions: 1) identifying potential and actual drug-related problems 2) resolving actual drug-related problems 3) preventing potential drug-related problems **(14)**. Problem resolution and prevention lead to the design, implementation and monitoring of a therapeutic plan that the pharmacist believe will optimally accomplish the therapeutic object **(14)**. The safety profile of the medication is a one of drug-related needs of patients **(53)**. Weight gain is an adverse drug reaction for schizophrenic patients who receive antipsychotic drugs. Therefore, pharmacist should play a role to identify, resolve and prevent weight gain and metabolic problems in these patients. Base on literature searches, medical programs for obese schizophrenic patients **(54-56)** have been provided as shown in table 10. However, the report on pharmaceutical care process in this group of patients cannot be found in the available database. Therefore, this study was designed to assess the result of pharmaceutical care process provided to obese schizophrenic patients.

Table 10 Summary of medical programs for obese schizophrenic patients

Study	Sample	Inclusion or exclusion criteria	time	Intervention	Results
Menza and others (54)	- Study group, 31 schizaphrenia or schizoaffictive - Control group, 20 patients on treatment with atypical antipsychotic drugs	- Received atypical antipsychotic drug $\geq$ 3 months and BMI $\geq$ 26 kg/m^2 or a self reported weight gain of 2.3 kg or more within 2 month of beginning treatment with an atypical agent	12 months	1) Nutrition counseling 2) Exercise 3) Behavioral interventions	1) Statistically significant pre-post improvements in weight ($p<0.2$), BMI ($p<0.02$), HbA_{1C} ($p<0.01$), diastolic ($p<0.01$) and systolic blood pressure ($p<0.05$) 2) Weight and BMI decreased significantly ($p<0.01$) in the intervention group compared with control group
Aquila and others (55)	- 32 inpatients who had been on treatment with atypical antipsychotic drugs for at least 1 year	No	18 months	1) Provided a low-fat, low-caloric diet (2,000 calories)	1) No significant change in mean body weight at 12 and 18 months after initiation of intervention 2) Weight gain was observed in only 30% of study patients after the intervention as opposed to 71% at the start of the study.
Ball and others (56)	- Study group, 4 women and 7 men who treated with olanzapine - Control group, 4 women and 7 men who treated with olanzapine (matched comparison group in outpatients)	Inclusion criteria - Outpatients who had been treated with olanzapine for at least six months at a dosage of 15 to 40 mg daily and who had gained at least 7% of their pretreatment weight Exclusion criteria - Use of other medications for which weight gain is a side effect	10 weeks	1) Patients were taught to evaluate food choice 2) Exercise sessions were scheduled three times a week 3) A parent or caregiver was asked to supervise each patient's diet and exercise at home	No significant difference were noted in weight change between two groups

CHAPTER III

MATERIALS AND METHODS

Materials

1. Patients' OPD card, inpatient charts and laboratory report forms
2. Physician balance beam scale
3. Standard measurement tape
4. Mercury sphygmomanometer
5. Data collection form (Appendix I)
6. SOAP form (Appendix II)
7. Food intake diary (Appendix III)
8. Booklet (Appendix IV)

Methods

1. Definitions

1.1 Pharmaceutical care for obese schizophrenic patients means identifying, resolving and preventing antipsychotic drugs-induced weight gain problems and metabolic complications and intervening the metabolic problems to the psychiatrists.

1.2 Metabolic complications or metabolic problems mean dyslipidemia, type 2 DM and metabolic syndrome.

1.3 Obese schizophrenic patients mean patients who were diagnosed as schizophrenia by the psychiatrist and had BMI $\geq$ 25 kg/m^2.

1.4 Inpatients or IPD patients mean patients who admitted to the hospital throughout the study.

1.5 Outpatients or OPD patients mean patients who admitted to the hospital at the first visit but received treatment from OPD at the following visits.

2. Study design

This study was a before-after experimental design with no control group.

3. Patients

Schizophrenic patients who admitted at Somdet Chaopraya Institute of Psychiatry were recruited during December 2003 to August 2004. The inclusion and exclusion criteria of these patients were as the following:

Inclusion criteria

1. Schizophrenic patients who have BMI $\geq$ 25 kg/m^2
2. Schizophrenic patients who are in age range between 15-65 years
3. Schizophrenic patients who are willing to join the research or their relatives sign their names in the consent forms.

Exclusion criteria

1. Schizophrenic patients who are diagnosed as Cushing's syndrome
2. Schizophrenic patients who do not have any relatives to take care of them after being discharged from the hospital

4. Sample size estimation

The number of sample was calculated based on one sample between paired observations by using the following formula **(57)**:

$$ES = \frac{m_x - m_y}{\delta}$$

ES = the effect size (unpaired t- test)

m_x = mean value of X

m_y = mean value of Y

δ = standard deviation

$$d = \frac{ES}{\sqrt{1-r}}$$

$$n = \frac{n_{0.10}}{100\ d^2} + 1$$

d = the effect size (paired t-test)

ES = the effect size (unpaired t- test)

ES = 0.5 (medium effect size)

r = correlation between pre and post observation,

r = 0.1 for maximum sample size

n = sample size

$n_{0.10}$= value from the table that α= 0.05 (2 tail) and power =0.8,

$n_{0.10}$ = 1571 (Appendix V).

$$d = \frac{0.5}{\sqrt{1-0.1}}$$

$$d = \frac{0.5}{0.95} = 0.53$$

$$n = \frac{1571}{100X\ 0.53^2} + 1$$

$$= 55.93+1$$

$$= 56.93 \approx 57 \text{ cases}$$

Since drop out rate of 20% were expected, totally 74 patients were recruited into the study.

5. Sampling method

Convenient sampling was used by recruiting obese schizophrenic patients treated by psychiatrists who were also the investigator in this study. The recruited obese cases must be admitted at the study wards. The study wards were Banburee, Maliwan, Jamjuree, Puangchompu, Laddawan, Rajaprueng 2, Rajaprueng 3, Rodsukon, Fuengfa and Ratree.

6. Ethical issue

The protocol of the study was approved by the Ethic Committee of Somdet Chaopraya Institute of Psychiatry prior to the beginning of the study.

7. Methods

7.1. Pre-study period

7.1.1. Literatures on antipsychotic drug-induced weight gain and how to manage obesity associated with antipsychotic uses were reviewed.

7.1.2. The preliminary study to identify the prevalence of obese patients at Somdet Chaopraya Institute of Psychiatry was performed.

7.1.3. Booklets containing knowledge about definition of obesity, health risks of obesity and strategies for weight loss by dietary therapy and physical activity were developed.

7.1.4. Prepared the data collection form, SOAP form and food intake diary.

7.2. Study period

Schizophrenic patients were diagnosed by the psychiatrist of Somdet Chaopraya Institute of Psychiatry. The enrolled patients and relatives were fully explained in terms of the study objectives, procedures and had signed their names

in the consent forms. The enrolled patients were followed up for 5 visits with one-month interval. When the patients were discharged from the hospital before the end of the study, they were followed up by the pharmacist at OPD visit. However, the pharmaceutical care process in outpatients was the same as that for inpatients.

Study procedure at each visit

1. Visit 1

1.1 Patient's OPD cards, inpatient charts and current drug list were reviewed.

1.2 Patients and relatives were interviewed to gather demographic data, family history, social history, drug and food allergy history and medication history.

1.3 Patients were monitored

1.3.1 Weight, height, BMI, waist circumference and blood pressure.

1.3.2 Laboratory test including FPG, HbA_{1c} and lipid profile (cholesterol, triglyceride, HDL-C and LDL-C).

1.4 Patients were assessing CHD risk. The assessment and categorization of the patient's CHD risk was shown in appendix VI.

1.5 Identifying, resolving and preventing excess weight problems (figure 3) were conducted.

1.6 Identifying, resolving and preventing metabolic problems were conducted.

1.7 The metabolic problems were intervened to the psychiatrist.

2. Visit 2-5

2.1 Patient's OPD cards, inpatient charts and current drug list were reviewed.

2.2 Patients were monitored

2.2.1 Weight, height, BMI and waist circumference.

2.2.2 Laboratory test including FPG, HbA_{1c} and lipid profile (except monitoring HbA_{1c} and lipid profile only at visit 3 and 5).

2.3 Patients who had no CHD and $\geq$ 2 risk factors at visit 1 were assessed CHD risk at visit 5.

2.4 New or existed excess weight problems were identified, resolved and prevented.

2.5 New or existed metabolic problems were identified, resolved and prevented.

2.6 At visit 5, the pharmacist concluded overall problems of excess weight problems and metabolic problems to the psychiatrists.

Study procedure at each visit was presented in table 11 and figure 4.

1) Identifying excess weight problems

1.1 Interviewed the patients and their relatives about

1.1.1 The eating pattern including type, amount, frequency and timing of meals, snacks and soft drink

1.1.2 Physical activity including type, duration and frequency of exercise

1.2 Asked nurse to record patient's information about food intake in one day in the food intake diary form (appendix III)

2) Resolving and preventing excess weight problems

2.1 Advised patients and their relatives about the dangers of excess weight and healthful of weight loss

2.2 Set target of weight reduction with patients and their relatives. In general, the target of weight loss was set at 5% weight loss from initial body weight.

2.3 Advised patients and their relatives about management of obesity by dietary modification and physical activity (as shown in appendix VII)

2.4 Calculated suitable food exchange list for patients, noted the favorite food and non favorite food of each patient and then discussed with dietitian to adjust caloric intake to 1,800 kcal/day. Calculation of food exchange list was shown in appendix VIII.

2.5 Encouraged the patients to exercise for at least 10-20 minutes every morning

2.6 Asked nurse to take care of patient's diet besides hospital diet especially, the patients who were non-complied with the diet control

2.7 Discussed problems and set plan with the patients, relatives and psychiatrists to resolve and prevent the problems

Figure 3 Steps of the identifying, resolving and preventing excess weight problems

Table 11 Visit schedule and parameter determination

Parameter	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5
■ Patient's data records					
- demographic data	✓				
- family history	✓				
- social history	✓				
- drug/food allergy history	✓				
- medication history	✓				
- current drug use	✓	✓	✓	✓	✓
■ Weight, height, waist circumference, blood pressure measurement and BMI calculation	✓	✓	✓	✓	✓
■ Laboratory monitoring					
- FPG	✓	✓	✓	✓	✓
- HbA_{1c}	✓		✓		✓
- Lipid profile	✓		✓		✓
■ Assessment of CHD risk*	✓				✓
Pharmaceutical care					
■ Identifying, resolving and preventing excess weight problems	✓	✓	✓	✓	✓
■ Identifying, resolving and preventing metabolic problems	✓	✓	✓	✓	✓
■ Intervention to psychiatrist	✓				
■ Providing of booklet					

*Patients who had no CHD and ≥ 2 risk factors at visit 1 were assessed CHD risk at visit 5.

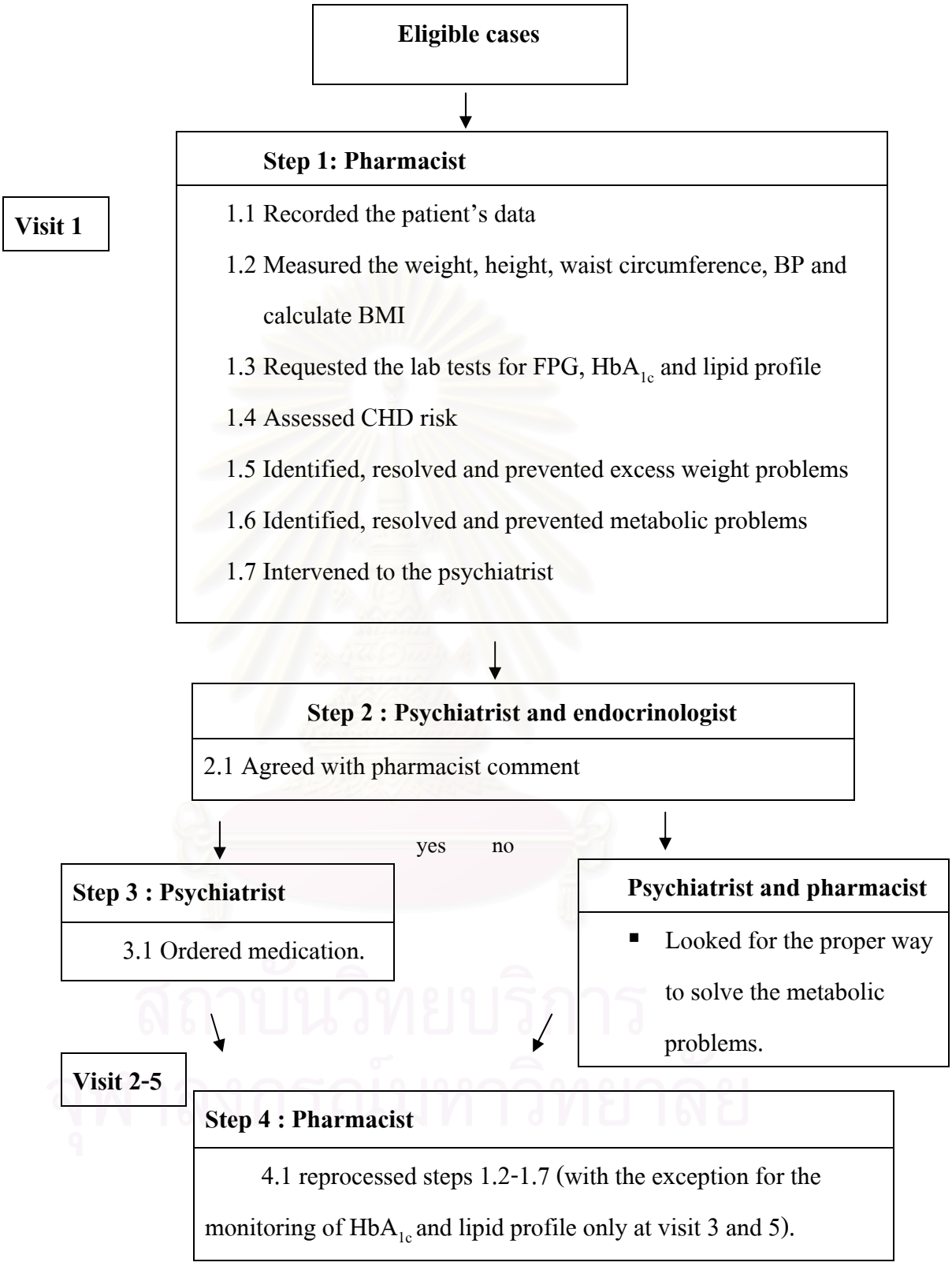

Figure 4 Workflow of the study

7.3. Instructions for measuring waist circumference, according to NHANES III protocol **(2)**.

The subjects stand and the examiner positioned at the right of them. The examiner palpated the upper hip bone to locate the right iliac crest. The standard measurement tape is placed in a horizontal plane around uppermost lateral border of the right iliac crest on the right side of the trunk. The plane of the tape is parallel to the floor. The tape is snug and does not compress the skin. The measurement is made at a normal minimal respiration.

8. Data collection

The following data were recorded in data collection form.

8.1. Patient's data

- Demographic data

  Name, hospital number, date on this admission, sex, age, status, education, address, phone number and number of year since schizophrenia were diagnosed

- Family history
- Social history
- Drug and food allergy history
- Medication history
- Current drug list

8.2. Dietary and physical activity data

Eating patterns including type, amount of food and mealtime and physical activity patterns including type, duration and frequency of exercise were recorded.

8.3. Clinical outcome data

- Weight, height, waist circumference, BP and BMI
- FPG, HbA_{1c} and lipid profile

8.4. Metabolic problems

9. Data analysis

The following data obtained were analyzed:

9.1. Prevalence of obese schizophrenic inpatients in Somdet Chaopraya Institute of Psychiatry

- The number and percentage of obese schizophrenic inpatients

9.2. Correlation between BMI and waist circumference in obese schizophrenic patients

- The relationship of BMI and waist circumference in all patients

9.3. Weight change between baseline and at the end of the study

- The number and percentage of schizophrenic patients who could lose weight
- The number and percentage of schizophrenic patients who had stable weight
- The number and percentage of schizophrenic patients who gained weight
- Comparison of the percentage of schizophrenic inpatients and outpatients who could lose weight
- Comparison of the percentage of schizophrenic inpatients and outpatients who had stable weight
- Comparison of the percentage of schizophrenic inpatients and outpatients who gained weight
- Comparison of the mean weight change from baseline in inpatients and outpatients (unpaired t-test)

9.4. Frequency distribution of factors contributing of metabolic syndrome

- The number and percentage of patients who had waist circumference $>$ 102 cm in men or $>$ 88 cm in women
- The number and percentage of patients who had TG $\geq$ 150 mg/dl

- The number and percentage of patients who had HDL-C < 40 mg/dl in men or < 50 mg/dl in women
- The number and percentage of patients who had BP $\geq$ 130/85 mmHg
- The number and percentage of patients who had FPG $\geq$ 110 mg/dl

9.5. CHD risk factors and 10-year risk in individual patients between baseline and at the end of the study

- Comparison of the number of CHD risk factors, in patients who had CHD risk factors equal or more than 2 risks, between baseline and at the end of the study
- Comparison of the percentage of 10-year risk, in patients who had CHD risk factors equal or more than 2 risks, between baseline and at the end of the study

All p-value were two-tailed and less than 0.05 were considered statistically significant difference.

CHAPTER IV

RESULTS

This study was performed at Somdet Chaopraya Institute of Psychiatry during December 2003 to August 2004. The results were presented as the following:

1. Frequency distribution of body mass index (BMI) and prevalence of obese schizophrenic patients
2. Baseline data
   - 2.1 Patient's demographic data
   - 2.2 Baseline clinical characteristics
   - 2.3 Frequency distribution of BMI, fasting plasma glucose (FPG) and risk for coronary heart disease (CHD) event
   - 2.4 Drugs prescribed at the first visit of this study
3. Correlation between BMI and waist circumference
4. Effect of pharmaceutical care on clinical outcomes
   - 4.1 Pharmaceutical care for obese schizophrenic patients
   - 4.2 Weight change between baseline and at the end of the study
   - 4.3 Frequency distribution of factors contributing to metabolic syndrome
   - 4.4 Presence and severity of metabolic syndrome at baseline and at the end of the study
   - 4.5 Change in the CHD 10–year risk in individual patient
   - 4.6 Identification and intervention of metabolic problems

1. Frequency distribution of body mass index (BMI) and prevalence of obese schizophrenic patients

Prevalence of obese schizophrenic patients during December 2003 to April 2004 was presented in table 12. From 547 schizophrenic patients who were admitted in the hospital, it was found that 135 patients (24.7%) were classified as obese based on the Asia-Pacific criteria (BMI $\geq$ 25 kg/m^2). The number of women who were obese were higher than those of men [87 of 247 (35.2%) and 48 of 300 (16.0%), respectively]. On the basis of the BMI results, 42 of 547 patients (7.7%) met the criteria for obesity class II (BMI $\geq$ 30 kg/m^2) and 93 of 547 patients (17.0%) were classified as obesity class I (BMI $\geq$ 25 kg/m^2). Of those 42 patients who met criteria for obesity class II, four patients were very obese with BMI $\geq$ 35 kg/m^2 (two men and two women). Interestingly, the number of patients who were defined as obese class II were higher in women group (31 of 247; 12.6%) more than those in men group (11 of 300; 3.7%).

Table 12 Frequency distribution of body mass index (BMI) and prevalence of obese schizophrenic patients (December 2003 – April 2004)

Sex	Number of patients screened for obesity	Number of patients		
		Obese I (BMI 25-29.9 kg/m^2)	Obese II (BMI $\geq$ 30 kg/m^2)	Total (BMI $\geq$ 25 kg/m^2)
Men	300	37 (12.3%)	11 (3.7%)	**48 (16.0%)**
Women	247	56 (22.7%)	31 (12.6%)	**87 (35.2%)**
Total	**547**	**93 (17.0%)**	**42 (7.7%)**	**135 (24.7%)**

2. Baseline Data

2.1 Patient's demographic data

Of these 135 eligible obese patients, 77 patients were enrolled in the study. However, the number of patients in each visit decreased to 73, 66, 64 and 58 in the second, third, fourth and fifth visit, respectively. The reasons for the patients' withdrawal from this study included referral to other hospitals, loss of follow up and patients' non-compliance. Demographic data of the 58 patients who completed the study period were presented in table 13. The studied sample consisted of 23 men (39.7%) and 35 women (60.3%). Mean age was 41.6 $\pm$ 10.7 years (range, 25-65 years). Majority of the patients were single (39 of 58; 67.2%) and had highest education of secondary school level (24 of 58; 41.4%). About 21 of 58 (36.2%) of patients had family history of hypertension and 15 of 58 (25.9%), 8 of 58 (13.8%) of patients had family history of diabetes mellitus (DM) and dyslipidemia, respectively.

Table 13 Patients' demographic data

Characteristics	**Number (%) of patients (n = 58)**
Sex	
Men	23 (39.7%)
Women	35 (60.3%)
Age (years)	
20-29	8 (13.8%)
30-39	19 (32.8%)
40-49	16 (27.6%)
50-59	12 (20.7%)
60-65	3 (5.2%)
Marital status	
Single	39 (67.2%)
Married	13 (22.4%)
Divorce	6 (10.3%)
Widow	0
Education	
Primary school	23 (39.7%)
Secondary school	24 (41.4%)
Diploma	6 (10.3%)
Bachelor	5 (8.6%)
Family history of disease	
Diabetes mellitus (DM)	15 (25.9%)
Hypertension	21 (36.2%)
Dyslipidemia	8 (13.8%)

2.2 Baseline clinical characteristics

Baseline clinical data of the patients were presented in table 14. Majority of the patients (22 of 58; 37.9 %) were on antipsychotic drugs treatment for 11-20 years. Mean body mass index (BMI) and waist circumference were 28.99±3.05 kg/m^2 and 101.29±9.29 cm, respectively. The mean value of laboratory monitoring for fasting plasma glucose (FPG), HbA_{1C}, cholesterol, triglyceride, HDL-C and LDL-C were 93.7±15.0 mg/dl, 6.28±0.91%, 191.4±38.7 mg/dl, 163.4±101.0 mg/dl, 49.1±13.2 mg/dl and 128.6±39.0 mg/dl, respectively. Patients' history of FPG and lipid profile monitoring prior to the study were presented in table 15. The majority of patients had never been checked for FPG and lipid profile (48 of 58; 82.8%). Only 8 of 58 (13.8%) of patients had been examined for both FPG and lipid profile.

Table 14 Baseline clinical characteristics

Characteristics	Number (%) of patients (n = 58)
Duration of antipsychotic drugs treatment (years)	
1-10	18 (31%)
11-20	22 (37.9%)
21-30	14 (24.1%)
31-40	4 (6.9%)
Weight (kg)	
Mean±SD	73.37±12.08
Range	54.7–108.0
Height (m)	
Mean±SD	1.588±0.093
Range	1.45–1.79
Body Mass Index, BMI (kg/m^2)	
Mean±SD	28.99±3.05
Range	25–36.33
Waist circumference (cm)	
Mean±SD	101.29±9.29
Range	85.1–132.1
FPG (mg/dl)	
Mean±SD	93.7±15.0
Range	69–132
HbA_{1c}(%)	
Mean±SD	6.28±0.91
Range	4.9–10.2

Table 14 Baseline clinical characteristics (cont.)

Characteristics	Number (%) of patients (n = 58)
Cholesterol (mg/dl)	
Mean±SD	191.4±38.7
Range	119–298
Triglyceride (mg/dl)	
Mean±SD	163.4±101.0
Range	72–691
HDL-C (mg/dl)	
Mean±SD	49.1±13.2
Range	28–89
LDL-C (mg/dl)	
Mean±SD	128.6±39.0
Range	56–264

Table 15 Patients' history of FPG and lipid profile monitoring before the study

Characteristics	Number (%) of patients (n = 58)
1. Used to check only FPG	2 (3.4%)
2. Used to check only lipid profile	0 (0%)
3. Used to check both FPG and lipid profile	8 (13.8%)
4. Never been checked for FPG and lipid profile	48 (82.8%)

2.3 Frequency distribution of BMI, fasting plasma glucose (FPG) and risk for coronary heart disease (CHD) event

All patients enrolled in this study were obese (BMI $\geq$ 25 kg/m^2). About one third of patients (20 of 58; 34.5%) suffered from obesity class II as presented in table 16.

Frequency of distribution of FPG was presented in table 17. Most of the patients (49 of 58; 84.5%) had normal FPG (FPG $\leq$ 109 mg/dl). It was found that 7 of 58 (12.1%) and 2 of 58 (3.4%) of patients had impaired fasting glucose (FPG 110–125 mg/dl) and type 2 DM (FPG $\geq$ 126 mg/dl), respectively.

Interestingly, 4 of 58 patients (6.9%) had experienced CHD event or had CHD risk equivalent (all of four patients who had type 2 DM). Ten of 58 (17.2%) of patients had no CHD and had two or more CHD risk factors. These data were presented in table 18.

Table 16 Frequency distribution of BMI in obese schizophrenic patients (on protocol)

Sex	Number of patients participated in this study	Number of patients	
		Obese I (BMI 25-29.9 kg/m^2)	**Obese II (BMI≥30 kg/m^2)**
Men	23	16 (69.6%)	7 (30.4%)
Women	35	22 (62.9%)	13 (37.1%)
Total	**58**	**38 (65.5%)**	**20 (34.5%)**

Table 17 Frequency distribution of fasting plasma glucose (FPG) profiles

Characteristics	Number (%) of patients (n = 58)
1. Normal FPG	49 (84.5%)
2. Impaired fasting glucose	7 (12.1%)
3. Diabetes Mellitus	2 (3.4%)

Table 18 Frequency distribution of risk for coronary heart disease (CHD) events

Risk categories*	Number (%) of patients (n = 58)
Established CHD or CHD risk equivalents	4 (6.9%)
No CHD + ≥2 risk factors	10 (17.2%)
No CHD + 1 risk factor	19 (32.8%)
No CHD + no risk factor	25(43.1%)

Note: *classified by the third report of the National Cholesterol Education Program (NCEP)

2.4 Drugs prescribed at the first visit of this study

Summaries of drugs taken by these patients were presented in table 19.

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
1	**Atypical Antipsychotic drugs** -Risperidone 2 mg 1x2 pc and 2 hs	-Valproate 500 mg 2 hs -Clonazepam 2 mg 1 hs	-Benzhexol 2 mg 1 x 1 pc and 1 prn for EPS -Glibenclamide 5 mg 1 x 1 ac -Metformin 500 mg 1 x 2 pc -Enalapril 5 mg ½ x OD
2	-Clozapine 100 mg 1½ hs	-Fluoxetine 20 mg 1 x 1pc	-
3	-Olanzapine 10 mg 1 hs -Risperidone 2 mg 1 x 1 pc	-Valproate 500 mg 3 x hs -Diazepam 2mg 1 x prn	-Benzhexol 2 mg ½ x 1 pc
4	-Olanzapine 10 mg 1 hs -Risperidone 2 mg 1 x 2 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Oxcarbazepine 1 x 2 and hs -Valproate 500 mg 2 hs	-
5	-Clozapine 100 mg 1 x 2 pc and 1½ hs -Haloperidol 2 mg 1 hs	-Lorazepam 1 mg 1 hs -Diazepam 2 mg 1 x 2 pc -Fluoxetine 20 mg 1 x 1pc	-

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
6	**Atypical antipsychotic drugs** -Olanzapine 10 mg 1 x 2 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Valproate 500 mg 2 hs -Lorazepam 2 mg 1 hs	-Benzhexol 2 mg 1 x 2 pc -Theophylline 200 mg 1 x 2 pc -Terbutaline turbuhaler 1 inhalation q 6 hrs
7	-Risperidone 2 mg 1 x 3 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Diazepam 5 mg 1 hs	-Benzhexol 2 mg 1 x 2 pc
8	-Clozapine 100 mg 1/2 x 2 pc and 2 hs	-	-
9	-Clozapine 100 mg 1 x 2 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Amitriptyline 10 mg 1 hs	-Benzhexol 2 mg 1 prn for EPS
10	-Clozapine 100 mg 3 hs -Thioridazine 200 mg 1 hs	-	-Propylthiouracil 50mg 1x1 pc -Enalapril 5 mg 1x2 pc -Benzhexol 2 mg 1 x 2 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
11	**Atypical antipsychotic drugs** -Clozapine 100 mg 1 x 2 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Vitamin B complex 1x2 pc and 1 hs
12	-Clozapine 100 mg 1 x 4 pc	-Carbamazepine CR 400 mg 1x2 pc	-Benzhexol 2 mg 1 prn for EPS
13	-Clozapine 100 mg 1 x 4 pc -Chlorpromazine 50 mg IM prn q 4 hrs for agitation	-Fluoxetine 20 mg 1 x 1 pc	-Benzhexol 5 mg 1 prn for EPS
14	-Clozapine 100 mg 1 x 2 pc	-Fluoxetine 20 mg 1 x 1 pc	-Vitamin B 1-6-12 1x3 pc -Bisacodyl 5 mg 2 tab prn for constipation -Benzhexol 2 mg 1 x 2 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
15	**Conventional antipsychotic drugs** -Perphenazine 8 mg 1x3 pc and 2 hs	-	-Benzhexol 2 mg 1 x 2 pc
16	-Haloperidol 100 mg 1 amp IM q 2 wks	-	-Benzhexol 5 mg 1 x 3 pc and 1 tab prn EPS
17	-Perphenazine 16 mg 1x2 pc -Chlorpromazine 50 mg 1 tab prn for insomnia	-Valproate 200 mg ½ tab x2 pc x 2 day and 1x2 pc	-Benzhexol 5 mg 1 x 2 pc
18	-Trifluoperazine 10 mg 1x2 pc -Chlorpromazine 50 mg 1 hs -Chlorpromazine 50 mg 1 amp prn q 4-6 hrs	-	-Benzhexol 2 mg 1 x 2 pc
19	-Chlorpromazine 50 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc
20	-Haloperidol 10 mg 2x2 pc and 2 hs -Chlorpromazine 100 mg 1 hs	-	-Benzhexol 5 mg 1 x 2 pc and 1 hs -Propranolol 10 mg 1x2 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
21	**Conventional antipsychotic drugs** -Haloperidol 20 mg 1x4 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Diazepam 10 mg 1-2 tab prn for insomnia -Clonazepam 2 mg 1 hs	-Benzhexol 5 mg 1 x 2 pc
22	-Haloperidol 10 mg 2x2 pc and 2 hs -Chlorpromazine 200 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-
23	-Trifluoperazine 10 mg 1x3 pc and 2 hs -Chlorpromazine 50 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc and 1 tab prn for EPS
24	-Perphenazine 16 mg 1x3 pc and 2 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Diazepam 10 mg 1 hs	-Benzhexol 5 mg 1 x 2 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
25	**Conventional antipsychotic drugs** -Perphenazine 16 mg 1x3 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Diazepam 10 mg 1 hs	-Enalapril 5 mg 1x1 pc -Aspirin 60 mg 1x1 pc -Benzhexol 5 mg 1 x 2 pc
26	-Perphenazine 16 mg 1x3 pc and 2 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Diazepam 10 mg 1 hs	-Benzhexol 5 mg 1 x 2 pc
27	-Haloperidol 10 mg 1x2 pc and 1 hs -Chlorpromazine 100 mg 1x4 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc
28	-Perphenazine 16 mg 2x2 pc and 1 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
29	**<u>Conventional antipsychotic drugs</u>** -Trifluoperazine 10 mg 1x4 pc and 2 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 3 pc
30	-Perphenazine 16 mg 1x4 pc -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 3 pc
31	-Haloperidol 10 mg 1x2 pc -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc
32	-Perphenazine 8 mg 1 hs -Chlorpromazine 50 mg 1 hs	-Clonazepam 2 mg 1x1 pc and 1 hs -Diazepam 5 mg 1 hs	-Benzhexol 2 mg 1 hs -Calcium carbonate 350 mg 1x2 pc -Metformin 500 mg 1x3 pc -Piroxicam 10 mg 1x2 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
33	**Conventional antipsychotic drugs** -Perphenazine 16 mg 1x3 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Valproate 200 mg 1x3 pc and 2 hs	-Benzhexol 2 mg 1 x 2 pc
34	-Flupentixol 3 mg 1x2 pc -Thioridazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Lorazepam 1 mg 1 tab prn for insomnia	-Benzhexol 2 mg 1 x 2 pc
35	-Perphenazine 16 mg 1x2 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation -Chlorpromazine 50 mg 1 tab prn for insomnia	-	-Benzhexol 5 mg 1 x 3 pc
36	-Chlorpromazine 100 mg 1x3 pc and 2 hs -Chlorpromazine 50 mg 1 amp prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 3 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
37	Conventional antipsychotic drugs -Haloperidol 5 mg 1x2 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc
38	-Perphenazine 8 mg 1x2 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 2 pc
39	-Perphenazine 16 mg 1x4 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Clonazepam 2 mg 1 hs for insomnia	-Benzhexol 5 mg 1 x 4 pc
40	-Perphenazine 16 mg 2x3 pc -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Lithium 300 mg 1x3 pc	-Benzhexol 2 mg 1 x 2 pc and 1 tab prn for EPS

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
41	**Conventional antipsychotic drugs** -Haloperidol 10 mg 1x2 pc and 1 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Lorazepam 2 mg 1 hs	-Benzhexol 5 mg 1 x 3 pc
42	-Perphenazine 16 mg 2x2 pc and 2 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 3 pc
43	-Perphenazine 8 mg 1x3 pc and 2 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Valproate 200 mg 1x3 pc	-Benzhexol 2 mg 1 x 3 pc
44	-Perphenazine 16 mg 1x1 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc and 1 tab prn for EPS -Diclofenac 25 mg 1x3 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
45	**Conventional antipsychotic drugs** -Perphenazine 16 mg 1x3 pc -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Clonazepam 2 mg 1 hs for insomnia	-Benzhexol 5 mg 1 x 2 pc
46	-Haloperidol 5 mg 1x2 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Diazepam 10 mg 1 hs	-Benzhexol 5 mg 1 x 3 pc
47	-Haloperidol 10 mg 1x3 pc and 1 hs	-Carbamazepine 200 mg 1x3 pc and 1 hs -Diazepam 10 mg 1 tab for insomnia	-Benzhexol 5 mg 1 x 2 pc and 1 hs
48	-Haloperidol 5 mg 1x3 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 2 pc
49	-Perphenazine 16 mg 1x4 pc -Chlorpromazine 50 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 3 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
50	**Conventional antipsychotic drugs** -Perphenazine 16 mg 1x3 pc and 1 hs -Chlorpromazine 50 mg 1 tab prn for insomnia	-	-Benzhexol 5 mg 1 x 2 pc and 1 tab prn for EPS
51	-Perphenazine 16 mg 1x2 pc and 1 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 2 pc
52	-Chlorpromazine 100 mg 1x1 pc and 1 hs -Haloperidol decanoate 50 mg 1 amp q 1 month -Haloperidol 2.5 mg IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 tab prn for EPS
53	-Haloperidol 10 mg 1x3 pc and2 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc -Folic acid 5 mg 1x1 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
54	**Conventional antipsychotic drugs** -Trifluoperazine 10 mg 1x2 pc and 1 tab hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Diazepam 10 mg 1 tab for insomnia	-Benzhexol 5 mg 1 x 2 pc -Propranolol 10 mg 1x2 pc
55	-Haloperidol 10 mg 2x2 pc -Chlorpromazine 200 mg 1x1 pc and 2x1 pc at the evening -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-Lithium 300 mg 1x1 pc and 2x1 pc at the evening -Diazepam 10 mg 1 tab for insomnia	-Benzhexol 5 mg 1 x 2 pc
56	-Haloperidol 10 mg 1x2 pc and 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	- Diazepam 10 mg 1 tab for insomnia	-Metformin 500 mg 1x2 pc -Atenolol 100 mg 1x1 od -Benzhexol 2 mg 1 x 2 pc
57	-Trifluoperazine 10 mg 1x3 pc -Chlorpromazine 50 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 2 mg 1 x 2 pc

Table 19 Antipsychotic drugs, other psychotropic drugs and concomitant drugs in studied subjects at the first visit (cont.)

Order	Antipsychotic drugs	Other psychotropic drugs	Other medications
58	**Conventional antipsychotic drugs** -Perphenazine 16 mg 1x2 pc and 1 hs -Chlorpromazine 100 mg 1 hs -Haloperidol 5 mg 1 amp IM prn q 4 hrs for agitation	-	-Benzhexol 5 mg 1 x 2 pc

3 Correlation between BMI and waist circumference

The relationships of BMI and waist circumference in all obese schizophrenic patients, in obese schizophrenic men and in obese schizophrenic women were presented in figure 5, 6 and 7, respectively. The coefficient of determination (r^2) in all obese patients was 0.64. This means that waist circumference contributed to the increase in BMI by 64%. The r^2 values in obese schizophrenic men and women were 0.81 and 0.49, respectively. Our results demonstrated that the BMI was highest correlated with waist circumference in obese men group.

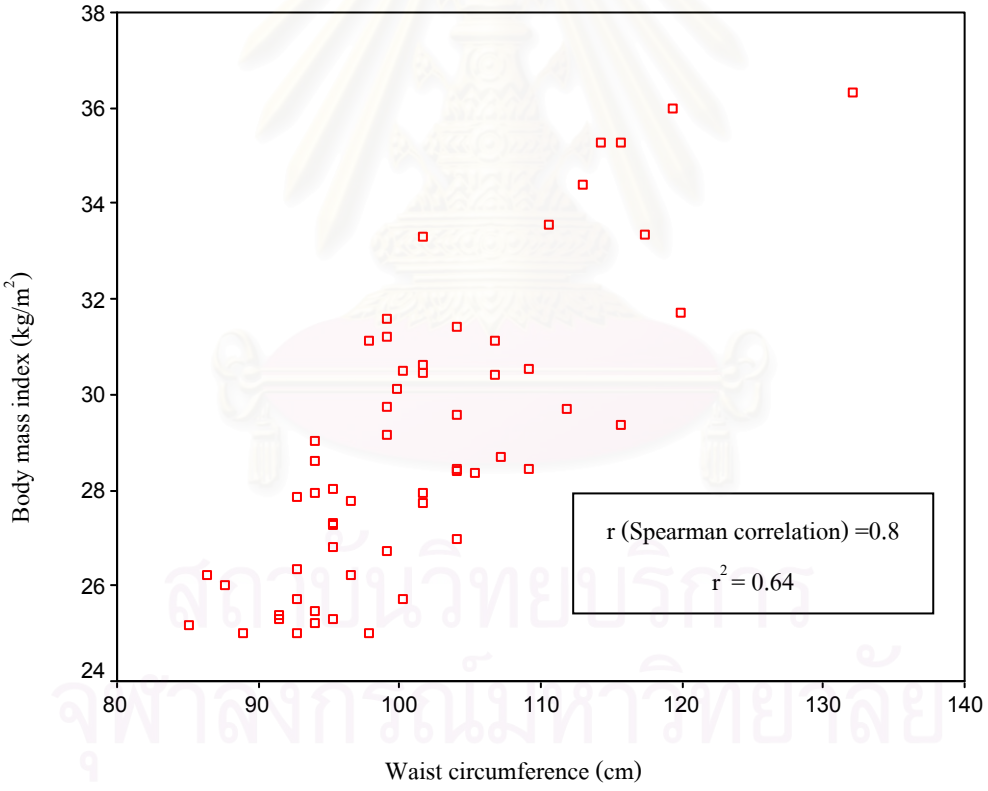

Figure 5 Correlation between BMI and waist circumference in all obese schizophrenic patients (n=58)

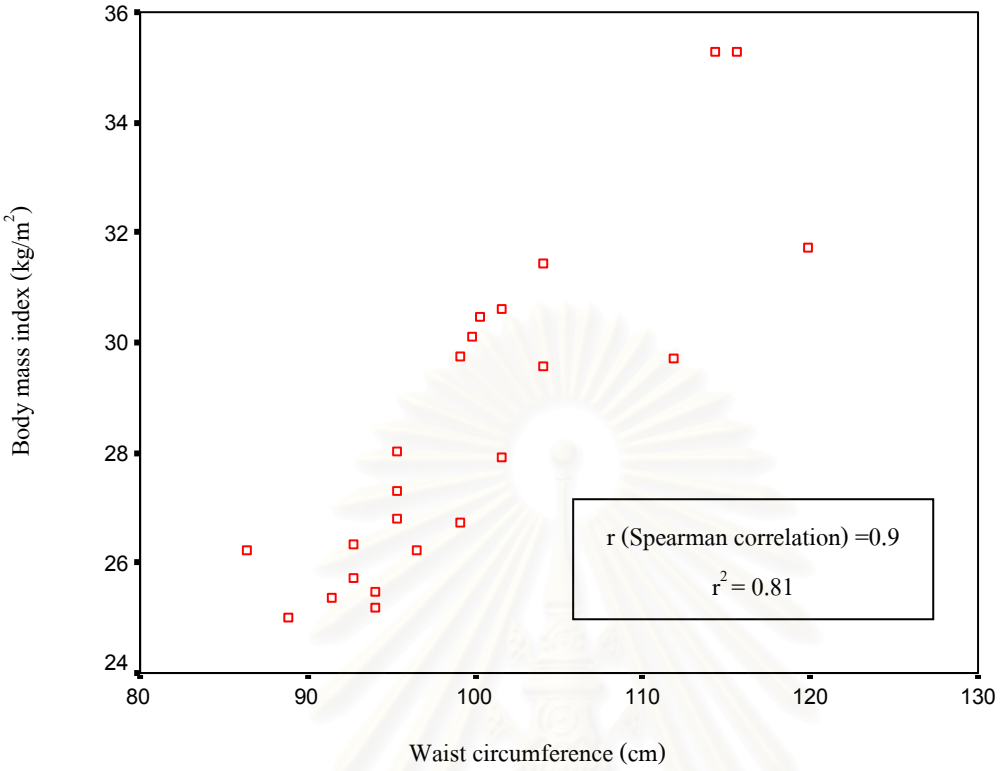

Figure 6 Correlation between BMI and waist circumference in obese schizophrenic men (n=23)

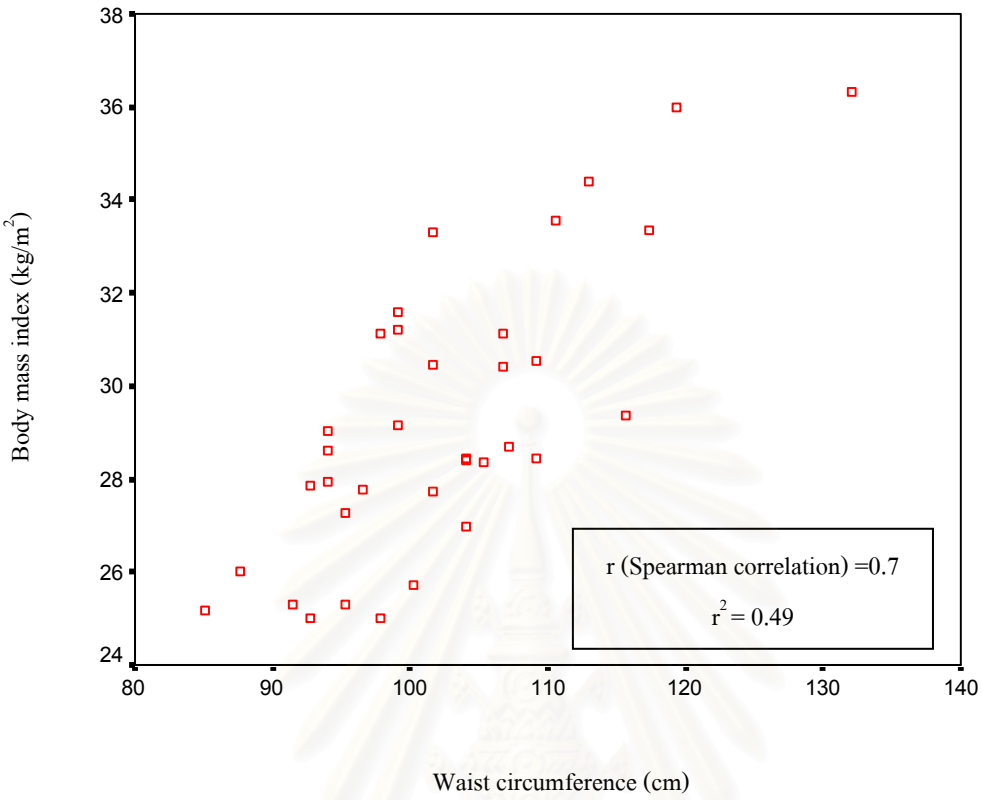

Figure 7 Correlation between BMI and waist circumference in obese schizophrenic women (n=35)

4 Effect of pharmaceutical care on clinical outcomes

4.1 Pharmaceutical care for obese schizophrenic patients

Schizophrenic patients who were enrolled in the study were scheduled to visit the pharmacist at less once a month. The pharmacist measured weight, height, BMI, waist circumference, BP and requested for laboratory test (FPG, HbA_{1c} and lipid profile) under psychiatrist approval. In addition, the pharmacist advised patients and their relatives to control patients' diet and to increase duration for their exercise. The booklet containing knowledge about definition of obesity, health risks of obesity and strategies for weight loss by dietary therapy and physical activity were developed (see appendix IV) and provided to the patients. Besides, pharmacist discussed with dietitian to reduce meal calories in patients. Finally, all the metabolic problems were identified and informed to the psychiatrist. Drug therapy was suggested to the treating psychiatrist and it was monitored throughout the end of the study.

4.2 Weight change between baseline and at the end of the study

The comparison of weight change between baseline and at the end of the study was presented in table 20. 62.1% (36 of 58) of patients could lose weight at the end of 4 month study period. Furthermore, 29.3% (17 of 58) of patients could lose weight equal to or more than 5% of baseline body weight. A greater number of women (25 of 35) could lose weight more than men (11 of 23). Of 13 obese women who had BMI $\geq$ 30 kg/m^2, 10 cases could reduce their body weight which was beneficial to their health. In addition, 5 of 13 women could lose their weight equal to or more than 5% of baseline body weight. On the other hand, only 3 of 7 men who had BMI more than 30 kg/m^2 could have body weight reduction at the end of the study. Patients who had the most increase in body weight gained 20.5 kg (19% of baseline; 108 kg at baseline and 128.5 kg at the end of the study), whereas patients who had the highest weight reduction could lose 13 kg (16.3% of baseline; 80 kg at baseline and 67 kg at

the end of the study). However, weight reduction in outpatient cases was not effective as show in table 21. It was found that only 22 (55%) cases could have their weight reduction. Inpatients could achieve to have their weight reduction in 77.8% (14 of 18) of cases. Mean weight change from baseline in inpatients was also significantly higher than those of outpatients (unpaired t- test, p= 0.029).

Table 20 Weight change between baseline and at the end of the study

Weight change	Men (n=23)		Women (n=35)		Total (n=58)
	BMI 25-29.9 kg/m^2 (n=16)	BMI≥30 kg/m^2 (n=7)	BMI 25-29.9 kg/m^2 (n=22)	BMI≥30 kg/m^2 (n=13)	
Weight reduction	**8 (34.8%)**	**3 (13.0%)**	**15 (42.8%)**	**10 (28.6%)**	**36 (62.1%)**
* equal to or more than 5% of baseline.	3 (13.0%)	-	9 (25.7%)	5 (14.3%)	17 (29.3%)
* less than 5% of baseline	5 (21.7%)	3 (13.0%)	6 (17.1%)	5 (14.3%)	19 (32.8%)
Stable weight	**1 (4.4%)**	**-**	**2 (5.7%)**	**1 (2.9%)**	**4 (6.9%)**
Weight gain	**7 (30.4%)**	**4 (17.4%)**	**5 (14.3%)**	**2 (5.7%)**	**18 (31.0%)**

Table 21 Number and percentage of IPD patients and OPD patients with weight change from baseline

Weight change	**Number of patients (n=58)**	
	IPD patients (n = 18)	**OPD patients (n = 40)**
Weight reduction	**14 (77.8%)**	**22 (55.0%)**
* more than or equal to 5% of baseline	10 (55.6%)	7 (17.5%)
* less than 5% of baseline	4 (22.2%)	15 (37.5%)
Stable weight	**2 (11.1%)**	**2 (5.0%)**
Weight gain	**2 (11.1%)**	**16 (40.0%)**
Mean weight change ±SD	-4.2±5*	-0.7±5.6

*p=0.029

4.1 Frequency distribution of factors contributing to metabolic syndrome

The frequency of metabolic syndrome diagnosed according to NCEP criteria was 22.4% (13 of 58) of the patients. The prevalence of different components contributing to metabolic syndrome in these patients was presented in table 22. The most common factors contributing to metabolic syndrome were waist circumference > 102 cm in men and > 88 cm in women (12 of 13; 92.3%) and HDL-C < 40 mg/dl in men and < 50 mg/dl in women (12 of 13; 92.3%).

Table 22 Frequency distribution of factors contributing of metabolic syndrome

Characteristics	Number (%) of patients (n = 13*)
1. Waist circumference > 102 cm in men and > 88 cm in women	12 (92.3%)
2. TG≥150 mg/dl	9 (69.2%)
3. HDL–Cholesterol <40 mg/dl in men and <50 mg/dl in women	12 (92.3%)
4. Blood pressure≥130/85 mmHg	5 (38.5%)
5. FPG ≥ 110 mg/dl	3 (23.1%)

13 patients * with metabolic syndrome

4.4 Presence and severity of metabolic syndrome at baseline and at the end of the study

Approximately two third (9 of 13; 69.2%) of the patients with metabolic syndrome at the baseline had less than three factors described by the ATP III as metabolic syndrome at the end of the study. These nine cases were not furthermore considered as metabolic syndrome as shown in table 23.

- Six of twelve patients with low HDL-C (HDL-C < 40 mg/dl in men and < 50 mg/dl in women) at the baseline had no risk factor at the end of the study because three patients exercised 10-30 minutes everyday. One patient played football for 90 minutes three times per week, one patient did more housework than what he did at the first visit but the last one did not change his lifestyle (he could not control diet and did not exercise).
- Five of nine patients with raised triglyceride level (TG > 150 mg/dl) at the baseline had achieved TG > 150 mg/dl at the end of the study because three patients could control diet and increase time for exercise, one patient ate reduced caloric diet (1,800 kcal/day) and the last one took gemfibrozil 600 mg 1X1 pc.
- One of three patients with high FPG (FPG $\geq$ 110 mg/dl) at the baseline had no this factor at the end of the study because he could control his diet.
- Every patients (12 patients) who had abdominal obesity (waist circumference $>$ 102 cm in men and $>$ 88 cm in women) at the baseline still had this condition at the end of the study.

However, 7 of 45 (15.6%) patients without metabolic syndrome at the baseline were diagnosed as having metabolic syndrome at the end of the study.

4.5 Change in the CHD 10–year risk in individual patient

CHD risk factors and 10-year risk in individual patient were presented in table 24. The CHD 10-year risk in the rest of 48 patients could not be calculated since 4 patients had CHD or CHD risk equivalent and other 44 patients had less than 2 risk factors. Therefore, it was found that 10 of 58 had 2 or more CHD risk factors and did not have CHD or CHD equivalent disease. Six of these ten patients had no risk or 1 risk factor at the end of the study. However, 4 of 10 still had 2 or more risk factors at the end of the study, one patient (case number 40) had 10-year risk decreased from 20% to 10%, one patient (case number 20) had equal 10-year risk and two patients (case number 17 and 22) had 10-year risk increased from 5% to 8% and 10% to 30% at the end of the study. The last one, outpatient, who had increased 10-year risk from 10% to 30%, was considered CHD equivalents. Scoring system for calculating patients CHD 10-year risk **(58)** was shown in appendixIX.

Table 23 Frequency distribution of factors contributing of metabolic syndrome between baseline and at the end of the study

Characteristics	Case numbers													
	2		3		18		20		23		25		27	
	before	after	before	after	before	after	before	after	before	after	before	after	before	after
1.Waist circumference > 102 cm in men > 88 cm in women	—	—	√	√	√	√	√	√	√	√	√	√	√	√
2.TG ≥ 150 mg/dl	√	—	√	√	—	—	—	—	√	√	√	—	√	√
3.HDL–Cholesterol < 40 mg/dl in men < 50 mg/dl in women	√	√	√	√	√	—	√	—	—	—	√	—	√	√
4.Blood pressure ≥ 130/85 mmHg	√	—	—	—	—	—	√	√	—	—	—	—	—	—
5.FBS ≥ 110 mg/dl	—	—	—	—	√	√	—	—	√	—	—	√	—	—
Conclusion	Metabolic syndrome disappeared		Still had metabolic syndrome		Metabolic syndrome disappeared		Metabolic syndrome disappeared		Metabolic syndrome disappeared		Metabolic syndrome disappeared		Still had metabolic syndrome	

√ = presence, - = not presence

Table 23 Frequency distribution of factors contributing of metabolic syndrome between baseline and at the end of the study (cont.)

Characteristics	Case numbers											
	29		30		32		37		44		53	
	before	after	before	after	before	after	before	after	before	after	before	after
1.Waist circumference > 102 cm in men > 88 cm in women	√	√	√	√	√	√	√	√	√	√	√	√
2.TG ≥ 150 mg/dl	√	√	—	√	√	—	√	—	—	—	√	—
3.HDL–Cholesterol < 40 mg/dl in men < 50 mg/dl in women	√	—	√	√	√	—	√	√	√	—	√	√
4.Blood pressure ≥ 130/85 mmHg	—	—	√	—	√	—	—	—	√	√	—	—
5.FBS ≥ 110 mg/dl	—	—	—	—	√	√	—	—	—	√	—	—
Conclusion	Metabolic syndrome disappeared		Still had metabolic syndrome		Metabolic syndrome disappeared		Metabolic syndrome disappeared		Still had metabolic syndrome		Metabolic syndrome disappeared	

√ = presence, - = not presence

Table 24 CHD risk factors and 10-year risk in individual patient between baseline and at the end of the study

Case numbers (sex)	OPD/IPD at the end of the study	CHD risk factors		10-year risk		Description
		baseline	the end of the study	baseline	the end of the study	
2 (man)	OPD	2	1	<1%	<1%	Baseline: CHD risk factors were BP 130/90 mmHg and HDL-C 34 mg/dl. The end of the study: CHD risk factor was only HDL-C 37 mg/dl. BP decreased to 120/70 mmHg.
17 (woman)	IPD	3	2	5%	8%	Baseline: CHD risk factors were having age of 55 years old, on antihypertensive drug, enalapril 5 mg 1 X 1 OD, and smoking cigarettes. The end of the study: CHD risk factors were having age of 55 years old, still on antihypertensive drug, enalapril in a same dose, and smoking cigarettes. However, HDL-C increased from 54 mg/dl to 87 mg/dl. 10 year-risk increased from 5% to 8% because her BP increased from 110/70 mmHg to 130/80 mmHg.

Table 24 CHD risk factors and 10-year risk in individual patient between baseline and at the end of the study (cont.)

Case numbers (sex)	OPD/IPD at the end of the study	CHD risk factors		10-year risk		Description
		baseline	the end of the study	baseline	the end of the study	
20 (man)	OPD	3	2	2%	2%	Baseline: CHD risk factors were smoking cigarettes, BP 140/80 mmHg and HDL-C 28 mg/dl. The end of the study: CHD risk factors were still smoking cigarettes, BP 140/90 mmHg but HDL-C increased to 40 mg/dl.
22 (man)	OPD	2	2	10%	30%	Baseline: CHD risk factors were having age of 46 years old and smoking cigarettes. The end of the study: CHD risk factors were as same as at the baseline. 10 year-risk increased from 10% to 30% because cholesterol level increased from 163 mg/dl to 284 mg/dl and BP increased from 120/70 mmHg to 140/90 mmHg.
29 (man)	OPD	2	1	2%	2%	Baseline: CHD risk factors were smoking cigarettes and HDL-C 35 mg/dl. The end of the study: CHD risk factor was still smoking cigarettes but HDL-C increased to 42 mg/dl.

Table 24 CHD risk factors and 10-year risk in individual patient between baseline and at the end of the study (cont.)

Case numbers (sex)	OPD/IPD at the end of the study	CHD risk factors		10-year risk		Description
		baseline	the end of the study	baseline	the end of the study	
30 (woman)	OPD	2	0	0%	1%	Baseline: CHD risk factors were BP 130/90 mmHg and HDL-C 34 mg/dl The end of the study: CHD risk factors disappeared (BP 120/80 mmHg and HDL-C 46 mg/dl) 10 year-risk increased from 0% to 1% because cholesterol level increased from 190 mg/dl to 250 mg/dl but her BP decreased from 130/90 mmHg to 120/80 mmHg and HDL-C increased from 34 mg/dl to 46 mg/dl.
40 (man)	OPD	2	2	20%	10%	Baseline: CHD risk factors were having age of 57 years old and on antihypertensive drug, enalapril 5 mg 1 X 2 pc The end of the study: CHD risk factors were as same as at the baseline 10 year-risk decreased from 20% to 10% because cholesterol level decreased from 298 mg/dl to 184 mg/dl

Table 24 CHD risk factors and 10-year risk in individual patient between baseline and at the end of the study (cont.)

Case numbers (sex)	OPD/IPD at the end of the study	CHD risk factors		10-year risk		Description
		baseline	the end of the study	baseline	the end of the study	
41 (man)	IPD	3	1	20%	6%	Baseline: CHD risk factors were having age of 47 years old, smoking cigarettes and HDL-C 38 mg/dl. The end of the study: CHD risk factors were having age of 47 years old and smoking cigarettes but his HDL-C level increased to 62 mg/dl. So, there was only one CHD risk factor. 10 year-risk decreased from 20% to 6% because cholesterol level decreased from 226 mg/dl to 190 mg/dl and HDL-C increased from 38 mg/dl to 62 mg/dl.
51 (man)	OPD	2	1	3%	6%	Baseline: CHD risk factors were smoking cigarettes and HDL-C 35 mg/dl. The end of the study: CHD risk factor was only smoking cigarettes. HDL-C increased to 45 mg/dl. 10 year-risk increased from 3% to 6% because cholesterol level increased from 157 mg/dl to 185 mg/dl and BP increased from 110/70 mmHg to 130/90 mmHg.

Table 24 CHD risk factors and 10-year risk in individual patient between baseline and at the end of the study (cont.)

Case numbers (sex)	OPD/IPD at the end of the study	CHD risk factors		10-year risk		Description
		baseline	the end of the study	baseline	the end of the study	
54 (man)	IPD	2	1	2%	3%	Baseline: CHD risk factors were smoking cigarettes and HDL-C 28 mg/dl. The end of the study: CHD risk factor was only smoking cigarettes. HDL-C increased to 47 mg/dl. 10 year-risk increased from 2% to 3% because cholesterol level increased from 196 mg/dl to 221 mg/dl but HDL-C increased from 28 mg/dl to 47 mg/dl.

4.6 Identification and intervention of metabolic problems

Identification and intervention of metabolic problems were presented in appendix X. The result of pharmacist interventions was shown in table 25. All of the patients and their relatives were advised for diet control and increase time for exercise. Twenty-nine of 58 (50%) patients complied both with the control diet and exercise but 16 of 58 (27.6%) patients did not complied with control diet and exercise. Pharmacist discussed with dietitian to reduce meal calories to 1,800 kcal per day for all cases (58 patients) and dietitian accepted all pharmacist's suggestion.

Pharmacist suggested psychiatrists concerning medication totally 26 times. The psychiatrists accepted with medical suggestion as shown in table 26. They agreed to add medication 13 times, to increase the dose of medication 2 times and to change the medication 1 time. However, the psychiatrists accepted with medical suggestion but did not add medication 10 times. They did not add simvastatin 10 mg 1x1 pc in the everning but suggested the patients to control diet 6 times. In addition, they did not add gemfibrozil 600 mg 1x1 pc and gemfibrozil 900 mg 1x1 pc two and one time, respectively but suggested the patients to control diet. The psychiatrist did not add enalapril 5 mg 1x1 pc to the patient but suggested the patient to follow up hypertensive problem with the treating internist 1 time.

The pharmacist notified plan of treatment of obesity and metabolic problem to the psychiatrists 290 times and they agreed with all the plan. The plans of treatment of obesity and metabolic problems included diet control and increase time for exercise. For the patients who did not have a good insight, the pharmacist asked nurses to take care of these patients' diet besides hospital diet 30 times and the nurses accepted all of the intervention.

Table 25 The result of pharmacist interventions

Intervention	Number of intervention	Result
1.Advised patients and their relatives to control diet and increase time for exercise	5*58 cases = 290 times	Diet complied 10 cases (17.2%) Exercise complied 3 cases (5.2%) Both complied 29 cases (50%) Non complied 16 cases (27.6%)
2.Discussed with dietitian to reduce meal calories to 1,800 kcal per day	58 cases	Accepted 58 cases (100%) Non accepted 0 cases
3.Suggested psychiatrist about medication	26 times	Accepted 16 interventions (61.5%) Accepted but did not add or change medication 10 interventions (38.5%)
4.Notified plan of treatment of obesity and metabolic problems in SOAP note to psychiatrist	5*58 = 290 times	Agreed 290 interventions (100%) Disagreed 0 interventions
5.Asked nurses to take care of patients' diet besides hospital diet to some patients	5*6 cases= 30 times	Accepted 30 interventions (100%) Non accepted 0 interventions

Table 26 Psychiatrists acceptance with medical suggestions

Medical intervention	Number of intervention (times)	Result
<u>Added medication</u> 1. added simvastatin 10 mg 1x1 pc in the evening	12	Agreed 6 times Agreed (but did not add medication) and suggested the patients to control diet 6 times
2. added simvastatin 20 mg 1x1 pc in the evening	2	Agreed 2 times
3. added gemfibrozil 600 mg 1x1 pc	7	Agreed 5 times Agreed (but did not add medication) and suggested the patients to control diet 2 times
4. added gemfibrozil 900 mg 1x1 pc	1	Agreed (but did not add medication) and suggested the patients to control diet 1 times
5. added enalapril 5 mg 1x1 pc	1	Agreed but did not add medication and needed the patient to follow up hypertensive problem with the treating internist 1 times

Table 26 Psychiatrists acceptance with medical suggestions (cont.)

Medical intervention	Number of intervention (times)	Result
<u>Increased the dose</u> 6. increased the dose of metformin from 500 mg 1x2 pc to 850 mg 1x3 pc	1	Agreed 1 times
7. increased the dose of enalapril 5 mg from ½x2 pc to 1x1 pc	1	Agreed 1 times
<u>Changed medication</u> 8. changed glibenclamide to diamicron MR 1xOD ac	1	Agreed 1 times

CHAPTER V

DISCUSSION

It is well accepted that obesity is one of the health problems found in schizophrenic patients. In our study, we found that 135 of 547 patients (24.7%) (from table 12) were classified as obese based on the Asia-Pacific criteria (BMI $\geq$ 25 kg/m^2). This prevalence was similar to our pilot study performed during 19 May to 30 June 2003 **(13)**, in which 45 of 159 schizophrenic inpatients (28.3%) were obese. When compared this prevalence with the prevalence in normal population (age 20 years up) in Thailand (data from Health Department, Ministry of Health in 1995 **(59)**), it was found that prevalence of obese schizophrenic patients were surprisingly similar to these of Thai normal population (26.1%). This may be explained by the number of women subjects (4,027 women versus 1,764 men) in the data set from Ministry of Health. In addition, women had higher prevalence of obesity than men (30.2% and 16.7%, respectively). Women patients with schizophrenia in this study had a significantly higher prevalence of obesity than women without schizophrenia (35.2 and 30.2%, respectively). However, men patients with schizophrenia had prevalence of obesity similar to those of men without schizophrenia (16.0 and 16.7%, respectively).

Furthermore, the results from the National Health Interview Survey (NHIS) **(60)** revealed that women with schizophrenia had a significantly higher mean BMI than did women without schizophrenia (27.4 and 24.5 kg/m^2, respectively, $p<0.001$). In contrast, men with schizophrenia had mean BMI similar to those of men without schizophrenia (26.1 and 25.6 kg/m^2, respectively). Coodin et al. reported that the prevalence of obesity in schizophrenic patients (BMI $\geq$ 30 kg/m^2) was 3.5 folds higher than the Canadian average **(61)**. While, the prevalence rates of obesity (BMI $\geq$ 90 th percentile) among

schizophrenic men and women were 5.1 and 6.4 times greater than in German reference population **(62)**. In addition, the prevalence of obesity (BMI $\geq$ 26.4 kg/m^2) of schizophrenic men and women was 2.74 and 2.51 folds higher than in Taiwanese reference, respectively **(63)**. However, this study found that the prevalence of obesity in schizophrenic women (BMI $\geq$ 25 kg/m^2) was only 1.2 folds higher than those of Thai normal population and the prevalence of obesity in schizophrenic men is similar to those of men without schizophrenia.

Weight gain is frequently reported in patients receiving antipsychotic drugs **(64)**. Weight gain has been associated with the interferences of various neurotransmitters and hormones in the brain such as dopamine, serotonin, histamine and prolactin **(3,23,38-40)**. It was shown that 5-HT$_{1A}$ agonists and 5-HT$_{2C/2A}$ antagonists caused a marked increase in feeding in animal models**(23,43)**. Clozapine and olanzapine are potent 5-HT$_{2C}$ and 5-HT$_{2A}$ antagonists **(38)** and these two drugs can cause marked increase in body weight **(39)**. Histamine H_1 receptor antagonism also increased feeding and weight gain **(40)**. Wirshing et al. noted an exponential relationship between the medications' H_1 receptor affinities and maximum weight gain **(23)**. Antipsychotic drugs with the maximum weight gain liabilities (i.e. clozapine and olanzapine) had the greatest affinities for the H_1 receptor, while those with the least amount of weight gain (i.e. haloperidol) had the weakest affinity **(23)**.

In general, we found that some patients gain weight while other does not when treated with clozapine and other antipsychotic drugs. Genetic predisposition to the ability of clozapine to induce weight gain has been reported. Basile et al. **(43)** investigated the common cysteine to serine amino acid substitution at position 23 of the 5-HT$_{2C}$ protein (Cys23Ser). Receptors with the serine variant showed higher in vitro affinity for m-chlorophenylpiperazine (m-CCP), a 5-HT$_{2C}$

selective agonist. There was a trend for patients carrying only the serine variant to have higher mean weight gain following treatment with clozapine **(43)**.

Besides, the antipsychotic drugs induced weight gain in schizophrenic patients, schizophrenia itself can induce weight gain in these patients. Schizophrenic patients without medication were more obese than individuals without schizophrenia because they lack of insight, eat poor diet and lack of exercise. Individuals with schizophrenia eat a diet which is high in fat and lower in fiber than normal population **(36,37)**. The negative symptoms of the illness itself, for example reduced motivation and social withdrawal. This could also result in weight gain in schizophrenic patients **(37)**.

Adipose tissues are considered as an endocrine organ because they can secrete soluble products with distant actions. The endocrine actions of products secrete by adipose tissue such as leptin, steroid hormones and angiotensinogen are well established **(65)**. Leptin suppresses appetite and increased energy expenditure. However, the increased circulating plasma leptin levels in obese patients may result from desensitization of the CNS to the peripheral leptin signal **(44)** or from decreased transport to brain target **(65)**. TNF- α level is increased in obese state **(66)**. A number of studies have demonstrated that insulin resistance changes in parallel with the TNF- α level **(64,67)**. IL-6 has postulated roles in the regulation of lipid and glucose metabolism, as with TNF- α. IL-6 is increased in obesity and correspond to markers of insulin resistance **(66)**. Angiotensin II which is the product of angiotensinogen is also increased in obesity. Angiotensin II can cause an increase in blood pressure and inhibit adipocyte differentiation.

We found that only 8 of 58 patients (13.8%) (from table 15) had been checked for FPG and lipid profile. Since type 2 DM and dyslipidemia are the major cardiovascular disease risk factors **(68)**, the FPG and lipid profile monitoring periodically is necessary in schizophrenic patients who are at risk of obesity.

Most patients with type 2 DM die from macrovascular disease especially CHD event. Majority of type 2 DM patients have more than 20% risk of experiencing a CHD event in the next 10 years. The 10-year risk in type 2 DM patients who have already experienced a CHD event is much higher, approaching 50%, justifying their classification into a CHD risk equivalent category **(58)**. While 10% increase in cholesterol level is associated with 20-30% increase in the risk of coronary heart disease and lowering the cholesterol level by 10% decreases the risk by 20-30% **(69)**. In addition, triglyceride levels greater than 250 mg/dl are associated with two folds higher risk of cardiovascular disease, compared with lower levels **(69)**.

From laboratory monitoring in our subjects, 19 schizophrenic patients were found to have dyslipidemia (13 patients with high LDL-C and 6 patients with hypertriglyceridemia), 6 patients with IFG, 1 new case with DM and 1 patient with high LDL-C and IFG. In conclusion, 27 of 58 patients had risk factors that could contribute to impaired health of schizophrenic patients.

The Mount Sinai Conference, held during October 17 to 18, 2002, developed recommendations for physical health monitoring of individuals with schizophrenia for whom antipsychotic medication is prescribed **(69)**. The recommendations, included regular monitoring of BMI, plasma glucose level and lipid profiles, were presented in table 27.

Table 27 Recommendation of physical monitoring for schizophrenic patients **(69)**

	baseline	**Recommendation**
1. Weight and waist circumference	X	- Patients should be weighed and measured waist circumference at every visit for the first 6 months after medication initiation or change.
2.FPG or HbA_{1c}	X	- A baseline measurement of plasma glucose level should be obtained for all patients before starting a new antipsychotic drug. - Patients who have significant risk factors for diabetes (family history, BMI$\geq$ 25 kg/m^2, and waist circumference $\geq$ 35 inches for women and $\geq$ 40 inches for men) should have their FPG or HbA_{1c} value monitored 4 months after starting an antipsychotic drug and then yearly. In weight gain patients should monitor every 4 months.
3. Fasting lipid profile	X	- If the patient's LDL-C level is more than 130 mg/dl, he should be monitor lipid profile once every 6 months. - If the patient's LDL-C level is normal, he should be monitor lipid profile once every 2 years.

Besides this recommendation, the American Diabetes Association, the American Psychiatric Association, the American Association of Clinical Endocrinologists and the North American Association for the Study of Obesity convened a consensus development conference held during 19 to 21 November 2003 on the subject of antipsychotic drugs **(68)**. The monitoring protocol from this consensus was presented in table 28.

At the present time, this monitoring protocol is not generally adopted as a practice guideline in Thailand. However, the screening results in our schizophrenic patients revealed the presence of hyperglycemia, hypercholesterolemia and hypertriglyceridemia in 27 of 58 patients. Thus, this monitoring protocol should be applied to all schizophrenic patients in order to detect these abnormalities as early as possible.

Table 28 Monitoring protocol for patient on antipsychotic drugs **(68)**

	baseline	**4 weeks**	**8 weeks**	**12weeks**	**Quarterly**	**Annually**	**Every 5 years**
- Personal/family history	X					X	
- Weight (BMI)	X	X	X	X	X		
- Waist circumference	X					X	
- Blood pressure	X			X		X	
- FPG	X			X		X	
- Fasting lipid profile	X			X			X

It was also found that 22.4% (13 of 58) of our samples were presented with metabolic syndrome (from table 22). This prevalence was much lower than those found in schizophrenic patients in USA and Finland (63% and 37%, respectively) **(70,71)**. The clinical identification of the metabolic syndrome in this study was defined by ATP III (as shown in table 6). Abdominal obesity is defined as waist circumference $>$ 102 cm in men and $>$ 88 cm in women. These criteria are appropriate for Europeans, but are not suitable for Asia-Pacific population. If we adopt the criteria of waist circumference of 90 cm for men and 80 cm for women in Asia-Pacific population. There will be 18 of 58 (31.0%) of patients who are defined as metabolic syndrome instead of 13 of 58 (22.4%) patients using the ATP III criteria. However, this cut-off value is not standardized for the definition of metabolic syndrome in Asian-Pacific at the present time.

People with the metabolic syndrome are at increased risk for developing type 2 DM and cardiovascular disease and also at increased mortality from cardiovascular disease **(16,70,71)**. From prospective study that comprised a random age-stratified sample of 1,209 Finnish men aged 42 to 60 years, it was found that the metabolic syndrome was associated with 2.4-3.4 folds higher mortality from CHD than normal population **(16)**. Another large Finnish and Swedish study found that subjects with metabolic syndrome had 3 fold increased risk of CHD and stroke **(18)**.

Abdominal or visceral fat is associated with the cardiovascular risk factors of metabolic syndrome **(3)**. Abdominal obesity is an independent risk factor for coronary heart disease more important than overall obesity **(72-75)**. The visceral adipose tissue is measured directly with computed tomography (CT) or magnetic imaging resonance **(4,76)**. Nicklas et al. reported women with visceral adipose tissue (VAT) $\geq$ 106 cm^2 are associated with elevated risk. Women with VAT of 106-162 cm^2 are 2.5 times more likely to have a low HDL-C ($p<0.05$). While women with a VAT $\geq$ 163 cm^2 are 5.5 times more likely to have a low HDL-C ($p<0.01$) and approximately 4.0 times more likely to have a high LDL/HDL ratio ($p<0.05$) and higher risk of having impaired glucose tolerance ($p<0.01$) compared with women with a VAT $\leq$ 105 cm^2 **(76)**. However, CT is expensive and requires the radiation of the subjects. The simple clinical measure of visceral fat mass is waist circumference **(2,3,77)**. The waist circumference is better correlates of abdominal visceral adipose tissue accumulation than waist-to-hip ratio (WHR) and increasing values of waist circumference are more consistently associated with increase in fasting and post glucose insulin levels than increasing values of WHR **(77)**. Han et al. reported that larger waist circumference identified people at increased cardiovascular risk. However, waist circumference exceeding 102 cm in men and 88 cm in women identified cardiovascular

risk factors at 2.5-3 times than normal population **(78)**. In addition, schizophrenic patients had over 3 times as much intra-abdominal fat (IAF) as did normal controls **(79)**. In our study, the relationship of BMI and waist circumference was highly correlated in schizophrenic patients (r^2 = 0.64 in total patients, r^2 = 0.81 in men and r^2 = 0.49 in women, from figure 5,6,7). Therefore these 2 parameters should be used as an indicator for metabolic risks.

Pharmaceutical care is a practice in which the practitioner takes responsibility for a patient's drug related needs and held accountable for this commitment **(53)**. The safety profile of the medication is a one of drug related needs of patient **(53)**. Weight gain is an adverse drug reaction for schizophrenic patients who receive antipsychotic drugs. Weight gain affect on medication compliance **(1)** and have been associated with many complications such as hypertension, type 2 DM and coronary heart disease **(10,12)**. Therefore, pharmacist should have a role to identify, resolve and prevent weight gain in schizophrenic patients. A reasonable for weight loss is to achieve a 5-10% reduction in baseline body weight because when the patients had 5-10% weight loss, there will be at least 30% of visceral adipose tissue loss. In addition, lipid profile and insulin sensitivity are also improved. Thus 5-10% weight loss could improve in all metabolic markers of coronary heart disease risk **(48)**. Role of the pharmacist in the management of weight gain in the obese schizophrenic patients are described as the followings:

1. Measuring weight, height, waist circumference and calculating BMI.
2. Measuring BP.
3. Requesting laboratory test (FPG, HbA_{1c} and lipid profile) to the psychiatrist.
4. Setting target of weight reduction with patients and relatives. In general, the target of weight loss was set at 5% weight loss from initial body weight.
5. Advising patients and their relatives to control diet and increase exercise because diet therapy and physical activity are the mainstay for weight loss

5.1. Diet therapy.

For inpatients, pharmacist discussed with dietitian to adjust caloric intake to 1,800 kcal/day. In the patients who needed to reduce weight by 0.5 kg/week they might decrease caloric intake for 550 kcal/day **(80)**. The normal diet for inpatients at Somdet Chaopraya Institute of Psychiatry has 2,200-2,400 kcal/day. The 1,800 kcal diet was not different in portion size and meal frequency from normal diet for other patients. But 1,800 kcal diet was reduced in total fat e.g., low fat milk replaced whole milk or chocolate milk and steamed or boiled food replaced fried food. While energy rich foods such as sweet and cake was replaced with fruit, for example, watermelons, pineapples and oranges. The menu example with 1,800 kcal/ day was shown in appendix XI. Snack and high caloric drinks intake by inpatients were closely controlled by nurses and pharmacist.

For outpatients, the pharmacist advised to patients and relatives to reduce patients' caloric intake by avoiding fried food, high caloric drinks, snack and sweet, reducing habitual portion sizes and ate three or four meal per day and did not eat meal or snack during the night time.

5.2. Physical activity.

The patients are encouraged to exercise for at least 10-20 minutes every morning.

6. Identifying and preventing metabolic problems and informed psychiatrist when patients had metabolic problems.

The appropriate medical intervention was provided for co-morbid conditions such as DM and dyslipidemia. For obese patients with type 2 DM, the agents decreasing insulin resistance (metformin or thiazolidinediones) are preferred **(81)**. Metformin is a first choice antidiabetic agent in obese patients with type 2 DM **(81)** because it can reduce insulin resistance **(81,82)** and significantly

reduce food intake from it's mild anorexic effect **(81,83)**. The Diabetes Prevention Program **(84)** randomly assigned 3,234 nondiabetic persons with elevated fasting and post load plasma glucose concentration, BMI $\geq$ 24 kg/m^2 and age $\geq$ 25 years to placebo, metformin (850 mg twice daily) or lifestyle-modification. The results of this study revealed that the average weight loss was 0.1, 2.1 and 5.6 kg, respectively. Besides, metformin therapy was associated with less weight gain. In UKPDS study (85), it was found that metformin-treated group showed a greater reduction in any diabetes-related end points ($p<0.0034$) compared with patients receiving sulfonylureas or insulin (85). Metformin also effectively reduced CHD risk factors (weight, fasting insulin, leptin, LDL-C, centripetal obesity) in morbid obese **(86)**. Thiazolidinediones act as PPAR-γ agonist and reduce insulin resistance. However, patients who were treated with thiazolidinediones had reported weight gain because subcutaneous fat accumulation and some fluid retention **(81)**. While sulphonylureas stimulate insulin release from pancreatic islet β cells **(81)** and may induce weight gain **(83,87)**, thus, they are not considered as first choice treatment in obese diabetic patients **(81)**. Insulin therapy is rarely a good option in the obese diabetic patients because of massive insulin resistance and high risk of weight gain **(81,83)**. Therefore, when insulin is necessary, it is generally prescribed in combination with oral drugs to promote its action and avoid excessive weight gain **(83)**. For high LDL-C obese patients after 2 months of therapeutic lifestyle change (control diet and increase physical activity), the statin is recommended. The Scandinavian Simvastatin Survival Study reported that coronary events were significantly reduced with simvastatin in patients with diabetes and hypercholesterolemia **(87)**. In addition, Heart Protection Study (HPS) which recruited subjects more than 4,000 diabetes, simvastatin had decreased the risk of acute coronary syndrome, stroke and revascularization by 25% in the subgroup of diabetic patients **(88)**.

Nicotinic acid is not recommended since it worsens glycemic control and raises plasma uric acid level in type 2 DM patients **(89)**. Bile acid sequestants is also not recommended to treat dyslipidemia in obese patients because it worsens of hypertriglyceridemia **(89)**. For hypertriglyceridemia obese patients, fibrate such as gemfibrozil is prescribed because it proved to be highly effective in lowering lipids in type 2 DM with hypertriglyceridemia **(81,90)**

After pharmaceutical care intervention, 70% (9 of 13) of patients (from table 23) who were screened for metabolic syndrome at the baseline did not further diagnosed as metabolic syndrome at the end of the study. This result clearly demonstrated that this pharmaceutical care intervention could decrease the risk for developing metabolic syndrome in schizophrenic patients.

In this study, percentage of inpatients that lost body weight was more than percentage of outpatients (77.8% and 55.0%, respectively from table 21). There are various reasons for these differences. First, inpatients were prescribed with low caloric meals of 1,800 kcal per day, whereas in outpatients, the calories cannot be well controlled. Second, inpatients exercised for at least 10-20 minutes everyday and also had activity in the day time but most of the outpatients did not exercise and had sedentary lifestyle. In addition, snacks and high caloric drinks intake by inpatients were also closely controlled by nurses and pharmacists. Weight and waist circumference were also monitored 1-2 times in a month in inpatient cases. 29.3% (17 of 58) of patients (from table 20) could lose weight equal to or more than 5% of baseline body weight and only 5.2% (3 of 58) of patients could lose weight equal to or more than 10% of baseline body weight. The relationship between the patients and relatives was very important to control diet and increase physical activity in the patients.

Pharmaceutical care for obese schizophrenic patients are different from that for obese normal population.

- First, pharmaceutical care for obese schizophrenic patients emphasized in educating patient's relatives or caregivers about diet control and exercise because they could supervise patients for their diet and exercise at home and select the suitable foods for the patients who were usually non-complying with the diet control.
- Second, the contents of education for obese schizophrenic patients should be simple, easy to remember than those for normal population. Most of the contents for both diet and exercise were illustrated as picture (as shown in appendix XII).
- Finally, instead of the appearance, which is usually being concerned by the normal population, pharmacist suggested the patients in terms of the advantages related to their health.

In conclusion, this pharmaceutical care intervention is beneficial to the patient since we could detect IFG, type 2 DM, hypertension, dyslipidemia and also could suggest appropriate drug therapy to the psychiatrists. In addition, we could also control weight in these patients. We suggested that pharmaceutical care should be implemented in all psychiatric hospitals with the aim to improve quality of care in schizophrenic patients.

CHAPTER VI

CONCLUSION

Pharmaceutical care services in this study were provided to obese schizophrenic patients at Somdet Chaopraya Institute of Psychiatry during December 2003 to August 2004. The purpose of this study was to assess the effect of pharmaceutical care process provided to these patients.

In this study, it was found that 135 of 547 schizophrenic inpatients (24.7%) were obese (BMI $\geq$ 25 kg/m^2). The number of women who were obese were higher than those in men [87 of 247 (35.2%) and 48 of 300 (16.0%), respectively]. From 135 obese patients, 58 patients were enrolled in this study and they were followed up for 5 visits with a one-month interval.

Co-efficient of determination (r^2) value between BMI and waist circumference in all obese patients was 0.64. This means that waist circumference contributed to the increase in BMI by 64%.

At the end of the study, 62.1% (36 of 58) of the patients could lose their weight at the end of 4 months. In addition, 29.3% (17 of 58) of the patients could lose weight equal to or more than 5% of the baseline body weight. When weight reduction in inpatients and outpatients was compared, it was found that inpatients could achieve to have their weight reduction in 14 of 18 (77.8%), whereas outpatients could achieve to have their weight reduction in only 22 of 40 (55%). Thirteen patients were diagnosed as having metabolic syndrome at the baseline evaluation. At the end of the study, 9 of 13 patients were without metabolic syndrome. Ten out of 58 patients had 2 or more CHD risk factors and did not have CHD or CHD equivalent diseases. Six of 10 patients had no risk or only one risk factor at the end of the study. However, 4 of 10 patients still had 2 or more risk factors at the end of the study. Two patients had 10-year risk increased from 5% to 8% and 10% to 30% at the end of the study.

In conclusion, this pattern of pharmaceutical care process provided to obese schizophrenic patients was associated with decrease in weight and the risks of complication such as type 2 DM, hypertension and dyslipidemia. This study demonstrated that pharmacist could play the important role in healthcare team in part of identifying, resolving and preventing metabolic problems in order to enhance positive patient outcomes.

Study limitation

1. Schizophrenic patients who were enrolled in this study were inpatients. In this group of patients, especially patients who admitted for the short time, they were often not compliant and could not take care of themselves. Therefore, pharmaceutical care process was not definitely beneficial to these patients.
2. Because this study was designed as a comparison of parameters assessed before and after the treatments without control group, it could not be directly compared the results obtained from the patients who received pharmaceutical care with those who participated in regular treatment program. The control group of subjects could not be arranged in this study owing to ethical concerns, i.e. once any abnormalities have been diagnosed and the patient has to be treated appropriately.
3. Most of the outpatients could not control diet and exercise. Therefore their body weight was not well-controlled as in inpatients.

Suggestions

1. The pharmacist should carefully tell the patients about antipsychotic drugs-induced weight gain because the patients may be non-complied with antipsychotic drugs and cannot control their mental illness.
2. The monitoring protocol for metabolic complications should be applied to obese schizophrenic patients.
3. For outpatients, they should receive intensive weight control program with group meeting. This program includes teaching of the basic nutrition principles. Topics include healthful weight management, meal planning and portion size. Actual food model, the real foods are used to experiment with and identify portion size. Besides, teaching of the basic nutrition principles, they are encouraged to exercise on their own at least 3 times (20-30 minutes per time) per week.

References

1. National Task Force on the Prevention and Treatment of Obesity. Overweight, obesity and health risk. Arch Intern Med 160 (2000): 898-904.
2. NHLBI Obesity Education Initiative. Clinical guidelines on the identification, evaluation and treatment of overweight and obesity in adults. New York: NIH Pubication,1998.
3. International Obesity Task Force. The Asia-pacific perspective: Redefining obesity and its treatment 2000. Available from: http://www.obesityasiapacific.com.
4. Peter, J.V. and Khan, M.A. Obesity. In J.T. DiPiro et al. (Editors), Pharmacotherapy: a pathophysiologic approach, pp. 2543-63. New York: McGraw-Hill, 2002.
5. Sachs, G.S. and Guille, C. Weight gain associated with use of psychotropic medications. J Clin Psychiatry 60, S.21 (1999): 16-9.
6. Elmslie, J.L.;Mann, J.I.;Silverstone, J.T.;Williams, S.M. and Romans, S.E. Determinants of overweight and obesity in patients with bipolar disorder. J Clin Psychiatry 62, No.6 (2001): 486-91.
7. Miller, D.D. Review and management of clozapine side effects. J Clin Psychiatry 61, S.8 (2000): 14-7.
8. Basson, B.R. et al. Factors influencing acute weight change in patients with schizophrenia olanzapine haloperidol or risperidone. J Clin Psychiatry 62, No.4 (2001): 231-8.
9. Henderson, D.C. et al. Clozapine, diabetes mellitus, weight gain and lipid abnormalities: a five-year naturalistic study. Am J Psychiatry 157, No.6 (2000): 975-81.
10. Allison, D.B. et al. Antipsychotic-induced weight gain: a comprehensive research synthesis. Am J Psychiatry 156,No.11 (1999): 1686-96.

11. Meyer, J.M. Effects of atypical antipsychotics on weight and serum lipid levels. J Clin Psychiatry 62, S.27 (2001): 27-34.

12. Sussman, N. Review of atypical antipsychotics and weight gain. J Clin Psychiatry 62, S.23 (2001): 5-12.

13. Pratyasanti, J. Prevalence of obesity in psychiatric inpatient of Somdet Chaopraya Institute of Psychiatry. Bangkok,2003. (Mimeographed).

14. Helper, C.D. and Strand, L.M. Opportunities and responsibilities in pharmaceutical care. Am J Hosp Pharm 47 (1990): 533-43.

15. Willett, W.C.;Dietz, W.H. and Colditz, G.A. Guidelines for healthy weight. N Engl J Med 341, No.6 (1999): 427-34.

16. Lakka, H.M. et al. The metabolic syndrome and total and cardiovascular disease mortality in middle-aged men. JAMA 288, No.21 (2002): 2709-16.

17. National Cholesterol. Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Executive Summary. 2001. Available from: www.nhlbi.nih.gov/guidelines/cholesterol/atp_iii

18. Isomaa, B. et al. Cardiovascular morbidity and mortality associated with the metabolic syndrome. Diabetes Care 24, No.4 (2001): 683-9.

19. Expert Panel on Detection Evaluation and Treatment of High Blood Cholesterol in Adults. Executive summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA 285 (2001): 2486-97.

20. McIntyre, R.S.;McCann, S.M. and Kennedy, S.H. Antipsychotic metabolic effects: weight gain, diabetes mellitus and lipid abnormalities. Can J Psychiatry 46 (2001): 273-81.

21. Simpson, M.M.;Goetz, R.R.;Devlin, M.J.;Goetz, S.A. and Walsh, B.T. Weight gain and antipsychotic medication: differences between antipsychotic-free and treatment periods. J Clin Psychiatry 62, No.9 (2001): 694-700.

22. Bobes, J. et al. Weight gain in patients with schizophrenia treated with risperidone, olanzapine, quetiapine or haloperidol: results of EIRE study. Schizophr Res 62 (2003): 77-88.

23. Wirshing, D.A. et al. Novel antipsychotics:comparison of weight gain liabilities. J Clin Psychiatry 60, No.6 (1999): 358-63.

24. Meyer, J.M. A retrospective comparison of weight, lipid,and glucose changes between risperidone- and olanzapine-treated inpatients: metabolic outcomes after 1 year. J Clin Psychiatry 63, No.5 (2002): 425-33.

25. Kinon, B.J.;Basson, B.R.;Gilmore, J.A. and Tollefson, G.D. Long-term olanzapine treatment: weight change and weight-related health factors in schizophrenia. J Clin Psychiatry 62, No. 2 (2001): 92-100.

26. Lee, E.;Leung, C.M. and Wong, E. Atypical antipsychotics and weight gain in Chinese patients:a comparison of olanzapine and risperidone. J Clin Psychiatry 65,No.6 (2004): 864-6.

27. Pijl, H. and Meinders, A.E. Bodyweight change as an adverse effect of drug treatment. Drug Saf 14, No. 5 (1996): 329-42.

28. Vestergaard, P.;Poulstrup, I. and Schou, M. Prospective studies on a lithium cohort. Acta Psychiatr Scand 78, No. 7 (1988): 434-41.

29. Price, L.H. and Heninger, G.R. Lithium in the treatment of mood disorders. N Engl J Med 331, No. 9 (1994): 591-8.

30. Vestergaard, P.;Amdisen, A. and Schou, M. Clinically significant side effects of lithuim treatment. Acta Psychiatr Scand 62 (1980): 193-200.

31. Jallon, P. and Picard, F. Body weight gain and anticonvulsants. Drug Saf 24, No. 13 (2001): 969-78.

32. Biton, V. et al. Weight change associated with valproate and lamotrigine monotherapy in patients with epilepsy. Neurology 56 (2001): 172-7.

33. Isojarvi, J.I.T. et al. Obesity and endocrine diorders in women taking valproate for epilepsy. Ann Neurol 39 (1996): 579-84.

34. Sussman, N.;Ginsberg, D.L. and Bikoff, J. Effects of nefazodone on body weight: a pooled analysis of selective serotonin reuptake inhibitor and imipramine controlled trials. J Clin Psychiatry 62, No. 4 (2001): 256-60.

35. Ameringen, M.V.;Mancini, C.;Pipe, B.;Campbell, M. and Oakman, J. Topiramate treatment for SSRI-induced weight gain in anxiety disorders. J Clin Psychiatry 63 (2002): 981-4.

36. Brown, S.;Birtwistle, J.;Roe, L. and Thompson, C. The unhealthy lifestyle of people with schizophrenia. Psychol Med 29 (1999): 697-701.

37. Ryan, M.C.M. and Thakore, J.H. Physical consequences of schizophrenia and its treatment the metabolic syndrome. Life Sciences 71 (2002): 239-57.

38. Meltzer, H.Y. Mechanism of action of novel antipsychotic drugs. Shizophr Bull 17 (1991): 263-87.

39. Meltzer, H.Y.;Perry, E. and Jayathilake, K. Clozapine-induced weight gain predicts improvement in psychopathology. Schizophr Res 59 (2003): 19-27.

40. Muller, D.J.;Muglia, P.;Fortune, T. and Kennedy, J.L. Pharmacogenetics of antipsychotic-induced weight gain. Pharmacol Res 49 (2004): 309-29.

41. Baptista, T. Body weight garin induced by antipsychotic drugs:mechanisms and management. Acta Psychiatr Scand 100 (1999): 3-16.

42. Casey, D.E. and Zorn, S.H. The pharmacology of weight gain with antipsychotics. J Clin Psychiatry 62, S.7 (2001): 4-10.

43. Basile, V.S. et al. Genetic dissection of atypical antipsychotic-induced weight gain:novel preliminary data on the pharmacogenetic puzzle. J. Clin Psychiatry 62, S.23 (2001): 45-66.

44. McIntyre, R.S.;Mancini, D.A. and Basile, V.S. Mechanisms of antipsychotic-induced weight gain. J Clin Psychiatry 62,S.23 (2001): 23-9.

45. Reynolds, G.P.;Zhang, Z.J. and Zhang, X.B. Association of antipsychotic drug-induced weight gain with a 5-HT2C receptor gene polymorphism. Lancet 359 (2002): 2086-7.

46. Perkins, D.O. Predictors of noncompliance in patients with schizophrenia. J Clin Psychiatry 63 (2002): 1121-8.

47. Greenberg, I.;Chan, S. and Blackburn, G.L. Nonpharmacologic and pharmacologic management of weight gain. J Clin Psychiatry 60, S.21 (1999): 31-6.

48. Despres, J.P.;Isabelle, L. and Prud'homme, D. Treatment of obesity: need to focus on high risk abdominally obese patients. BMJ 322 (2001): 716-20.

49. Goldstein, D.J. Beneficial health effects of modest weight loss. Int J Obes 16 (1992): 397-415.

50. Yanovski, S.Z. and Yanovski, J.A. Obesity. N Engl J Med 346, No.8 (2002): 591-602.

51. Fabricatore, A.N. and Wadden, T.A. Treatment of obesity: an overview. Clin Diabetes 21, No.2 (2003): 67-72.

52. Ourbrisbane. National physical activities guidelines Ourbrisbane, Available from: www.ourbrisbane.com/sport/active_healthy_living/physical. [2003,November 12]

53. Cipolle, R.J.;Strand, L.M. and Morley, P.C. Pharmaceutical care practice. New York: McGraw-Hill,1998.

54. Menza, M. et al. Managing atypical antipsychotic-associated weight gain: 12-month data on a multimodal weight control program. J Clin Psychiatry 65 (2004): 471-7.

55. Aquila, R. and Emanuel, M. Interventions for weight gain in adults treated with novel antipsychotics. Primary Care Companion J Clin Psychiatry 2, No.1 (2000): 20-3.

56. Ball, M.P.;Coons, V.B. and Buchanan, R.W. A program for treating olanzapine-related weight gain. Psychiatr Serv 52, No.7 (2001): 967-9.

57. Cohen, J. Statistical power analysis for the behavioral sciences. New Jersey: Lawrence Erlbaum Associates,1998.

58. Mckenney, J.M. New guidelines for managing hypercholesterolemia. J Am Pharm Assoc 41 (2001): 596-607.

59. กรมอนามัย. รายงานการสำรวจภาวะอาหารและโภชนาการของประเทศไทย. พิมพ์ครั้งที่ 4. กรุงเทพมหานคร: กรมอนามัย กระทรวงสาธารณสุข, 2538.

60. Allison, D.B. et al. The distribution of body mass index among individuals with and without schizophrenia. J Clin Psychiatry 60, No.4 (1999): 215-20.

61. Coodin, S. Body mass index in persons with schizophrenia. Can J Psychiatry 46 (2001): 549-55.

62. Theisen, F.M. et al. Prevalence of obesity in adolescent and young adult patients with and without schizophrenia and in relationship to antipsychotic medication. J of Psychia Reserch 35 (2001): 339-45.

63. Hsiao, C.C.;Ree, S.C.;Chiang, Y.L.;Yeh, S.S. and Chen, C.K. Obesity in schizophrenic outpatients receiving antipsychotics in Taiwan. Psychia Clin Neurosciences 58 (2004): 403-9.

64. Lofgren, P. et al. Secretion of tumor necrosis factor - α shows a strong relationship to insulin- stimulated glucose transport in human adipose tissue. Diabetes 49 (2000): 688-92.

65. Ahima, R.S. and Flier, J.S. Adipose tissue as an endocrine organ. TEM 11, No.8 (2000): 327-32.

66. Prin, J.B. Adipose tissue as an endocrine organ. Best Pract Res Clin Endocrinol Metab 16,No.4 (2002): 635-51.

67. Katsuki, A. et al. Serum levels of tumor necrosis factor - α are increased in obese patients with noninsulin-dependent diabetes mellitus. J Clin Endrocrinol Metab 83 (1998): 859-62.

68. American Diabetes Association;American Association of Clinical Endocrinologists;American Psychiatric Association and North American Association for the Study of Obesity. Consensus development conference on antipsychotic drugs and obesity and diabetes. Diabetes care 27 (2004): 596-601.

69. Marder, S.R. et al. Physical health monitoring of patients with schizophrenia. Am J Psychiatry 161 (2004): 1334-49.

70. Heiskanen, T.;Niskanen, L.;Lyytikainen, R.;Saarinen, P.I. and Hintikka, J. Metabolic syndrome in patient with schizophrenia. J Clin Psychiatry 64 (2003): 575-9.

71. Ford, E.S.;Giles, W.H. and Dietz, W.H. Prevalence of the metabolic syndrome among US adults. JAMA 287, No.3 (2002): 356-9.

72. Lakka, H.M.;Lakka, T.A.;Tuomilehto, J. and Solonen, J.T. Abdominal obesity is associated with increased risk of acute coronary events in men. Eur Heart J 23,No.9 (2002): 706-13.

73. Rimm, E.B.;Stampfer, M.J. and Giovannucci, E. Body size and fat distribution as predictors of coronary heart disease among middle-aged and older US men. Am J Epidemiol 141 (1995): 1117-27.

74. Rexrode, K.M. et al. Abdominal adiposity and coronary heart disease in women. JAMA 280 (1998): 1843-8.

75. Folsom, A.R.;Stevens, J.;Schreiner, P.J. and McGovern, P.G. Body mass index, waist/ hip ratio, and coronary heart disease incidence in African Americans and

Whites Atherosclerosis Risk in Communities Study Investigators. Am J Epidemiol 148 (1998): 1187-94.

76. Nicklas, B.J. et al. Visceral adipose tissue cutoffs associated with metabolic risk factors for coronary heart disease in women. Diabetes Care 26, No.5 (2003): 1413-20.

77. Pouliot, M.C. et al. Waist circumference and abdominal sagittal diameter: best simple anthropometric indexes of abdominal visceral adipose tissue accumulation and related cardiovascular risk in men and women. Am J Cardiol 73 (1994): 460-8.

78. Han, T.S.;Leer, E.M.;Seidell, J.C. and Lean, M.E.J. Waist circumference action level in the identification of cardiovascular risk factors: prevalence study in a random sample. BMJ 311 (1995): 1401-5.

79. Thakore, J.H.;Mann, J.N.;Vlahos, I.;Martin, A. and Reznek, R. Increased visceral fat distribution in drug-naive and drug-free patients with schizophrenia. Int J Obes 26 (2002): 137-41.

80. ธิติรัตน์ ปานม่วง. อาหารลดน้ำหนัก. ใน อรอนงค์ กังสดาลอำไพ (บรรณาธิการ), โภชนบำบัด 2000, หน้า 61-77. กรุงเทพมหานคร: มาฉลองคุณ, 2542.

81. Scheen, A.J. Current management strategies for coexisting diabetes mellitus and obesity. Drugs 63, No. 12 (2003): 1165-84.

82. Florence, J.A. and Yeager, B.F. Treatment of type 2 diabetis mellitus. Am Fam Physician 59 No. 10 (1999): 2835-44.

83. Scheen, A.J. Treatment of diabetes in patients with severe obesity. Biomed & Pharmacother 54 (2000): 74-9.

84. Diabetes Prevention Program Research Group. Reduction in the incidence of the type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 346, No. 6 (2002): 393-403.

85. UK Prospective Diabetes Study (UKPDS) Group. Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). Lancet 352 (1998): 854-65.

86. Glueck, C.J. et al. Metformin reduces weight, centripetal obesity, insulin, leptin and low-density lipoprotein cholesterol in nondiabetic, morbidly obese subjects with body mass index greater than 30. Metabolism 50, No. 7 (2001): 856-61.

87. Larger, E.;Rufat, P.;Dubois-Laforgue, D. and Ledoux, S. Insulin therapy does not itself induce weight gain in patients with type 2 diabetes. Diabetes care 24, No. 10 (2001): 1849-50.

88. A subgroup analysis of Scandinavian Simvastatin Survival Study (4S). Cholesterol lowering with simvastatin improves prognosis of diabetic patients with coronary heart disease. Diabetes care 20, No. 4 (1997): 614-20.

89. Garg, A. and Grundy, S.M. Management of dyslipidemia in NIDDM. Diabetes care 13, No. 2 (1990): 153-69.

90. Garg, A. Lipid-lowering therapy and macrovascular disease in diabetes mellitus. Diabetes 41, No. 2 (1992): 1111-5.

APPENDICES

Appendix I: Data collection form

แบบบันทึกข้อมูลผู้ป่วยจิตเภทที่มีภาวะอ้วน

วันที่เก็บข้อมูล_____

วันที่เข้ารับการรักษาครั้งนี้_____

ลำดับที่_____ **ward**_____**แพทย์**_____

1. HN_____AN_____ชื่อ-นามสกุล_____

2. ที่อยู่ที่ติดต่อได้

_____

_____

_____

3.เบอร์โทรศัพท์ _____

4.ติดต่อกับ_____

5. เอกสารที่ได้รับ □คู่มือ □ สมุดบันทึก □ เอกสาร 1 □ เอกสาร 2 □ เอกสาร 3

	วันที่ถึงกำหนดเจาะเลือด	วันที่เจาะเลือด	หมายเหตุ
การเก็บข้อมูลครั้งแรก			
การติดตามครั้งที่ 1			
การติดตามครั้งที่ 2			
การติดตามครั้งที่ 3			
การติดตามครั้งที่ 4			

Note_____

_____

_____

_____

_____

I. ข้อมูลพื้นฐาน

1.HN_____AN_____ชื่อ-นามสกุล_____ลำดับที่_____

2. เพศ (1) ชาย (2) หญิง

3. วันเดือนปีเกิด _____

4. อายุ _____ ปี

5. สถานภาพสมรส (1) โสด (2) คู่ (3) ม่าย

6. การศึกษา (1) ต่ำกว่าประถมศึกษา (2) ประถมศึกษา
(3) มัธยมศึกษาตอนต้น (4) มัธยมศึกษาตอนปลาย
(5) ปวส./ อนุปริญญา (6) ปริญญาตรี
(7) สูงกว่าปริญญาตรี

II. ประวัติครอบครัว

(A1) ประวัติการเจ็บป่วยทางจิตของคนในครอบครัว
(1) ไม่มี (2) มี ได้แก่ _____

(A2) จำนวนพี่น้อง_____ คน (A2.1) ผู้ป่วยเป็นคนที่_____

(A3) จำนวนสมาชิกในครอบครัว_____คน
ได้แก่ _____

(A4) บิดา (1) มีชีวิตอยู่ (2) เสียชีวิต ด้วยโรค_____
โรคประจำตัว_____

(A5) มารดา (1) มีชีวิตอยู่ (2) เสียชีวิต ด้วยโรค_____
โรคประจำตัว_____

III. ประวัติการใช้สารเสพติด

(B1) ชา ☐ ดื่ม ความถี่ _____ จำนวน _____ แก้ว/วัน นาน_____ปี
☐ ไม่ดื่ม

(B2) กาแฟ ☐ ดื่ม ความถี่ _____ จำนวน _____ แก้ว/วัน นาน_____ปี
☐ ไม่ดื่ม

(B3) บุหรี่ ☐ สูบ ความถี่ _____ จำนวน _____ แก้ว/วัน นาน_____ปี
☐ ไม่สูบ

(B4) สุรา เบียร์ ☐ ดื่ม ความถี่ _____ จำนวน _____ แก้ว/วัน นาน_____ปี
☐ ไม่ดื่ม

(B5) สารเสพติดอื่นๆ □ ใช้ ความถี่ _____ จำนวน _____ แก้ว/วัน นาน_____ปี
คือ_____ □ ไม่ใช้

(C1) ประวัติแพ้ยา/ อาหาร (1) แพ้ (2) ไม่แพ้
รายชื่อยา/อาหารที่แพ้

1._____อาการ_____

2. _____อาการ_____

3. _____อาการ_____

(D1) โรคประจำตัว (1) มี (2) ไม่มี

กรณีมีโรคประจำตัว

(1) เบาหวาน (1) มี (2) ไม่มี

(2) ความดันโลหิตสูง (1) มี (2) ไม่มี

(3) หัวใจ (1) มี (2) ไม่มี

(4) ไต (1) มี (2) ไม่มี

(5) ตับ (1) มี (2) ไม่มี

(6) อื่นๆ (1) มี ระบุ_____(2) ไม่มี

(E1) ผู้ดูแลการรับประทานยา

(1) ผู้ป่วย (2) ญาติ ระบุ _____

(3) ทั้งผู้ป่วยและญาติ (4) อื่นๆ ระบุ_____

IV. ประวัติการเจ็บป่วย

(F1) อายุที่เริ่มเจ็บป่วยทางจิต _____ปี

(F2) เริ่มเจ็บป่วยทางจิตตั้งแต่ _____

(F3) ระยะเวลาที่เจ็บป่วยทางจิตจนถึงปัจจุบัน_____ ปี

V. ข้อมูลของผู้ดูแลผู้ป่วย

ชื่อ-นามสกุล_____

(G1) ความสัมพันธ์กับผู้ป่วย

(1) พ่อ-แม่ (2) พี่-น้อง (3) บุตร

(4) ญาติ (5) อื่นๆ ระบุ_____

(G2) ระดับการศึกษา

(1) ต่ำกว่าประถมศึกษา (2) ประถมศึกษา

(3) มัธยมศึกษาตอนต้น (4) มัธยมศึกษาตอนปลาย

(5) ปวส./ อนุปริญญา (6) ปริญญาตรี

(7) สูงกว่าปริญญาตรี

(G3) การอ่านออกเขียนได้

(1) อ่านและเขียนไม่ได้ (2) อ่านได้-เขียนไม่ได้ (3) อ่านได้-เขียนได้

VI. รายการยาที่ได้รับในปัจจุบัน

(H1) รายการยาที่ได้รับจากสถาบันจิตเวชศาสตร์สมเด็จเจ้าพระยา

1._____

2. _____

3. _____

4. _____

5. _____

(H2) รายการยาที่ได้รับจากที่อื่นรวมทั้งยาสมุนไพร ยาลูกกลอน และผลิตภัณฑ์เสริมอาหาร

1._____

2. _____

3. _____

4. _____

5. _____

6. _____

VII. การออกกำลังกาย

1. ชนิดของการออกกำลังกาย_____

2. ความถี่ของการออกกำลังกาย_____

3. ระยะเวลาในการออกกำลังกายแต่ละครั้ง_____

VIII. ข้อมูลเกี่ยวกับการรับประทานอาหาร

1. อาหารมื้อหลัก

1.1. รับประทานวันละ _____มื้อ

1.2. ประเภทอาหารที่รับประทาน

มื้อเช้า_____

มื้อเที่ยง_____

มื้อเย็น_____

1.3. ชอบรับประทานอาหารประเภท_____

ไม่ชอบรับประทานอาหารประเภท_____

1.4. รสชาติอาหารที่ชอบเป็นพิเศษ_____

1.5. รับประทานข้าวมื้อละ _____จาน

1.6. รับประทานมากในมื้อ_____

รับประทานน้อยในมื้อ_____

2. อาหารระหว่างมื้อ

2.1. รับประทานวันละ _____ครั้ง

เวลา_____

2.2. ประเภทอาหาร

*ของขบเคี้ยว ได้แก่_____

*ขนมหวาน ได้แก่_____

*ผลไม้ ได้แก่_____

*ลูกอม ได้แก่_____

*เครื่องดื่ม ได้แก่ _____

2.3. เครื่องดื่ม

- ดื่มขณะรับประทานอาหารได้แก่ _____

มื้อละ_____ ความถี่ต่อวัน_____

- ดื่มระหว่างวันได้แก่_____

ปริมาณ_____ ความถี่ต่อวัน_____

3.ข้อมูลเพิ่มเติม

IX. แบบบันทึกค่าน้ำหนัก ส่วนสูง ผลตรวจทางห้องปฏิบัติการ

HN_____AN_____ชื่อ-สกุล_____ลำดับที่_____

	การติดตามข้อมูล				
	ครั้งที่ 1	**ครั้งที่ 2**	**ครั้งที่ 3**	**ครั้งที่ 4**	**ครั้งที่ 5**
วันที่					
Weight (kg)					
Height (m)					
BMI (kg/m^2)					
Waist circumference (cm)					
BP(mmHg)					
Labolatory tests					
Fasting glucose (mg/dL)					
HbA_{1C} (%)					
Cholesterol (mg/dL)					
Triglyceride (mg/dL)					
HDL (mg/dL)					
LDL (mg/dL)					

ผลของค่าต่างๆแสดงถึง

☐ Metabolic syndrome (เข้าตามเกณฑ์ 3 ใน 5 ข้อ)

1. WC > 102 cm in men

   WC > 88 cm in women
2. Triglyceride ≥ 150 mg/dL
3. HDL< 40 mg/dL in men

   HDL < 50 mg/dL in women
4. BP ≥ 130/85 mmHg
5. Fasting glucose ≥ 110 mg/dL

☐ DM

☐ HTN

☐ Dyslipidemia

Medication record Page _____

Drug and dosage regimen	**Start date**										

Appendix II: SOAP form

แบบบันทึกระบบ SOAP

ชื่อผู้ป่วย_____อายุ_____วันที่_____

S_____

_____

O_____

_____

_____

A_____

_____

_____

_____

_____

_____

_____

P_____

_____

_____

_____

ลงชื่อเภสัชกร_____

ความเห็นของแพทย์

☐ เห็นด้วยกับแผนการรักษา

☐ เห็นด้วยและมีข้อเสนอเพิ่มเติม

_____

_____

_____

ลงชื่อแพทย์_____

Appendix III: Food intake diary

เอกสารบันทึกการรับประทานอาหารใน 1 วัน

ชื่อ_____วันที่_____ผู้บันทึก_____

มื้ออาหาร	อาหาร	ปริมาณ	หมายเหตุ
เช้า	ข้าว		ระบุว่า ครึ่งจาน 1 จาน หรือ 2 จาน
	☐ ข้าวสวย		
	☐ ข้าวต้ม		
	☐ อื่นๆระบุ_____		
	กับข้าว		ระบุว่า ครึ่งจาน 1 จาน 2 จาน หรือไม่ทานเลย กรณีผู้ป่วยซื้ออาหารมาทานเองโปรดระบุด้วย
	1._____		
	2._____		
	3._____		
	4._____		
	ขนม ระบุ_____		
	เครื่องดื่มระบุ_____		ระบุปริมาณ เช่น โค้ก 1 กระป๋อง หรือน้ำแปล่า 1 แก้ว
สาย	อาหาร ขนม ระบุ		ระบุชื่อขนมและปริมาณ เช่น มันฝรั่งเลย์ ซอง 6 บาท 1 ถุง ทองหยอด 3 ชิ้น
	1.		
	2.		
	3.		
	เครื่องดื่มระบุ_____		ระบุปริมาณ เช่น โค้ก 1 กระป๋อง หรือน้ำแปล่า 1 แก้ว
เที่ยง	ข้าว		ระบุว่า ครึ่งจาน 1 จาน หรือ 2 จาน
	☐ ข้าวสวย		
	☐ ข้าวต้ม		
	☐ อื่นๆระบุ_____		

มื้ออาหาร	อาหาร	ปริมาณ	หมายเหตุ
	กับข้าว		ระบุว่า ครึ่งจาน 1 จาน 2 จาน หรือไม่ทานเลย กรณีผู้ป่วยซื้ออาหารมาทานเองโปรดระบุด้วย
	1._____		
	2._____		
	3._____		
	4._____		
เที่ยง	ขนม ระบุ_____		
	เครื่องดื่มระบุ_____		ระบุปริมาณ เช่น โค้ก 1 กระป๋อง หรือน้ำเปล่า 1 แก้ว
บ่าย	อาหาร ขนม ระบุ		
	1.		
	2.		
	3.		
	เครื่องดื่มระบุ_____		
เย็น	ข้าว		ระบุว่า ครึ่งจาน 1 จาน หรือ 2 จาน
	☐ ข้าวสวย		
	☐ ข้าวต้ม		
	☐ อื่นๆระบุ_____		
	กับข้าว		ระบุว่า ครึ่งจาน 1 จาน 2 จาน หรือไม่ทานเลย กรณีผู้ป่วยซื้ออาหารมาทานเองโปรดระบุด้วย
	1._____		
	2._____		
	3._____		
	4._____		
	ขนม ระบุ_____		
	เครื่องดื่มระบุ_____		ระบุปริมาณ เช่น โค้ก 1 กระป๋อง หรือน้ำเปล่า 1 แก้ว
ก่อนนอน	อาหาร ขนม ระบุ		
	1.		
	2.		
	เครื่องดื่มระบุ_____		ระบุปริมาณ เช่น นม 1 กล่อง

Appendix IV: Booklet

บทนำก่อนรู้จักภาวะอ้วน

ปัจจุบันความนิยมในรูปร่างของคนเปลี่ยนแปลงไปจากเดิมที่คิดว่าคนที่มีรูปร่างอ้วนท้วนสมบูรณ์นั้น แสดงว่าเป็นคนมีฐานะดี สุขภาพสมบูรณ์ แต่ปัจจุบันคนส่วนใหญ่นิยมคนที่มีรูปร่างสมส่วน ไม่อ้วน ไม่ผอมจนเกินไป แล้วจะมีเกณฑ์อะไรในการตัดสินว่าคนไหนมีภาวะอ้วนเกิดขึ้นแล้ว คู่มือเล่มนี้สามารถตอบคำถามนี้และอีกหลายคำถามที่เกี่ยวกับภาวะอ้วนได้ นอกจากนั้นยังบอกถึงวิธีการควบคุมน้ำหนัก โดยจะกล่าวถึงหลักการแบบง่าย ๆ พร้อมตัวอย่างประกอบ

คู่มือฉบับนี้มีเป้าหมาย **เพื่อชี้ชวนให้ญาติและผู้ป่วยจิตเภทที่มีภาวะอ้วน เข้าใจและรู้ถึงปัญหาทางสุขภาพที่เกิดเนื่องจากภาวะอ้วนและทราบถึงหลักการของการควบคุมน้ำหนักอย่างง่าย ๆ จึงเป็นที่มาของชื่อคู่มือ “ภาวะอ้วน ชวนรู้”**

ภาวะอ้วนคืออะไร

ภาวะอ้วน คือ ภาวะที่มีการสะสมของไขมันตามส่วนต่าง ๆ ของร่างกายมากกว่าปกติ

สาเหตุของภาวะอ้วน

1) กินอาหารมากเกินความต้องการของร่างกาย และออกกำลังกายน้อย
2) กรรมพันธุกรรม ถ้าพ่อแม่อ้วนพบว่าลูกมีโอกาสอ้วนด้วย
3) ความผิดปกติที่สมอง ทำให้การควบคุมการกินอาหารผิดปกติ
4) ความผิดปกติของการทำงานของต่อมไร้ท่อ เช่น ฮอร์โมนอินซูลินมากเกินไป
5) ยาบางชนิด ทำให้เกิดความอยากอาหารมากขึ้น

เมื่อไรจึงถือว่าอ้วน

คำถามนี้คงจะมีคำตอบหลากหลายตามความคิดเห็นของแต่ละคน จึงจำเป็นจะต้องมีเกณฑ์ในการตัดสิน ซึ่งเกณฑ์ในการตัดสินที่ง่ายและเป็นที่นิยม คือ การหาค่าดัชนีมวลกาย (BMI) โดยการนำค่าน้ำหนักตัว (หน่วยเป็นกิโลกรัม) หารด้วยส่วนสูง (เป็นเมตร) ยกกำลังสอง

ถ้าค่า BMI มีค่าอยู่ระหว่าง **18.5-22.9 กิโลกรัม/ตารางเมตร** แสดงว่า **ปกติ**

ถ้า**น้อยกว่า 18.5 กิโลกรัม/ตารางเมตร** แสดงว่า **ผอม**

ถ้ามีค่าอยู่ระหว่าง **23-24.29 กิโลกรัม/ตารางเมตร** แสดงว่า **น้ำหนักเกิน**

ถ้ามีค่าตั้งแต่ **25 กิโลกรัม/ตารางเมตร** แสดงว่า **อ้วน**

ถ้ามีค่าตั้งแต่ **30 กิโลกรัม/ตารางเมตร** แสดงว่า **อ้วนมาก**

โดยนอกจากค่าดัชนีมวลกายที่บ่งถึงภาวะอ้วนแล้วค่าที่วัดได้ง่ายและมีความสำคัญมาก อีกค่าหนึ่ง คือ **ค่าเส้นรอบเอว** ซึ่งอาจเกิดข้อสงสัยสงสัยอีกว่า แล้วค่าเส้นรอบเอวบอกอะไรแก่เรา **ค่าเส้นรอบเอวนี้จะบอกถึงความเสี่ยงต่อการเกิดโรคต่างๆ เช่น โรคเบาหวาน โรคความดันโลหิตสูง และโรคไขมันในเลือดผิดปกติ** โดยมีเกณฑ์ในการตัดสินในผู้ชายและผู้หญิงแตกต่างกัน คือ ในผู้ชายถือว่ามีความเสี่ยงต่อการเกิดโรคมากขึ้นเมื่อมีขนาดเอวมากกว่า 36 นิ้ว ในผู้หญิงถือว่ามีความเสี่ยงต่อการเกิดโรคมากขึ้นเมื่อมีขนาดเอวมากกว่า 32 นิ้ว

โดยสามารถดูความเสี่ยงต่อการเกิดโรคเบาหวาน โรคความดันโลหิตสูง และโรคไขมันในเลือดผิดปกติได้จากตารางที่ 1

ตารางที่ 1 แสดงค่าดัชนีมวลกายและเส้นรอบเอวกับความเสี่ยงต่อโรคต่างๆ*

จำแนก	ดัชนีมวลกาย (กิโลกรัม/เมตร^2)	ความเสี่ยงต่อโรคต่าง ๆ*	
		เส้นรอบเอว	
		น้อยกว่า 36 นิ้วในผู้ชาย น้อยกว่า 32 นิ้วในผู้หญิง	มากกว่าหรือเท่ากับ 36 นิ้วในผู้ชาย มากกว่าหรือเท่ากับ 32 นิ้วในผู้หญิง
น้ำหนักน้อย	น้อยกว่า 18.5	ต่ำ	ปกติ
น้ำหนักปกติ	18.5-22.9	ปกติ	เพิ่มขึ้นเล็กน้อย
น้ำหนักเกิน	23-24.9	เพิ่มขึ้นเล็กน้อย	ปานกลาง
ภาวะอ้วนขั้นที่ 1	25-29.9	ปานกลาง	รุนแรง
ภาวะอ้วนขั้นที่ 2	มากกว่าหรือเท่ากับ 30	รุนแรง	รุนแรงมาก

หมายเหตุ ความเสี่ยงต่อโรคต่างๆ* หมายถึง โรคเบาหวาน โรคความดันโลหิตสูง และโรคไขมันในเลือดผิดปกติ

ที่มา: The Asia-Pacific perspective : redefining obesity and its treatment.

ตัวอย่างเช่น คุณสวยงาม เป็นหญิงสาว อายุ 28 ปี น้ำหนักตัว 57 กิโลกรัม สูง 165 เซนติเมตร เส้นรอบเอว 28 เซนติเมตร เมื่อนำมาคิดค่าดัชนีมวลกายโดยนำ 57 (กิโลกรัม) หารด้วย 1.65 (เมตร) ได้เท่ากับ 34.55 กิโลกรัม/เมตร และหารด้วย 1.65 (เมตร) อีกครั้ง จะได้ค่าดัชนีมวลกายเท่ากับ 20.94 กิโลกรัม/ตารางเมตร ถือว่าคุณสวยงามมีน้ำหนักตัวในเกณฑ์ปกติ ส่วนคุณจำม่ำ เป็นหญิง อายุ 40 ปี น้ำหนักตัว 100 กิโลกรัม สูง 165 เซนติเมตร เส้นรอบเอว 39 นิ้ว

เมื่อนำมาคิดค่าดัชนีมวลกายได้เท่ากับ 36.73 กิโลกรัม/ตารางเมตร **ถือว่าคุณจ้ำม่ำเป็นคนอ้วนมากและมีความเสี่ยงในการเกิดโรคเบาหวาน โรคความดันโลหิตสูง และโรคไขมันในเลือดผิดปกติรุนแรงมาก** เพราะมีเส้นรอบเอวมากกว่า 32 นิ้ว ซึ่งเป็นอันตรายต่อสุขภาพของคุณจ้ำม่ำมาก

อันตรายจากการเกิดภาวะอ้วน

ภาวะอ้วนนอกจากจะก่อให้เกิดความอึดอัด เหนื่อยง่าย และเชื่องช้าในการทำกิจกรรมต่างๆแล้ว ภาวะอ้วนยังมีผลสำคัญอีก 2 ประการคือ

1) เพิ่มอัตราการตาย

โดยพบว่าคนอ้วน (มีค่าดัชนีมวลกายตั้งแต่ 25 กิโลกรัม/ตารางเมตร) มีอัตราการตาย สูงกว่าคนไม่อ้วน และมีอัตราการตายมากขึ้นเรื่อยๆ เมื่อดัชนีมวลกายมากขึ้น

2) มีความเสี่ยงต่อการเกิดโรคต่างๆเพิ่มขึ้น ได้แก่

- โรคความดันโลหิตสูงและหัวใจขาดเลือด
- โรคเบาหวาน
- โรคไขมันในเลือดผิดปกติ
- โรคมะเร็งบางชนิด
- โรคข้อเสื่อม
- โรคนิ่วในถุงน้ำดี
- ภาวะหยุดหายใจขณะหลับ

เมื่อเราทราบถึงอันตรายที่จะเกิดขึ้นจากภาวะอ้วนแล้ว เราควรทำอย่างไร

เมื่ออ้วนแล้วควรทำอย่างไร

ในปัจจุบันมีการศึกษาพบว่า ถ้าคนอ้วนลดน้ำหนักตัวลงร้อยละ 5 ถึง 10 จะช่วยให้โรคเบาหวาน โรคความดันโลหิตสูงและโรคไขมันในเลือดผิดปกติดีขึ้น นั่นหมายถึง ถ้าคุณจ้ำม่ำมีน้ำหนักตัว 100 กิโลกรัม ถ้าลดน้ำหนักตัวลง 5-10 กิโลกรัมจะช่วยให้โรคต่างๆข้างต้นดีขึ้น

แล้วคุณจ้ำม่ำควรทำอย่างไร

ภาวะอ้วนเกิดจากการใช้พลังงานจากการกินมากกว่าพลังงานที่ใช้ไป ถ้าจะเปรียบเทียบการเพิ่มหรือลดของน้ำหนักตัวกับการเก็บเงินจะทำให้คุณเข้าใจง่ายขึ้น

ถ้าแต่ละวันเราได้เงินเพิ่มวันละ10 บาท ใช้ไป 5 บาท จะมีเงินเหลือเก็บวันละ 5 บาท เพิ่มขึ้นทุกๆ วัน เราจะมีเงินในถุงมากขึ้น

ถ้าแต่ละวันเราได้เงินเพิ่มวันละ10 บาท ใช้ไป 10 บาท จะไม่มีเงินเก็บเพิ่มขึ้นเลย เงินในถุงจะมีเท่าเดิม

ถ้าแต่ละวันเราได้เงินเพิ่มวันละ10 บาท ใช้ไป 15 บาท จะเป็นหนี้วันละ 5 บาทเพิ่มขึ้นทุกๆ วัน เราต้องนำเงินในถุงออกมาใช้ เงินในถุงจะมีน้อยลง

น้ำหนักตัวก็เช่นเดียวกับการเก็บเงิน ถ้าเรากินมากกว่าการใช้พลังงาน ผลก็คือ เกิดภาวะอ้วนขึ้นกับเรา ดังนั้นถ้าต้องการลดน้ำหนักให้ได้ผล จะต้องทำตาม 2 ข้อ ต่อไปนี้

I เลือกที่จะกิน

II. ใช้พลังงานเพิ่มขึ้น

I. เลือกที่จะกิน

มีข้อแนะนำว่าควรลดน้ำหนักลงอาทิตย์ละ ครึ่ง ถึง 1 กิโลกรัมเท่านั้น เพื่อให้ร่างกายค่อยๆปรับตัวตามธรรมชาติ เพราะการลดน้ำหนักตัวอย่างรวดเร็ว โดยการกินน้อยจะทำให้คนที่ลดน้ำหนักทุรนทุราย เพราะความหิวและกลับมากินตามปกติ ทำให้น้ำหนักตัวเพิ่มขึ้นอย่างรวดเร็ว

แต่ก่อนที่เราจะรู้จักเลือกที่จะกิน เราต้องเข้าใจก่อนว่าคนแต่ละคนมีความต้องการพลังงานในแต่ละวันไม่เท่ากัน ขึ้นกับเพศ อายุ และกิจกรรมที่คนคนนั้นทำ เช่น ชายอายุ 30 ปี ทำงานเป็นกรรมกรย่อมต้องการพลังงานที่ได้จากการกินมากกว่าหญิงอายุ 60 ปี ที่นั่งดูโทรทัศน์อยู่ที่บ้าน ซึ่งคุณจะต้องการพลังงานจากการกินเท่าไรใน 1 วัน สามารถดูได้จากตารางที่ 2

ตารางที่ 2 แสดงปริมาณแคลอรี่ที่คนไทยควรได้รับใน 1 วัน

อายุ (ปี)	เพศ	กิโลแคลอรี่	เพศ	กิโลแคลอรี่
20-29	ชาย	2550	หญิง	1800
30-39	ชาย	2450	หญิง	1700
40-49	ชาย	2350	หญิง	1650
50-59	ชาย	2200	หญิง	1550
60-69	ชาย	2000	หญิง	1450
70 ขึ้นไป	ชาย	1750	หญิง	1250

ที่มา : หนังสือหลักโภชนาการปัจจุบัน หน้า 139.

กลับมาที่คุณจ้ำม่ำ เป็นหญิงอายุ 40 ปี จากตารางที่ 2 ถ้าคุณจ้ำม่ำเป็นคนน้ำหนักปกติต้องการพลังงานจากการกิน 1,650 กิโลแคลอรี่ แต่จากการศึกษาพบว่า การลดน้ำหนักลง ครึ่ง กิโลกรัม/สัปดาห์ ต้องกินอาหารที่มีแคลอรี่น้อยลง วันละ 550 กิโลแคลอรี่ตลอดสัปดาห์ ดังนั้นคุณจ้ำม่ำควรกินอาหารวันละ 1,650 – 550 เท่ากับ 1,100 กิโลแคลอรี่

คุณจ๋ำม่ำจะกินอะไรได้บ้าง ?

อาหารแต่ละชนิดจะให้พลังงานที่แตกต่างกัน อาหารบางชนิดให้พลังงานมาก บางชนิดให้พลังงานที่น้อยกว่า **การที่เรากินอาหารที่ให้พลังงานมากลดลงจะช่วยให้เราลดน้ำหนักตัวลงได้** โดยสามารถดูได้ง่ายๆว่าอาหารใดที่ให้พลังงานมากจากตารางที่ 3 (สีชมพู) และอาหารใดให้พลังงานน้อยกว่าจากตารางที่ 4 (สีฟ้า)

ตารางที่ 3 แสดงรายการอาหารที่ให้พลังงานมากและอาหารที่ให้พลังงานน้อยกว่า

ชนิดอาหาร	พลังงาน (กิโลแคลอรี)	ชนิดอาหาร	พลังงาน (กิโลแคลอรี)
อาหารจานเดียว		***ขนม*****	
ก๋วยเตี๋ยวผัดซีอิ้วหมูใส่ไข่	679	บานาน่าสปริด	540
ข้าวคลุกกะปิ	614	ฟักทองแกงบวด	369
ข้าวมันไก่	596	ชอคโกแลตมิลล์เชค ไขมันต่ำ	320
ขนมผักกาดใส่ไข่	582	ไอศครีมซันเดย์	319
ก๋วยเตี๋ยวผัดไทยใส่ไข่	577	วานิลลามิลล์เชค ไขมันต่ำ	290
หมี่กรอบ	574	พายคัสตาร์ด	280
ข้าวผัดหมูใส่ไข่	557	ทับทิมกรอบ	276
ข้าวผัดใบกระเพราไก่	555	พายแอปเปิ้ลแมคโดนัลด์	260
ข้าวหมูแดง	541	เผือกกะทิ	256
ข้าวหมกไก่	534	กล้วยบวดชี	255
ก๋วยเตี๋ยวเส้นเล็กแห้งหมู	530	เฟรนฟรายด์แมคโดนัลด์	220
ข้าวแกงเขียวหวานไก่	483	ซาหริ่ม	217
หมี่กะทิ	465	บราวนี	140
ก๋วยเตี๋ยวแกง	454	ไอศกรีมวานิลลา	130
ขนมจีนซาวน้ำ	441	โดนัท	125
ข้าวขาหมู	436		
หอยแมลงภู่ทอดใส่ไข่	428		
ก๋วยเตี๋ยวเนื้อสับ	417		

ตารางที่ 4 แสดงรายการอาหารที่ให้พลังงานน้อยกว่า

ชนิดอาหาร	พลังงาน (กิโลแคลอรี)	ชนิดอาหาร	พลังงาน (กิโลแคลอรี)
อาหารจานด่วน*		**ผลไม้*** **	
บิ๊กแมค	560	มะขามหวาน	333
แซนด์วิชไก่, แมคโดนัลด์	490	ทุเรียนหมอนทอง	163
แซนด์วิชไก่, เคเอฟซี	482	กล้วยน้ำว้า	148
ไก่ชุบแป้งทอด อก KFC	406	ทุเรียนชะนี	148
ครัวซอง ไข่ + ชีส	369	กล้วยไข่	147
ชีสเบอร์เกอร์	307	กล้วยหอม	132
แฮมเบอร์เกอร์ปลา	267	ขนุน	117
ไก่ชุบแป้งทอด ปีก KFC	254	ลำใย	111
		ละมุดไทย	93
		มะม่วงเขียวเสวยดิบ	87
		มะม่วงเขียวเสวยสุก	82
		มังคุด	82
		เงาะโรงเรียน	76

หมายเหตุ อาหารจานด่วน* และขนม* * ค่าพลังงานคิดจาก 1 ส่วนรับประทาน
ผลไม้*** ค่าพลังงานคิดจากน้ำหนักส่วนที่กินได้ 1 ขีด

ที่มา : ดัดแปลงจากหนังสือโภชนบำบัด 2000 หน้า 71 –72.
หนังสือตำรับอาหารจานเดียวกับคุณค่าทางโภชนาการ หน้า 55.
ตารางแสดงคุณค่าทางโภชนาการของอาหารไทย หน้า 38-42

ชนิดอาหาร	พลังงาน (กิโลแคลอรี)	ชนิดอาหาร	พลังงาน (กิโลแคลอรี)
อาหารจานเดียว		**ผลไม้*** **	
ก๋วยเตี๋ยวเส้นใหญ่ราดหน้าหมู	397	มะละกอ	53
ก๋วยเตี๋ยวเส้นใหญ่ราดหน้าไก่	385	ส้มโอทองดี	44
ก๋วยเตี๋ยวเส้นใหญ่เย็นตาโฟ	352	ฝรั่งกลมสาลี่	43
ขนมจีนน้ำยา	332	ส้มเขียวหวาน	42
ก๋วยเตี๋ยวเส้นใหญ่ราดหน้ากุ้ง	292	ชมพู่เมืองเพชร	28
ข้าวยำปักษ์ใต้	248	แตงไทย	13
ขนมจีนน้ำเงี้ยว	243	แตงโม	8
กระเพาะปลาปรุงสำเร็จ	239		
ขนมจีนน้ำพริก	228		
เส้นหมี่ลูกชิ้นเนื้อวัวน้ำ	226		
ขนมจีนน้ำยาปักษ์ใต้	146		

หมายเหตุ ผลไม้*** ค่าพลังงานคิดจากน้ำหนักส่วนที่กินได้ 1 ขีด

ที่มา : ดัดแปลงจากหนังสือโภชนบำบัด 2000 หน้า 71 –72.
หนังสือตำรับอาหารจานเดียวกับคุณค่าทางโภชนาการ หน้า 55.
ตารางแสดงคุณค่าทางโภชนาการของอาหารไทย หน้า 38-42.

ลองคิดดูถ้าคุณจ้ำม้ำ กินอาหารมื้อเช้า ซึ่งประกอบด้วย

1. ก๋วยเตี๋ยวผัดซีอิ้วหมูใส่ไข่ 1 จาน ให้พลังงาน 679 กิโลแคลอรี
2. กล้วยบวดชี 1 ถ้วย ให้พลังงาน 255 กิโลแคลอรี
3. ไอศกรีมซันเดย์ 1 ถ้วย ให้พลังงาน 319 กิโลแคลอรี

จะเห็นได้ว่าคุณจ้ำม้ำจะได้รับพลังงานจากการกินอาหารมื้อเช้ามื้อเดียว เท่ากับ 1,253 กิโลแคลอรีซึ่งมากกว่าพลังงานที่ควรได้รับทั้งวันเมื่อต้องการลดน้ำหนัก (1,100 กิโลแคลอรี) ดังนั้น ถ้าคุณจ้ำม้ำเปลี่ยนรายการอาหารมาเป็น

ก๋วยเตี๋ยวราดหน้ากุ้ง 1 จาน ให้พลังงาน 292 กิโลแคลอรี
ชมพู่เมืองเพชร 3 ขีด ให้พลังงาน 84 กิโลแคลอรี

ซึ่งจะให้พลังงานรวมเพียง 376 กิโลแคลอรี ดังนั้นคุณจะเห็นว่าอาหารต่างชนิดกันจะให้พลังงานที่ไม่เท่ากัน **ดังนั้นคุณควรหลีกเลี่ยงอาหารที่ให้พลังงานมาก**

นอกจากคุณจะหลีกเลี่ยงการกินอาหารที่ให้พลังงานมากแล้ว เรายังมีเคล็ดลับในการกินอาหารมาฝากกันด้วย

เคล็ดลับในการกินอาหาร

เคล็ดลับในการกินอาหารเน้นไปที่ 2 เรื่อง คือ เรื่องของอาหารและวิธีการกินอาหาร ซึ่งจะกล่าวแยกเป็นเรื่องๆ ดังนี้

อาหาร

1. ลดการกิน

- **ขนมหวาน** เช่นขนมเค้ก ลูกอม ช็อกโกแลต ทองหยิบ ทองหยอด วุ้นน้ำเชื่อม สังขยา น้ำหวาน ผลไม้เชื่อม ผลไม้กวน น้ำอัดลม และผลไม้กระป๋อง
- อาหาร**ฟาสฟู้ด** เช่นแฮมเบอร์เกอร์ ไก่ทอด มันฝรั่งทอด
- **ผลไม้หวานจัด** เช่นทุเรียน ลำใย มะม่วงสุก องุ่น ขนุน ละมุด อ้อย
- **อาหารที่มีไขมันมาก** เช่นหมูสามชั้น กุนเชียง ไส้กรอก เบคอน ข้าวมันไก่ มันฝรั่งทอด ข้าวเกรียบทอด ถั่วลิสง เม็ดมะม่วงหิมพานต์ **อาหารที่มีกะทิ** เช่น กล้วยบวดชี แกงไก่
- **เครื่องดื่มที่มีแอลกอฮอล์**

2. **ควรกิน**
   - **ผักและผลไม้** เพราะมีเส้นใยอาหารสูงแต่ให้พลังงานต่ำ ผลไม้ที่ควรรับประทานได้แก่ ชมพู่ ฝรั่ง ส้ม สัปปะรดที่ไม่หวานมาก
   - **เนื้อปลา เนื้อหมู และเป็ดไก่ที่ลอกหนังแล้ว**
   - **น้ำอัดลมชนิดไดเอท แทนชนิดธรรมดา**
   - **นมพร่องมันเนย แทนนมปกติ** และ **ควรหลีกเลี่ยงนมปรุงแต่ง** เช่น นมหวาน นมช็อกโกแลต

3. **ควรปรุงอาหารโดยวิธีการนึ่ง อบ หรือย่าง** แทนการทอดหรือผัด เช่นเปลี่ยนจากปลาทอดเป็นปลานึ่ง

<u>วิธีการกิน</u>

1. กินอาหารให้**ครบทั้ง 5 หมู่** ให้**ครบทั้ง 3 มื้อ** แต่**ลดปริมาณอาหารลง โดยเฉพาะอาหารมื้อเย็น** ห้ามอดอาหารมื้อใดมื้อหนึ่ง
2. **ตักอาหารเข้าปากช้า ๆ** และ**หยุดกินทันทีเมื่อรู้สึกอิ่ม**
3. **ลดการกินอาหารจุบจิบหรือน้ำหวาน**ระหว่างมื้อ

ถ้า**คุณทำได้ทั้งการปรับอาหารและวิธีการกิน** น้ำหนักตัวคุณก็จะลดลงแล้ว หรืออย่างน้อยก็ไม่เพิ่มขึ้น

II. ใช้พลังงานเพิ่มขึ้น

การใช้พลังงานมากขึ้นสามารถทำได้ 2 ทางคือ

1. **การเพิ่มการออกกำลังกาย** โดยข้อแนะนำในการออกกำลังกาย**ควรทำอย่างน้อยครั้งละ 30 นาที สัปดาห์ละอย่างน้อย 3 วัน**
2. **เพิ่มการเคลื่อนไหวของร่างกาย** โดยเปลี่ยนจากการนั่ง-นอน ดูโทรทัศน์ นอนฟังเพลง นั่งเล่นเกม มาเป็น การเดินไปตลาด เดินเล่นหลังอาหาร ช่วยงานบ้าน เช่น กวาดบ้าน ถูบ้าน เช็ดโต๊ะ เปลี่ยนจากการใช้ลิฟต์มาใช้บันไดแทน เพียงเท่านี้คุณก็ใช้พลังงานมากขึ้นแล้ว โดย**มีข้อแนะนำให้คุณทำกิจกรรมเพื่อเพิ่มการเคลื่อนไหวของร่างกายอย่างน้อยวันละ 30 นาที** โดยอาจจะทำต่อเนื่องเป็นเวลา 30 นาทีเลย หรือทำกิจกรรมอย่างต่อเนื่องอย่างน้อยครั้งละ 10 นาทีให้ได้เวลารวม 30 นาทีต่อวัน โดยกิจกรรมที่ทำได้แก่ การเดินเร็ว การทำสวน การขี่จักรยาน การเต้นรำ

จะเห็นได้ว่า **เพียงคุณเปลี่ยนจากการนอนดูโทรทัศน์มาเป็นกิจกรรมอื่น ๆ ที่คุณชอบแทน** คุณจะมีทั้งความสุขในการทำสิ่งที่ชอบและยังช่วยลดน้ำหนักตัวลดลงอีกด้วย

ดังนั้นสิ่งที่สำคัญ คือการเลือกที่จะกินอาหารและใช้พลังงานเพิ่มขึ้น <u>โดยจะต้องทำให้เป็นนิสัย</u> ซึ่งช่วงแรก ๆ อาจจะยาก ดังนั้น **จึงต้องอาศัยกำลังใจจากคนใกล้ชิด รวมทั้งความตั้งใจในการควบคุมน้ำหนักตัวของคุณเอง** โดย**คุณควรชั่งน้ำหนักเดือนละ 1-2 ครั้ง และมีการจดบันทึกไว้** เมื่อน้ำหนักตัวเพิ่มขึ้น ควรรีบควบคุมน้ำหนัก

อย่าลืมว่า..!! **น้ำหนักตัวคงที่ดีกว่าน้ำหนักตัวเพิ่มขึ้น.**

สรุปหัวใจของการลดน้ำหนัก

1) **เลือกที่จะกิน** – ลดการกินอาหารมัน อาหารหวาน อาหารฟาสฟู้ด
2) **ใช้พลังงานเพิ่มขึ้น** - ทำกิจกรรมที่ช่วยให้ใช้พลังงานมากขึ้นแทนการนอนดูโทรทัศน์
3) **ทำให้เป็นนิสัย** - ทำตามข้อ 1 และ 2
   - หมั่นชั่งน้ำหนักตัวเดือนละ 1-2 ครั้ง

เพียงเท่านี้คุณก็จะสามารถลดหรือควบคุมน้ำหนักตัวได้แล้ว

ไม่ยากเลยใช่ไหม....!!

รายการบันทึกน้ำหนัก

ชื่อ.....วันที่.....

เพศ*.....*อายุ*.....*ปี
น้ำหนัก.....กิโลกรัม
ส่วนสูง.....เซนติเมตร
ค่าดัชนีมวลกาย.....กิโลกรัม/เมตร^2
เส้นรอบเอว.....เซนติเมตร

ผล ❒ ดัชนีมวลกายมากกว่าหรือเท่ากับ 5 กิโลกรัม/เมตร^2
❒ ดัชนีมวลกายมากกว่าหรือเท่ากับ 30 กิโลกรัม/เมตร^2
❒ เส้นรอบเอวมากกว่าหรือเท่ากับ 36 นิ้วในชาย
❒ เส้นรอบเอวมากกว่าหรือเท่ากับ 32 นิ้วในหญิง
สรุป.....

รายการ	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	ครั้งที่ 4	ครั้งที่ 5
วันที่					
น้ำหนัก (กิโลกรัม)					
ส่วนสูง (เซนติเมตร)					
ดัชนีมวลกาย (กิโลกรัม/เมตร^2)					
เส้นรอบเอว (เซนติเมตร)					
ความดันโลหิต (มิลลิเมตรปรอท)					
<u>ค่าผลตรวจเลือด</u>					
Fasting glucose (mg/dL)					
HbA_{1C} (%)					
Cholesterol (mg/dL)					
Trglyceride (mg/dL)					
HDL (mg/dL)					
LDL (mg/dL)					

APPENDIX V

n^{*} to detect d^{**} by t-test ($\alpha = 0.05$)

Power	**.10**	.20	.30	.40	.50	.60	.70	.80	1.00	1.20	1.40
.25	332	84	38	22	14	10	8	6	5	4	3
.50	769	193	86	49	32	22	17	13	9	7	5
.60	981	246	110	62	40	28	21	16	11	8	6
2/3	1144	287	128	73	47	33	24	19	12	9	7
.70	1235	310	138	78	50	35	26	20	13	10	7
.75	1389	348	155	88	57	40	29	23	15	11	8
.80	**1571**	393	175	99	64	45	33	26	17	12	9
.85	1797	450	201	113	73	51	38	29	19	14	10
.90	2102	526	234	132	85	59	44	34	22	16	12
.95	2600	651	290	163	105	73	54	42	27	19	14
.99	3675	920	409	231	148	103	76	58	38	27	20

n^{*} = sample size

d^{**} = the effect size

Appendix VI

Assessment and categorization of the patient's CHD risk

Once the fasting lipoprotein profile has been obtained and assessed, a history of clinical CHD event and CHD risk factors should be obtained. With this information, the patient can be classified into one of three risk categories as presented in table VI -1.

1. **CHD or CHD risk equivalent**
2. **Two or more CHD risk factors**
3. **Zero or one risk factor**

1. CHD or CHD risk equivalent

The CHD patient can be identified by the presence of one or more of the following:

- Signs and symptoms of stable angina pectoris
- History of myocardial infarction
- Evidence of a silence myocardial infarction or myocardial ischemia
- History of unstable angina
- Revascularization procedures such as coronary bypass surgery and angioplasty

ATP III has increased the number of patients who fit into this category by adding the CHD risk equivalent patients. Patients with a CHD risk equivalent have the same level of CHD risk but have not yet experienced a CHD event. Following is a description of the three CHD risk equivalent patient groups.

1) Patients with other forms of atherosclerotic vascular disease. This includes patients with peripheral vascular disease, abdominal aortic aneurysm or symptomatic carotid artery disease.

2) Patients with type 2 DM

3) Patients with global risks exceeding 20% in 10 years

2. Two or more CHD risk factors

Patients who have not experienced a CHD event and a CHD risk equivalent but have two or more CHD risk factors are assigned to an intermediate risk category. The list of risk factors for making this determination is presented in table VI-2.

3. Zero or one risk factor

The final risk assessment category is for those with fewer than two CHD risk factors. These patients almost always have a 10-year CHD risk of less than 10%.

Table VI-1 Initial classification of hyperlipidemia patients

Risk category	LDL-C Goal
CHD or CHD risk equivalent	≤100 mg/dl
Multiple (≥2) risk factors	<130 mg/dl
0-1 risk factor	<160 mg/dl

CHD = coronary heart disease; LDL-C = low-density lipoprotein cholesterol

Table VI-2 Major risk factors for CHD other than LDL-C

Age (men ≥ 45 years; women ≥ 55 years)
Family history of premature CHD (clinical CHD or sudden death documented in first-degree male relatives before age 55 or female relatives in first-degree before age 65)
Cigarette smoking (any cigarette smoking in the past month)
Hypertension (blood pressure ≥ 140/90 mm Hg or on antihypertensive medication)
Low HDL-C (<40 mg/dl)

CHD = coronary heart disease; HDL-C = high-density lipoprotein cholesterol;

LDL-C = low-density lipoprotein cholesterol

HDL-C ≥ 60 mg/dl is a “negative” risk factor (i.e., its presence removes one risk factor from the total count)

Appendix VII: Management of obesity

Management of obesity should include dietary modification and physical activity

1) Dietary modification

1.1 Restrict the amount of high fat and high caloric foods. The diet should be restricted for fats, oils, sweets, coconut cream, fast foods, alcoholic drink and soft drink.

1.2 Emphasize vegetables, fish, chicken without skin but no sweet fruits.

1.3 Should drink low fat milk instead of whole milk or chocolate milk

1.4 Should drink diet soft drink instead of soft drink

1.5 Should eat steamed or boiled food instead of fried food

1.6 Should distribute food intake as even as possible throughout the day (typically, three meals) and meals should not be skipped

1.7 Decrease comsumption of snack and soft drink between meals

1.8 Eat slowly and put down the fork when have enough

2) Physical activity

2.1 Programmed activity

Programmed activity is typically planned, aerobic and completed in a signal bout e.g. walking, biking, swimming, running and aerobic classes.

The patients should do programmed activity for 30 minutes 3 times a week.

2.2 Lifestyle activity

Lifestyle activity involves increasing energy expenditure throughout the day by methods such as using stairs rather than escalators, walking to shop or office instead of taking a bus or driving, finding some household tasks to do instead of watching television.

Appendix VIII: Calculation of food exchange

In patients who need to reduce weight by 0.5 kg/week they may decrease caloric intake for 550 kcal/day. The normal diet for inpatients at Somdet Chaopraya Institute of Psychiatry contain 2,200-2,400 kcal/day. Therefore, a 1,800 kcal diet is appropriate caloric intake for these patients because this diet is not different in portion size and meal frequency from normal diet for other schizophrenic patients. In addition, there is restricted by limitation of time and dietitian workload. Thus, the dietitian can not prepare different caloric diet for each patient.

The food exchange list

The data of food exchange for one serving size of six food groups are presented in table VIII-1

Table VIII-1 Food exchange list for meal planning

Food	**One serving size**	**Nutrition of One serving size**			
		Carbohydrate (g)	**Protein (g)**	**Fat (g)**	**Energy (kcal)**
1) Milk (low fat)	240 cc	12	8	5	125
2) Starch	75 g	15	3	-	72
3) Meat (lean)	30 g	-	7	3	55
4) Vegetable	100 g	5	2	-	28
5) Fat	1 Teaspoon	-	-	5	45
6) Fruit	-	15	-	-	60

Calculation of the nutrition

- Protein 20% of total energy = (20/100)*1,800 = 360 kcal

  360/4 kcal = 90 g

- Carbohydrate 55% of total energy = (55/100)*1,800 = 990 kcal

  990/4 kcal = 247.5 g

- Fat 25% of total energy = (25/100)*1,800 = 450 kcal

  450/4 kcal = 50 g

Base on a 1,800 kcal diet calculated by the exchange system, each patient receives protein 90 g, carbohydrate 247.5 g and fat 50 g.

First, the carbohydrate groups are calculated

Food	**Number of servings**	**Carbohydrate (g)**	**Protein (g)**	**Fat (g)**
Milk (low fat)	2	12*2 = 24	8*2 = 16	5*2 = 10
Vegetable	4	5*4 = 20	2*4 = 8	-
Fruit	4	15*4 = 60	-	-

Total carbohydrate = 104 g

The amount of carbohydrate required = 247.5-104 = 143.5 g

Starch = 143.5/15 = 9.6 servings

Food	**Number of servings**	**Carbohydrate (g)**	**Protein (g)**	**Fat (g)**
Starch	9	15*9 = 135	3*9 = 27	-

Total Protein = 16+8+27 = 51 g

The amount of Protein required = 90-51 = 39 g

Meat (lean) = 39/7 = 5.57 servings

Food	**Number of servings**	**Carbohydrate (g)**	**Protein (g)**	**Fat (g)**
Meat (lean)	6	-	7*6 = 42	3*6 = 18

Total fat = 28 g

The amount of fat required = 50-28 = 22 g

Fat = 22/5 = 4.4 servings

Food	**Number of servings**	**Carbohydrate (g)**	**Protein (g)**	**Fat (g)**
Fat	4	-	-	5*4 = 20

A 1,800 kcal diet and distribution of food exchanges are shown in table VIII-2 and table VIII-3, respectively.

Table VIII-2 1,800 kcal diet

Food	**Number of servings**	**Carbohydrate (g)**	**Protein (g)**	**Fat (g)**
1) Milk (low fat)	2	24	16	10
2) Starch	9	135	27	-
3) Meat (lean)	6	-	42	18
4) Vegetable	4	20	10	-
5) Fat	4	-	-	20
6) Fruit	4	60	-	-
	Total	**239**	**95**	**48**

Table VIII-3 Distribution of food exchanges (1,800 kcal/day)

Food	Number of servings			
	Total	**Morning**	**noon**	**evening**
1) Milk (low fat)	2	1	-	1
2) Starch	9	2	3	4
3) Meat (lean)	6	2	2	2
4) Vegetable	4	1	1.5	1.5
5) Fat	4	1	1	2
6) Fruit	4	1	1	2

The dietitian prepared the 1,800 kcal diet for each patient by application of the food exchange list and the favorite and non–favorite food note.

APPENDIX IX

Scoring system for calculating patient CHD 10-year risk

Age	Points (Men)	Points (Women)
20-34	-9	-7
35-39	-4	-3
40-44	0	0
45-49	3	3
50-54	6	6
55-59	8	8
60-64	10	10
65-69	11	12
70-74	12	14
75-79	13	16

Total Cholesterol: Men (Women)

Total Cholesterol	Points at Ages 20-39	Points at Ages 40-49	Points at Ages 50-59	Points at Ages 60-69	Points at Ages 70-79
< 160	0	0	0	0	0
160-199	4	3	2	1	0 (1)
200-239	7 (8)	5 (6)	3 (4)	1 (2)	0 (1)
240-279	9 (11)	6 (8)	4 (5)	2 (3)	1 (2)
≥ 280	11 (13)	8 (10)	5 (7)	3 (4)	1 (2)

Smoking: Men (Women)

Total Cholesterol	Points at Ages 20-39	Points at Ages 40-49	Points at Ages 50-59	Points at Ages 60-69	Points at Ages 70-79
Nonsmoker	0	0	0	0	0
Smoker	8 (9)	5 (7)	3 (4)	1 (2)	1 (1)

Systolic BP: Men (Women)

Systolic BP	Untreated	Treated
< 120	0	0
120-129	0 (1)	1 (3)
130-139	1 (2)	2 (4)
140-159	1 (3)	2 (5)
≥ 160	2 (4)	3 (6)

HDL-C: Men and Women

HDL	Points (Men)	Points (Women)
≥ 60	-1	-1
50-59	0	0
40-49	1	1
< 40	2	2

Total points: for Men

Total Points	10-Year Risk	Total Points	10-Year Risk
< 0	< 1%	11	8%
1	1%	12	10%
2	1%	13	12%
3	1%	14	16%
4	1%	15	20%
5	2%	16	25%
6	2%	≥ 17	≥ 30%
7	3%		
8	4%		
9	5%		
10	6%		

Total points: for Women

Total Points	10-Year Risk	Total Points	10-Year Risk
< 9	< 1%	20	11%
9	1%	21	14%
10	1%	22	17%
11	1%	23	22%
12	1%	24	27%
13	2%	≥ 25	≥ 30%
14	2%		
15	3%		
16	4%		
17	5%		
18	6%		
19	8%		

Appendix X: Pharmaceutical care intervention in obese schizophrenic patients

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
1 IPD Woman 65 years old	1) known case DM and was treated with glibenclamide 5 mg 1 × 1 ac, metformin 500 mg 1 × 2 pc (FPG 90 mg/dl, HbA_{1c} =10.2%). 2) dyslipidemia ; visit 1 -cholesterol 173 mg/dl -TG 100 mg/dl -HDL-C 44 mg/dl -LDL-C 109 mg/dl visit 3 -cholesterol 205 mg/dl -TG 224 mg/dl -HDL-C 51 mg/dl -LDL-C 134 mg/dl (target LDL-C =100 mg/dl) 3) known case HT and was treated with enarapril 5 mg ½ ×1pc(BP 120/80 mmHg). 4) severe obesity ; -wt 71 kg -ht 145.5 cm -BMI 33.54 kg/m^2 -WC 110.5 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) suggested psychiatrist to increase the dose of metformin to 850 mg 1 × 3 pc because the treating dose could not control FPG in visit3 (FPG 171 mg/dl) and changed from glibenclamide to diamicron MR 1 × OD ac because glibenclamide are associated with a greater risk of hypoglycemia, especially in the elderly. In addition, pharmacist suggested psychiatrist to increase the dose of enalapril to 5 mg 1X 1 OD because the treating dose could not control BP (150/70 mmHg, visit 3) and added simvastatin 10 mg 1 × 1 pc in the evening because LDL-C (visit 4) increased to 134 mg/dl 4) asked nurses to take care of patient's diet besides hospital diet because the patient are usually non-complied with the diet control.	Yes Yes Yes Yes	Before; The patient ate big portion of dessert and drank 4-5 bottles of sour milk (yakult ®; 80 cc/ bottle) per day and she exercised for 10-15 minutes everyday. After; Patient drank 1-2 bottles of sour milk per day and still exercised 10-15 minutes everyday.	1)- FPG 153 mg/dl - HbA_{1c}6.6% 2) -cholesterol 144 mg/dl -TG 147 mg/dl -HDL-C 57 mg/dl -LDL-C 79 mg/dl 3) BP 100/70 mg/dl 4) 6.34% weight loss from baseline body weight. She lost 4.5 kg in 4 months. Her weight was reduced from 71 kg to 66.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
2 OPD Man 37 years old	1)hypertriglyceridemia ; visit 1 -TG 290 mg/dl -cholesterol 184 mg/dl -HDL-C 34 mg/dl -LDL-C 92 mg/dl visit 3 -TG 393 mg/dl -cholesterol 177 mg/dl -HDL-C 37 mg/dl -LDL-C 133 mg/dl 2) metabolic syndrome; -WC 101.6 cm -TG 290 mg/dl -HDL-C 34 mg/dl -BP 130/90 mmHg 3) obesity ; -wt 89.5 kg -ht 179 cm -BMI 27.93 kg/m^2 -WC 101.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) suggested psychiatrist to add gemfibrozil 600 mg 1 × 1 pc because TG still increased from 290 mg/dl to 393 mg/dl (visit 1 and visit 3, respectively).	Yes Yes Yes	Before; The patient drank 2-3 bottles of soft drink (422 cc per bottle) per day, ate 2-3 plates of fried rice per day and ate fried bananas and two fried eggs everyday. In addition, he ate dessert 2 times per day. He did not exercise at all. After ; He drank 1 bottle of soft drink and ate fried rice 1 plate per day but he still ate fried bananas and dessert. He rode a bike for 10-15 minutes everyday.	1) -TG 143 mg/dl -cholesterol 177 mg/dl -HDL-C 37 mg/dl -LDL-C 133 mg/dl 2) metabolic syndrome disappeared; -WC 101.6 cm -TG 143 mg/dl -HDL-C 37 mg/dl -BP 120/70 mmHg 3) 0.6% weight loss from baseline body weight. His weight was lost 0.5 kg in 4 months from 89.5 kg to 89 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
3 IPD Woman 40 years old	1) dyslipidemia ; visit 1 -cholesterol 237 mg/dl -TG 180 mg/dl -HDL-C 44 mg/dl -LDL-C 157 mg/dl visit 3 -cholesterol 234 mg/dl -TG 207 mg/dl -HDL-C 41 mg/dl -LDL-C 202 mg/dl (target LDL-C = 160 mg/dl) 2) metabolic syndrome; -WC 99.1 cm -TG 180 mg/dl -HDL-C 44 mg/dl 3) severe obesity ; -wt 74.5 kg -ht 154.5 cm -BMI 31.21 kg/m^2 -WC 99.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories intake to 1,800 kcal per day. 3) after controlled diet for 2 months, LDL-C increased from 157 mg/dl to 202 mg/dl ; therefore, pharmacist informed psychiatrist to prescribe simvastatin 10 mg 1× 1 pc in the evening.	Yes Yes Yes	Before; Every morning she ate fried buns and drank 1-2 bottles of soft drink (422 cc per bottle) or 2 thermoses of iced black coffee per day. She also ate snack every evening. She exercised for 10-15 minutes every morning. After; She ate 4 slices of pineapples per day instead of fried food. She drank 3-4 bottles of soft drink per week. She still exercised for 10-15 minutes every morning.	1) -cholesterol 201 mg/dl -TG 153 mg/dl -HDL-C 42 mg/dl -LDL-C 147 mg/dl 2) reduced severity of metabolic syndrome ; -WC 96.5 cm -TG 153mg/dl -HDL-C 42 mg/dl 3) 6.3% weight loss from baseline body weight. She lost 4.7 kg in 4 months from 74.5 kg to 69.8 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
4 IPD Woman 47 years old	1) severe obesity ; -wt 93 kg -ht 167 cm -BMI 33.35 kg/m^2 -WC 117.3 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories intake to 1,800 kcal per day.	Yes Yes	Before; The patient drank 1 bottle of soft drink (280 cc per bottle) per day. Her relative brought her ice cream and fast food, such as hamburgers, chips and fried chickens once a week. In addition, her relative brought the patient soft drink, chocolates and snacks. However, the patient exercised for 10-15 minutes per day. After; Her relative took her to eat out in a restaurant 1-2 times per month and did not buy fast food for her anymore. In addition, her relative bought diet soft drink and watermelons and apples for the patient. The patient still exercised for 10-15 minutes per day.	1) 4.8% weight loss from baseline body weight. She lost 4.5 kg in 4 months (from 93 kg to 88.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
5 OPD Woman 38 years old	1) dyslipidemia ; visit 1 -cholesterol 241 mg/dl -TG 117 mg/dl -HDL-C 52 mg/dl -LDL-C 166 mg/dl visit 3 -cholesterol 241 mg/dl -TG 166 mg/dl -HDL-C 46 mg/dl -LDL-C 212 mg/dl (target LDL-C =160 mg/dl) 2) obesity ; -wt 62.5 kg -ht 150 cm -BMI 27.78 kg/m^2 -WC 96.5 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) after controlled diet for 2 months, LDL-C had increased from 166 mg/dl to 212 mg/dl ; therefore, pharmacist recommended psychiatrist to prescribe simvastatin 10 mg 1× 1 pc in the evening.	Yes Yes Yes but did not add medication	Before; The patient drank 7-8 bottles of soft drink (422 cc per bottle) per day. She ate 2-3 fried eggs and dessert which contained coconut cream everyday. She did not exercise and slept 5-6 hours during a daytime. After; She still drank 7-8 bottles of soft drink per day and ate 2-3 fried eggs per day. She could not control diet because her husband had no time to take care of the patient. The patient still did not exercise at all.	1) -cholesterol 236 mg/dl -TG 234 mg/dl -HDL-C 38 mg/dl -LDL-C 189 mg/dl 2) 6.08% weight gain from the initial body weight. She gained 3.8 kg in 4 months (from 62.5 kg to 66.3 kg). 3) metabolic syndrome appeared; -WC 99.1 cm -TG 234 mg/dl -HDL-C 38 mg/dl (visit 1 -WC 96.5 cm -TG 117 mg/dl -HDL-C 52 mg/dl)

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
6 IPD Woman 54 years old	1) severe obesity ; -wt 81 kg -ht 150 cm -BMI 36 kg/m^2 -WC 119.4 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) asked nurses to take care of patient's diet besides hospital diet because patient did not have a good insight.	Yes Yes Yes	Before; She drank one glass of tamarind juice everyday and ate snacks 2-3 times per week. She exercised for 10-15 minutes per day. After; She drank a few glass of tamarind juice per week and ate snacks one time per week. She still exercised for 10-15 minutes per day.	1) 5.9% weight loss from baseline body weight. She lost 4.8 kg in 4 months. Her weight was reduced from 81 kg to 76.2 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
7 OPD Woman 56 years old	1) obesity ; -wt 70.5 kg -ht 164 cm -BMI 26.21 kg/m^2 -WC 96.5 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient drank 1 bottle of soft drink (280 cc per bottle) per day and 1 thermos of black coffee per day. He ate 1 piece of bread or cake per day. He exercised for 10-15 minutes per day. After; The patient decreased his volume of soft drink intake from 1 bottles per day to couple of bottle per week and he did not drink black coffee but he still ate 1 piece of bread or cake per day. He went out to water the plants for 20 minutes per day.	1) 11.3% weight loss from baseline body weight. He lost 8 kg in 4 months (from 70.5 kg to 62.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
8 IPD Woman 58 years old	1) obesity ; -wt 71 kg -ht 155.5 cm -BMI 29.36 kg/m^2 -WC 115.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. This patient ate vegetarian food since visit 2 and the level of cholesterol, TG and LDL-C were increased. Pharmacist told her that vegetarian food had a lot of calories and could raise her lipid profile. Pharmacist advised her to eat caloric controlled diet and she accepted. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day.	Yes Yes	Before; The patient drank 2 bottles of soft drink (422 cc per bottle) everyday and exercised for 10-15 minutes per day. After; The patient still drank 1 bottle of soft drink per day but she did not drink sweet drink and still exercised for 10-15 minutes per day.	1) 9.9% weight loss from baseline body weight. She lost 7 kg in 4 months (from 71 kg to 64 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
9 IPD Woman 51 years old	1) IFG; -FPG 113 mg/dl -HbA_{1c} 8.1% 2) obesity; -wt 65 kg -ht 150.5 cm -BMI 28.70 kg/m^2 -WC 107.2 cm	1) advised her son to control his mother's diet because this patient was paranoid. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) asked nurses to take care of patient's diet besides hospital diet because the patient are usually non-complied with the diet control.	Yes Yes Yes	Before; The patient drank 1-2 bottles of soft drink (280 cc per bottle) per day and asked for dessert from other patients. And she did not exercise at all. After; She still drank 1-2 bottles of soft drink as same as visit 1 and still did not exercise.	1) -FPG 99 mg/dl -HbA_{1c} 6.5% 2) stable weight (65 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
10 IPD Woman 46 years old	1) obesity; -wt 71.5 kg -ht 153 cm -BMI 30.54 kg/m^2 -WC 109.2 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) asked nurses to take care of patient's diet besides hospital diet because the patient did not have a good insight.	Yes Yes Yes	Before; The patient ate a small bowl of dessert and drank 1 glass of sweet drink per day. She ate 2 pieces of sausage and drank 1 bottle of sour milk (180 cc per bottle) every evening. This patient visited home twice a month (two days per each time). When she visited her home, she ate 2 fried eggs and dessert everyday. After; She ate only 2-3 small bowls of dessert per week but she still drank 1 glass of sweet drink per day. She ate 1 piece of sausage every evening. When she visited her home, her mother prepared fruit, such as watermelons, guavas and pears for her daughter instead of dessert and fried eggs which she used to cook for her daughter.	1) 1.4% weight loss from baseline body weight. She lost 1 kg in 4 months. Her weight was reduced from 71.5 kg to 70.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
11 IPD Woman 34 years old	1) obesity; -wt 61 kg -ht 149.5 cm -BMI 27.29 kg/m^2 -WC 95.3 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) asked nurses to take care of patient's diet besides hospital diet because the patient did not have a good insight.	Yes Yes Yes	Before; She ate hospital diet and sometime she asked for dessert from other patients. She exercised for 10-15 minutes per day. After; She ate control caloric diet and still exercised for 10-15 minutes per day.	1) 6.6% weight loss from baseline body weight. She lost 4 kg in 4 months (from 61 kg to 57 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
12 IPD Man 29 years old	1) hypertriglyceridemia; visit 1 -cholesterol 216 mg/dl -TG 131 mg/dl -HDL-C 40 mg/dl -LDL-C 150 mg/dl visit 3 -cholesterol 187 mg/dl -TG 240 mg/dl -HDL-C 42 mg/dl -LDL-C 120 mg/dl 3) severe obese; -wt 89.5 kg -ht 171 cm -BMI 30.61 kg/m^2 -WC 101.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) after controlled diet for 2 months, LDL-C had decreased from 150 mg/dl to 120 mg/dl but TG had increased from 131 mg/dl to 240 mg/dl ; therefore pharmacist informed psychiatrist to prescribe gemfibrozil 600 mg1 × 1 pc.	Yes Yes Yes	Before; The patient drank 1-2 bottles of soft drink (422 cc per bottle), 1-2 glasses of black coffee and 1-2 bottles of sour milk per day. He ate 2 small bowls of dessert which contained coconut cream everyday, 2-3 fried buns every morning and ate 2 packs of snack before go to bed. He did not exercise at all. After; He still drank 1-2 glasses of black coffee but drank only 1 bottle of soft drink per day. He decreased his amount of dessert intake to 1 small bowl per day. However, he still ate fried buns every morning and snacks before go to bed. He exercised for 20-30 minutes per day.	1) -cholesterol 183 mg/dl -TG 130 mg/dl -HDL-C 49 mg/dl -LDL-C 123 mg/dl 2) 1.7% weight gain from baseline body weight. She gained 1.5 kg in 4 months (from 89.5 kg to 91 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
13 IPD Woman 46 years old	1) severe obesity; -wt 78 kg -ht 160 cm -BMI 30.47 kg/m^2 -WC 101.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day.	Yes Yes	Before; The patient ate 1-2 small bowls of dessert which contained coconut cream and 2-3 pieces of fried bun everyday. She also ate 3-4 cups of ice cream per week and drank 1 bottle of soft drink (280 cc per bottle) and 1 bottle of chrysanthemum juice (200 cc per bottle) per day. She exercised for 10-15 minutes per day. After; She stopped eating dessert which contained coconut cream, fried buns and ice cream and stopped drinking soft drink and sweet drink. She ate fruit, such as pineapples, mangoes and watermelons instead of high caloric diet. Also, she still exercised for 10-15 minutes per day.	1) 7.3% weight loss from baseline body weight. She lost 5.7 kg in 4 months. Her weight was reduced from 78 kg to 72.3 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
14 OPD Woman 38 years old	1) severe obesity; -wt 71 kg -ht 151 cm -BMI 31.14 kg/m^2 -WC 106.7 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; She drank 1 bottle of sweet milk, 2 bottles of sour milk and 1 glass of iced tea per day. In addition, she ate dessert, such as Taco and Kanomchunt everyday. She ate rice with chili-stir fried three-layered pork 2 times per week. She ate sweet tamarinds, longans, ripe mangoes and fried noodle everyday. She had a sedentary lifestyle. After; She stopped drinking sweet milk and sour milk but she still drank iced tea and ate dessert. She still ate rice with chili-stir fried three-layered pork but she ate only 2 times per month. However she still ate sweet fruits. In addition, she ate noodle with roasted duck with no oil everyday. She still had the same lifestyle.	1) stable weight (71 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
15 OPD Woman 33 years old	1) obesity; -wt 72.5 kg -ht 164 cm -BMI 26.96 kg/m^2 -WC 104.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; Patient drank 1-2 bottles of green tea per day and drank 1 glass of orange juice every night. She ate fried rice and fried noodle 3-4 times per week. In addition, she ate a half of the whole ripe papaya 3-4 times per week, 1-2 ripe mangoes and ate 6-10 pieces of candy everyday. Moreover, she did not exercise at all. After; She still ate, as same as visit 1 and she still did not exercise, too.	1) 0.7% weight gain from baseline body weight. She gained 0.5 kg in 4 months. Her weight was gained from 72.5 kg to 73 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
16 OPD Woman 32 years old	1) IFG; -FPG 114 mg/dl -HbA_{1c} 6.2% 2) obesity; -wt 70 kg -ht 155 cm -BMI 29.14 kg/m^2 -WC 99.1cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; Patient ate 4 meals per day because she and her relatives believed that psychotropic drugs irritate gastrointestinal tract. This patient drank 1 bottle of soft drink (280 cc per bottle) and 1-2 glasses of longans juice per day. She ate 2 plates of rice per meal and ate deep fried fish or fried processed pork 3-4 times per week. In addition, she ate 7-10 pods of tamarind per day. , she did not exercise and did not do any housework. After; She ate 3 meals per day and did not drink soft drink and longan juice. Moreover, she ate a plate of rice per meal and ate deep fried fish or fried pork 1-2 times per week.Furthermore, she ate 3-4 tamarind pods per day. All in all, she exercised for 10-15 minutes everyday and did housework.	1) - FPG 91 mg/dl - HbA_{1c} 5.8% 2) 1.9% weight loss from baseline body weight. She lost 1.3 kg in 4 months. Her weight was reduced from 70 kg to 68.7 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
17 OPD Woman 55 years old	1) hypertriglyceridemia; -TG 317 mg/dl -cholesterol 267 mg/dl -HDL-C 54 mg/dl -LDL-C 176 mg/dl 2) known case HT and was treated with enalapril 5 mg1 × 1 OD pc (BP 110/70 mmHg). 3) obesity; -wt 58.9 kg -ht 153 cm -BMI 25.16 kg/m^2 -WC 85.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) suggested psychiatrist to prescribe gemfribrozil 600 mg 1 × 1 OD pc because she had high TG.	Yes Yes Yes	Before; Patient drank 2 cups of coffee every morning and drank 1-2 glasses of iced tea and 1 bottle of sparrow's nest beverage per day. She ate 2 small bowls of dessert every night. Moreover, she always ate chicken curry, ice cream and mango with coconut cream on glutinous rice. She did housework but did not exercise at all. After; She decreased her amount of coffee intake from 2 cups to 1 cup per day and stopped drinking iced tea. She ate1 small bowls of dessert and still drank sparrow's nest beverage everyday. She still ate chicken curry, ice cream and mangoes with glutinous rice but with lower frequency. She still did housework but did not exercise.	1) -cholesterol 207 mg/dl - TG 83 mg/dl - HDL-C 87 mg/dl - LDL-C 143 mg/dl 2) BP 130/80 mmHg and still received enalapril in the same dose. 3) 7.5% weight loss from baseline body weight. She lost 4.4 kg in 4 months. Her weight was reduced from 58.9 kg to 54.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
18 OPD Woman 55 years old	1) IFG; -FPG 118 mg/dl -HbA_{1c} 6.1% 2) metabolic syndrome; -WC 101.6 cm -HDL-C 43 mg/dl -FPG 118 mg/dl 3) obesity; -wt 66.6 kg -ht 155 cm -BMI 27.72 kg/m^2 -WC 101.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; Patient ate 4 meals per day because she and her relatives believed that psychotropic drugs irritate gastrointestinal tract. This patient drank 2 bottles of soft drink (280 cc per bottle), 1 bottle of sweet milk, 1 glass of sweet drink and 1 bottle of fruit juice everyday. In addition, she usually ate curry and 8 oranges and one forth of the whole watermelon. Moreover, she did not exercise and she had a pain in her knees when she stood up or walked upstairs. After; She still ate 4 meals per day. She drank 1 can of diet soft drink instead of soft drink and drank 1 bottle of low fat milk per day. She stopped drinking sweet drink and fruit juice. In addition, she drank iced chrysanthemum juice with no sugar. She ate curry twice a week and ate	1) - FPG 114 mg/dl - HbA_{1c} 6.5% 2) metabolic syndrome disappeared; - WC 97.8 cm - HDL- C 60 mg/dl - FPG 114 mg/dl 3) weight loss 5.1% from the initial body weight. Her weight was reduced 3.4 kg in 4 months from 66.6 kg to 63.2 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
18 ODP Woman 55 years old (cont.)				1- 2 oranges per day. She exercised on a stationary bike for 20-30 minutes everyday and she felt good having reduced weight and had no pain in her knees any more.	

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
19 OPD Woman 40 years old	1) severe obesity; -wt 87 kg -ht 159 cm -BMI 34.41 kg/m^2 -WC 113 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; Patient believed that she must ate meal before taking medicine; therefore, she ate meal before go to bed. She ate pickled mangoes everyday and ate 1 kg of longan 3 times per week, 3 apples and 3 oranges per day. Her sister controlled her diet. She did not exercise at all. After; She moved to stay with her son but he could not control her diet. She ate bread with egg custard, 5 pieces of fried bun, curry and dessert everyday. In addition, she drank 1 bottle of soft drink (280 per bottle) per day and ate 20 ripe mangoes, 10 bananas and 2 ripe papayas per week. She ate half glass of dry Milo® powder per day. She still did not exercise and she had a pain in her knees when she stood up.	1) 5.7% weight gain from baseline body weight. She gained 5 kg in 4 months. Her weight was increased from 87 kg to 92 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
20 OPD Man 27 years old	1) known case HT but lost of follow up (BP 150/110 mmHg). 2) metabolic syndrome; -WC104.1 cm -HDL-C 28 mg/dl -BP 150/100 mmHg 3) severe obesity; -wt 93 kg -ht 172 cm -BMI 31.44 kg/m^2 -WC 104.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) suggested psychiatrist to prescribe enalapril 5 mg 1 × 1 OD pc but psychiatrist disagreed because he needed the patient to follow up hypertensive problem with the treating internist. However, the patient did not go to follow up with the treating internist.	Yes Yes Yes but did not add medication	Before; Patient 's mother sold food, such as fried noodle with pork, chicken curry and roasted chicken. The patient ate 6-7 meals per day. The last meal was at 03.00 AM. In addition, he drank 5-6 bottles of soft drink (422 cc per bottle), 2-3 bottles of tonic drink called Red Bull® and 1 bottle of a mineral beverage called Sponsor® per day. However, he ate 2-3 eggs per day and ate curry and chicken skin. He ate fried fish or fried pork everyday. He played football for 90 minutes 3 times per week. After; He could not control his diet but he still exercised.	1) BP 140/90 mmHg 2) metabolic syndrome disappeared; -WC 104.1 cm -HDL-C 40 mg/dl -BP 140/90 mmHg 3) 3.2% weight gain from baseline body weight. He gained 3 kg in 4 months. His weight was increased from 93 kg to 96 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
21 OPD Man 25 years old	1) severe obesity; -wt 83 kg -ht 166 cm -BMI 30.12 kg/m^2 -WC 99.8cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; Patient ate 4 meals per day; in addition, for his last meal (8.00 PM), he drank 1 bottle of soymilk and 2 pieces of sandwich every night. He drank 1 bottle of soft drink (1000 cc per bottle), 1 bottle of sweet milk and ate 1 small bowl of ice cream per day. Moreover, he ate curry, steamed chicken rice and fried noodle everyday. He liked to eat Thong-Yod, Thong- Yip, Lod-Chong in coconut milk. He did not exercise at all. After; He could not control his diet; in addition, he ate a half kilo of steamed glutinous rice in coconut milk per week, 3 ripe mangoes and 3 unripe mangoes per day. All in all, he still did not exercise.	1) 8.1% weight gain from baseline body weight. He gained 6-7 kg in 4 months. He gained weight from 83 kg to 89.70 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
22 OPD Man 46 years old	1) obesity; -wt 66 kg -ht 161 cm -BMI 25.46 kg/m^2 -WC 94 cm 2) dyslipidemia; visit 1 -cholesterol 163 mg/dl -TG 238 mg/dl -HDL-C 48 mg/dl -LDL-C 89 mg/dl visit 3 -cholesterol 212 mg/dl -TG 247 mg/dl -HDL-C 48 mg/dl -LDL-C 147 mg/dl (target LDL-C = 130 mg/dl)	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) after controlled diet for 2 months, LDL-C had increased from 89 to 147 mg/dl (target LDL-C in this patient = 130 mg/dl) ; therefore, pharmacist recommended psychiatrist to prescribe simvastatin 10 mg 1 × 1pc in the evening.	Yes Yes Yes but did not add medication	Before; Patient ate 4 meals per day and the last meal, at 10.00 PM, he ate 1 bowl of ground pork congee with an egg and 2-3 pieces of bread with egg custard every night. In addition, he ate 2-3 fried eggs, drank 2 bottles of sweet milk per day but he did not drink soft drink. He ate fried noodle 2-3 times per week. He did not exercise at all. After; He increased his amount of food intake than visit 1 because his relatives could not control his diet. He ate 2 plates of steamed rice per meal and ate 3 ripe mangoes 2-3 times per week. In addition, he drank 2 bottles of soft drink (280 cc / bottle) per day. All in all, he still did not exercise.	1) 8.3% weight gain from baseline body weight. He gained 5.5 kg in 4 months from 66 kg to 71.5 kg. 2) -cholesterol 284 mg/dl -TG 496 mg/dl -HDL-C 54 mg/dl -LDL-C 181 mg/dl 3) increased 10 year risk for CHD from 10% to 30%

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
23 OPD Man 41 years old	1) dyslipidemia; visit 1 -cholesterol 259 mg/dl -TG 162 mg/dl -HDL-C 48 mg/dl -LDL-C 179 mg/dl visit 3 -cholesterol 214 mg/dl -TG 131 mg/dl -HDL-C 52 mg/dl -LDL-C 152 mg/dl (target LDL-C = 160 mg/dl) 2) IFG; -FPG 112 mg/dl -HbA_{1c} 6.2% 3) metabolic syndrome; - WC 119.8 cm - TG 162 mg/dl - FPG 112 mg/dl 3) severe obesity; -wt 96 kg -BMI 31.7 kg/m^2 -WC 119.9 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) informed psychiatrist to prescribe simvastatin 10 mg 1 × 1 pc in the evening.	Yes Yes Yes	Before; Patient drank 4-5 cups of coffee, 3-4 bottles of Red-Bull®, 3-4 thermoses of black coffee and 2 cups of cocoa per day; in addition, he ate 2-3 eggs per day. He ate pork rind, deep fried pork rind, pork sausage, dessert which contained coconut cream. , he could not exercise because he was injured in a motorcycle accident. After; He drank 1 cup of coffee, 1 bottle of soft drink (422 cc per bottle), and 1 bottle of milk per day. In addition, he ate 3-4 ripe mangoes per week and rice with stewed pig leg 4-5 times per week. All in all, he still could not exercise.	1) -cholesterol 251 mg/dl -TG 170 mg/dl -HDL-C 46 mg/dl -LDL-C 204 mg/dl 2) - FPG 98 mg/dl - HbA_{1c} 6.1% 3) metabolic syndrome disappeared; - WC 110.5 cm - TG 170 mg/dl - FPG 98 mg/dl 4) weight loss 3.1% from baseline body weight. His weight was reduced 3 kg in 4 months from 96 kg to 93 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
24 OPD Man 25 years old	1) obesity; -wt 64 kg -ht 160 cm -BMI 25 kg/m^2 -WC 88.9 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; Patient's mother sold fried pork and fried fish, so he ate fried pork and fish everyday. In addition, he drank 6-7 bottles of Red- Bull®, 1-2 bottles of soft drink (422 cc per bottle) per day, 4 glasses of beer everyday. Before admission, he drank 1 bottle of syrup (Hale's Blue Boy®) everyday for seven days. He did not exercised at all. After; His mother could not control his diet and he still did not exercise.	1) 0.8% weight gain from baseline body weight. He gained 0.5 kg in 4 months. His weight was increased from 64 kg to 64.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
25 IPD Woman 65 years old	1) dyslipidemia; visit 1 -cholesterol 205 mg/dl -TG 185 mg/dl -HDL-C 40 mg/dl -LDL-C 179 mg/dl visit 3 -cholesterol 190 mg/dl -TG 145 mg/dl -HDL-C 48 mg/dl -LDL-C 135 mg/dl (target LDL-C = 100 mg/dl) 2) known case DM and was treated with metformin 500 mg 1 × 3 pc (FPG 108 mg/dl, HbA_{1c} 6.8%) 3) metabolic syndrome; -WC 109.2 cm -TG 185 mg/dl -HDL-C 40 mg/dl 4) obesity; -wt 61.5 kg -ht 147 cm -BMI 28.46 kg/m^2 -WC 109.2 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) asked nurse to take care of patient's diet besides hospital diet because the patient did not have good insight. 4) suggested psychiatrist to add simvastatin 10 mg 1x1 pc in the evening to decrease LDL-C level.	Yes Yes Yes Yes but did not add medication	Before; This patient is an old women. She could not walk without walker, so she could not more movement. She drank 1 glass of tamarind juice per day because she got constipated. After; She still drank tamarind juice everyday. In addition, she ate papaya salad, pork cooked northern style 3-4 times per week. She exercised for 10-15 minutes everyday	1) -cholesterol 245 mg/dl -TG 126 mg/dl -HDL-C 57 mg/dl -LDL-C 188 mg/dl 2) -FPG 124 mg/dl -HbA_{1c} 6.7% 3) metabolic syndrome still appeared; -WC 109.2 cm -TG 126 mg/dl -HDL-C 57 mg/dl -FPG124 mg/dl (visit 1 FPG 108 mg/dl). 4) 0.8% weight gain from baseline body weight. She gained 0.5 kg in 4 months (from 61.5 kg to 62 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
26 OPD Man 29 years old	1) sleep apnea; his mother observed that her son stopped breathing 2-5 seconds while he was sleeping. 2) dyslipidemia; visit 1 -cholesterol 237 mg/dl -TG 195 mg/dl -HDL-C 43 mg/dl -LDL-C 170 mg/dl visit 3 -cholesterol 132 mg/dl -TG 169 mg/dl -HDL-C 45 mg/dl -LDL-C 64 mg/dl (target LDL-C = 160 mg/dl) 3) severe obesity; -wt 102 kg -ht 170 cm -BMI 35.29 kg/m^2 -WC 114.3 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) suggested psychiatrist to prescribe simvastatin 10 mg 1x1 pc in the evening because he had high LDL-C level.	Yes Yes Yes	Before; Patient's mother sold papaya salad and roasted chicken. The patient ate 6 meals per day, He ate his last meal at 01.00 AM,which was steamed rice with fried egg. In addition, he ate 3-5 fried eggs, 3 pieces of roasted chicken and 3 pieces of fried pork per day. Moreover, he drank 2-3 bottles of soft drink (422 cc per bottle), 2 glasses of iced tea and 1 cup of cocoa everyday. He did not exercise. After; He ate 4 meals per day and ate his last meal at 8.00 PM. Moreover, he ate 1 fried egg per day and did not eat roasted chicken. He ate only 3 pieces of fried pork per week. Also, he drank 1 bottle of soft drink per day and did not drink any iced tea. He drank low fat milk instead of cocoa. He joined an aerobic class one-hour per day.	1) sleep apnea disappeared. 2) -cholesterol 159 mg/dl -TG 168 mg/dl -HDL-C 54 mg/dl -LDL-C 93 mg/dl 3) 4.4% weight loss from the initial body weight. His weight was reduced 4.5 kg in 4 months from 102 kg to 97.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
27 OPD Woman 37 years old	1.hypertriglyceride; visit 1 -cholesterol 261 mg/dl -TG 691 mg/dl -HDL-C 42 mg/dl -LDL-C 135 mg/dl visit 3 -cholesterol 258 mg/dl -TG 400 mg/dl -HDL-C 40 mg/dl -LDL-C 181 mg/dl 2. metabolic syndrome; -WC 97.8 cm -TG 691 mg/dl -HDL-C 42 mg/dl 3. severe obesity; -wt 70 kg -ht 150 cm -BMI 31.11 kg/m^2 -WC 97.8 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) suggested psychiatrist to add gemfibrozil 900 mg 1X1 OD because her TG was very high and increase risk for acute pancreatitis.	Yes Yes Yes but did not add medication	Before; Patient ate pork legs and two eggs everyday. Her relative cooked high volume of high calorie food because she was lazy to cook everyday. Patient ate fried pork and fried chicken one or two times per week and drank one glass of soft drink everyday. She did not exercise. After; Patient reduced high fat food intake, ate two eggs per week and did not drink any soft drink. She exercised for 10-15 minutes per day.	1. -cholesterol 256 mg/dl -TG 372 mg/dl -HDL-C 42 mg/dl -LDL-C 182 mg/dl 2. reduced severity of metabolic syndrome; -WC 96.53 cm -TG 372 mg/dl -HDL-C 42 mg/dl 3. 3.6% weight loss from baseline body weight. Her weight was reduced 2.5 kg in 4 months from 70 kg to 67.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
28 IPD Woman 53 years old	1) obesity; -wt 57 kg -ht 151 cm -BMI 25 kg/m^2 -WC 92.7 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient is a Hindu, do not eat beef. In addition, she ate high carbohydrate and high fat food, such as Rotti with oil, biscuit, Indian curry, so she ate food with low protein and fiber. She drank 2-3 bottles of sweet milk and 1 cup of cocoa per day and she ate 2-3 pieces of toast with butter every morning. But she did not drink soft drink. In addition, she did not exercise at all. After; She ate more fruit and vegetable than visit 1. She drank sweet milk 1-2 bottles per day. In addition, she ate whole-wheat bread replace bread and decreased to eat Indian curry. In the end, she still did not exercise.	1) 6.1% weight loss from baseline body weight. Her weight was reduced 3.5 kg in 4 months from 57 kg to 53.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
29 OPD Man 36 years old	1) hypertriglyceridemia; visit 1 -cholesterol 147 mg/dl -TG 323 mg/dl -HDL-C 35 mg/dl -LDL-C 96 mg/dl visit 3 -cholesterol 166 mg/dl -TG 198 mg/dl -HDL-C 34 mg/dl -LDL-C 118 mg/dl 2) metabolic syndrome; -WC115.6 cm -TG 323 mg/dl -HDL-C 35 mg/dl 3) severe obesity; -wt 108 kg -ht 175 cm -BMI 35.27 kg/m^2 -WC 115.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) suggested psychiatrist to prescribe gemfibrozil 600 mg1x1 pc because her TG was high.	Yes Yes Yes but did not add medication	Before ; The patient ate 4 meals per day. He drank 1 lit of soft drink, 1 bottle of Red Bull® and 2 bottles of Sponsor® per day. In addition, he ate 2 small bowls of dessert, 8 pieces of fried banana everyday and he ate steamed chicken rice, rice with stewed pig leg, deep fried pork skin, roasted chicken and fried pork. He played badminton for 1 hour everyday. After; He stayed with his mother but she could not control his diet. He increased his amount of food intake, for example, he drank 2 cups of coffee, 1 glass of sweet drink, 3 small bowels of dessert, 1 piece of bread, 2 fried eggs, 8 pieces of fried banana, deep fried pork skin and chicken curry everyday. In addition, he stopped playing badminton.	1) -cholesterol 184 mg/dl -TG 359 mg/dl -HDL-C 42 mg/dl -LDL-C 122 mg/dl 2) metabolic syndrome disappeared; -WC 128.3 cm -TG 359 mg/dl -HDL-C 42 mg/dl 3) 19% weight gain from baseline body weight. He gained 20.5 kg in 4 months from 108 kg to 128.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
30 OPD Woman 44 years old	1) metabolic syndrome; -WC 94 cm -HDL-C 34 mg/dl -BP 130/90 mmHg 2) obesity; -wt 61 kg -ht 146 cm -BMI 28.62 kg/m^2 -WC 94 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) after controlled diet for 2 months, LDL-C increased from 141 mg/dl to 184 mg/dl; therefore, pharmacist informed psychiatrist to prescribe simvastatin 10 mg 1x1 pc in the evening.	Yes Yes Yes but did not add medication	Before; The patient ate 6 meals per day. She drank 2 bottles of soft drink (280 cc per bottle), 1 bottle of Red-Bull® per day and ate chicken fat and chicken buttock everyday. In addition, she ate dessert, such as Thong-Yod, Thong-Yip and cake. She did not exercise at all. After; She still drank soft drink but with lower volume (from 2 bottles to 1 bottle per day) and stopped drinking Red- Bull®. However, she still ate high fat diet and did not exercise.	1) She still had metabolic syndrome; -WC 94 cm -HDL-C 46 mg/dl -BP 120/80 mm Hg -TG 170 mg/dl 2) 3.8% weight loss from the initial body weight. She lost 2.3 kg in 4 months. Her weight was reduced from 61 to 58.7 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
31 OPD Woman 32 years old	1) obesity; -wt 57.7 kg -ht 151 cm -BMI 25.31 kg/m^2 -WC 91.4 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient drank 1 bottle of soft drink (422 cc per bottle), 1 bottle of sweet milk, and 1-2 cans of coffee everyday. And she ate 2 fried eggs, 20 pieces of candy,1-2 packs of snack and 2-3 pieces of toast with butter everyday. She exercised by walking to her working place (2 km per day). After; She still drank 1 bottle of soft drink per day. She still ate candy but with lower amount (from 20 pieces to 4 pieces per day) and ate 1 pack of snack per day. In addition, she stopped drinking coffee and ate only 1-2 fried eggs per week.	1) 6.4% weight loss from baseline body weight. She lost 3.7 kg in 4 months. Her weight was reduced from 57.7 kg to 54 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
32 OPD Woman 36 years old	1) IFG; -FPG 123 mg/dl -HbA_{1c} 6.4% 2) metabolic syndrome; -WC 99.1 cm -TG 205 mg/dl -HDL-C 43 mg/dl -BP 110/90 mmHg -FPG 123 mg/dl 3) severe obesity; -wt 72 kg -ht 151 cm -BMI 31.58 kg/m^2 -WC 99.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient drank 2 bottles of soft drink (280 cc per bottle), 1 thermos of black coffee per day. She ate chicken curry, banana in coconut milk, pork sausage and pork viscera everyday. In addition, she ate 5-6 fried eggs per week. She did not exercise at all. After; She drank 1 can of diet soft drink and stopped drinking black coffee. In addition, she did not eat chicken curry, banana in coconut milk, pork sausage. However, she ate pork viscera 1 time per week and ate one fried egg per week. She ate noodle with no oil everyday. She ate fried fish everyday but she absorbed oil with tissue paper before eating. She walked for 20-30 minute per day.	1) -FPG 111 mg/dl -HbA_{1c} 6.6% 2) metabolic syndrome disappeared; -WC 96.5 cm -TG 131 mg/dl -HDL-C 52 mg/dl -BP120/80 mm Hg -FPG 111 mg/dl 3) 4.9% weight loss from baseline body weight. She lost 3.5 kg in 4 months. Her weight was reduced from 72 kg to 68.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
33 OPD Woman 56 years old	1) obesity; -wt 61 kg -ht 154 cm -BMI 25.72 kg/m^2 -WC 100.3 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) after controlled diet for 2 months, LDL-C increased from 145 mg/dl to 188 mg/dl; therefore, pharmacist informed psychiatrist to prescribe simvastatin 10 mg 1x1 pc in the evening.	Yes Yes Yes but did not add medication	Before; The patient ate 1-2 plates of steamed chicken rice, drank 8 bottles of fresh orange juice (200 cc per bottle) everyday. In addition; she ate one kind of dessert everyday, such as Kanomchunt, egg custard baked and Lod-Chong. She did not exercise at all. After; She still ate 1-2 plates of steamed chicken rice and still drank fresh orange juice but with lower volume from 8 bottles to 3 bottles per day. However, she ate 2-3 kinds of dessert per day and ate one whole durian 3 times per month. She still did not exercise. Her relatives could not control her diet because she stayed alone at home during a daytime.	1) 1.6% weight loss of baseline body weight. She lost 1 kg in 4 months. Her weight was reduced from 61 kg to 60 kg. 2) -cholesterol 249 mg/dl -TG 152 mg/dl -HDL-C 80 mg/dl -LDL-C 181 mg/dl 3) metabolic syndrome appeared; -WC 99.1 cm -TG 152 mg/dl -BP 140/80 mmHg (Visit 1; -WC 100.3 cm -TG 140 mg/dl -BP 100/70 mmHg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
34 OPD Woman 37 years old	1) obesity; -wt 70.5 kg -ht 157.5 cm -BMI 28.42 kg/m^2 -WC 104.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient ate noodle in soup every lunch. She ate Thong-Yod, Thong-Yip, hamburger, and snacks each 3-4 times per week. In addition, she drank 1 bottle of soft drink (280 cc per bottle) everyday because she believed that soft drink could make weight loss. She ate 2 fried eggs per day and ate cuttlefish and shrimp 3-4 times per week. She did not exercise at all. After; She ate noodle in soup with no oil every lunch and still ate dessert 3-4 times per day. In addition, she stopped drinking soft drink and ate only 2 fried eggs per week. She ate cuttlefish and shrimp 1 time per week. Moreover, she still drank 1 bottle of soft drink every night. All in all, she did not exercise.	1) 2.1% weight gain from baseline body weight. She gained 1.5 kg in 4 months (from 70.5 kg to 72 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
35 OPD Woman 50 years old	1) severe obesity; -wt 93 kg -ht 160 cm -BMI 36.33 kg/m^2 -WC132.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient gained weight 20 kg in one year before this study. She ate 6 meals per day (her last meal was at 02.00 AM, she ate noodle with egg). She ate 1-2 cups of ice cream per day. In addition, she drank 1 bottle of soft drink (280 cc per bottle), 3-4 glasses of iced black coffee and 2 cups of coffee per day. Furthermore, she ate fried noodle and 2 fried eggs everyday. She did not exercise but did her household chores, such as cleaning, washing. After; Her elder sister controlled her diet. The patient ate 3 meals per day (after 07.00 PM, she did not eat anything). In addition, she drank 1 bottles of soft drink, 3 cups of coffee per week and she ate 1-2 cups of ice cream per week. She stopped drinking black coffee. In addition, she ate	1) 3.2% weight loss from baseline body weight. She lost 3 kg in 4 months. Her weight was reduced from 93 kg to 90 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
35 OPD Woman 50 years old (cont.)				2 fried eggs per week and ate noodle with no oil instead of fried noodle. She exercised for 10-20 minutes everyday.	

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
36 IPD Woman 52 years old	1) obesity; -wt 64 kg -ht 150 cm -BMI 28.44 kg/m^2 -WC 104.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient drank 7-8 bottles of soft drink (422 cc per bottle) everyday. She ate 2 fried eggs per day and ate 3-4 packs of snack with soft drink at 02.00 AM every night. In addition, she always ate fried buns, chicken curry, and fried pork. She did not exercise at all. After; She drank 1 bottle of soft drink and ate controlled diet, 1,800 kcal per day. She still did not exercise.	1) 6.3% weight loss from baseline body weight. She lost 4 kg in 4 months. Her weight was reduced from 64 kg to 60 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
37 OPD Woman 45 years old	1) dyslipidemia; visit 1 -cholesterol 207 mg/dl -TG 151 mg/dl -HDL-C 46 mg/dl -LDL-C 165 mg/dl visit 3 -cholesterol 252 mg/dl -TG 102 mg/dl -HDL-C 51 mg/dl -LDL-C 200 mg/dl (target LDL-C = 160 mg/dl) 2) metabolic syndrome; -WC 105.4 cm -TG 151 mg/dl -HDL-C 46 mg/dl 3) obesity; -wt 64.7 kg -ht 151 cm -BMI 28.38 kg/m^2 -WC 105.4 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) after controlled diet for 2 months, LDL-C increased from 165 mg/dl to 200 mg/dl; therefore, pharmacist informed psychiatrist to prescribe simvastatin 10 mg 1x1 pc in the evening.	Yes Yes Yes but did not add medication	Before; The patient drank 1 bottle of soft drink (422 cc per bottle) per day and ate chicken or pork curry, roasted chicken and pork skin everyday. In addition, she ate 2 small bowls of dessert per day. She did not exercise at all. After; She still ate high caloric diet but she played badminton with her son 3 times per week (15 minutes each time).	1) -cholesterol 270 mg/dl -TG 137 mg/dl -HDL-C 44 mg/dl -LDL-C 228 mg/dl 2) metabolic syndrome disappeared; -WC 102.9 cm -TG 137 mg/dl -HDL-C 44 mg/dl 3) 3.4% weight loss from baseline body weight. She lost 2.2 kg in 4 months. Her weight was reduced from 64.7 kg to 62.5 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
38 OPD Man 42 years old	1) obesity; -wt 70.5 kg -ht 164 cm -BMI 26.21 kg/m^2 -WC 86.4 cm 2) known case HT and was treated with atenolol 50 mg 1x2 pc (BP 140/90 mmHg).	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient drank 2 bottles of soft drink (422 cc per bottle), 4-5 cups of coffee per day; in addition, he added 4-5 tablespoons of sugar in each cup of coffee. He ate1 plate of steamed chicken rice and ate 2 or 3 kinds of dessert, such as Thong-Yip, Thong-Yod and Tub Tim Krob everyday. He did not exercise. After; His wife could not control the patient's diet so, he still ate as same as first visit, furthermore, he ate 2 whole durian per week, 1 ripe mango per day and he ate bread with egg custard everyday. He still did not exercise.	1) 3.5% weight gain from the initial body weight. He gained 2.5 kg in 4 months (from 70.5 to 73 kg). 2) BP 130/90 mm Hg 3) DM; -FPG 152% -HbA_{1c} 6.4%

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
39 OPD Man 34 years old	1) dyslipidemia; visit 1 -cholesterol 208 mg/dl -TG 180 mg/dl -HDL-C 29 mg/dl -LDL-C 182 mg/dl visit 3 -cholesterol 248 mg/dl -TG 123 mg/dl -HDL-C 38 mg/dl -LDL-C 210 mg/dl (target LDL-C = 160 mg/dl) 2) obesity; -wt 73.7 kg -ht 171 cm -BMI 25.2 kg/m^2 -WC 94 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) after controlled diet for 2 months, LDL-C increased from 182 mg/dl to 210 mg/dl; therefore, pharmacist informed psychiatrist to prescribe simvastatin 10 mg 1x1 pc in the evening.	Yes Yes Yes	Before; The patient drank 4 bottles of soft drink (280 cc per bottle), 1 glass of iced tea, 2 bottles of fruit juice and ate 1 plate of glutinous rice steamed in coconut milk with durian everyday. In addition, he ate high fat diet, such as, rice with stewed pig leg, Thai sausage, duck skin and fried green mussel. He had a sedentary lifestyle and did not exercise. After; He drank tomato juice instead of soft drink and iced tea. He ate glutinous rice steamed in coconut milk with durian once a week. Similarly, he decreased to eat high caloric diet but he still has sedentary lifestyle.	1) -cholesterol 221 mg/dl -TG 144 mg/dl -HDL-C 37 mg/dl -LDL-C 177 mg/dl 2) 7.7% weight loss from baseline body weight. He lost 5.7 kg in 4 months (from 73.7 to 68 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
40 OPD Man 57 years old	1) dyslipidemia; visit 1 -cholesterol 298 mg/dl -TG 227 mg/dl -HDL-C 42 mg/dl -LDL-C 264 mg/dl visit 3 -cholesterol 262 mg/dl -TG 388 mg/dl -HDL-C 46 mg/dl -LDL-C 185 mg/dl (target LDL-C = 130 mg/dl) 2) known case HT; BP 120/80 mm Hg and received enalpril 5 mg 1x2 pc. 3) obesity; -wt 73.5 kg -ht 169 cm -BMI 25.7 kg/m^2 -WC 92.7 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) informed psychiatrist to prescribe simvastatin 20 mg 1x1 pc in the evening because his LDL-C was high.	Yes Yes Yes	Before; The patient drank 3 bottles of soft drink (422 cc per bottle), 3-4 bottles of green tea (500 cc per bottle), 1 thermos of black coffee and 4-5 bottles of sweet milk everyday. In addition; he ate fried noodle, fried fish, sausage, duck and chicken skin everyday. He did not exercise at all. After; He stopped drinking soft drink, sweet milk and green tea. And he ate noodle with no oil instead of fried noodle. However, he ate1 small bowl of taro balls in coconut milk with an egg and 1 small bowl of dessert in syrupy ice everyday. He took medicinal herb, Ham, 2x2 pc. He rode bike for 30 minutes everyday.	1) -cholesterol 184 mg/dl -TG 316 mg/dl -HDL-C 43 mg/dl -LDL-C 130 mg/dl 2) BP 120/80 mm Hg 3) stable weight (73.5 kg). 4) 10-year risk for CHD decreased from 20% to 10% because cholesterol was decreased from 298 mg/dl at baseline to 184 mg/dl at the end of the study.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
41 IPD Man 47 years old	1) dyslipidemia; visit 1 -cholesterol 226 mg/dl -TG 319 mg/dl -HDL-C 38 mg/dl -LDL-C 177 mg/dl visit 3 -cholesterol 156 mg/dl -TG 157 mg/dl -HDL-C 47 mg/dl -LDL-C 95 mg/dl (target LDL-C = 130 mg/dl) 2) obesity; -wt 70 kg -ht 163 cm -BMI 26.35 kg/m^2 -WC 92.7 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) informed psychiatrist to prescribe simvastatin 20 mg 1x1 pc in the evening because his LDL-C was high.	Yes Yes Yes	Before; He drank 1-2 glasses of black coffee and ate 1 small bowl of glutinous rice steamed in coconut milk with egg custard everyday. He did not exercise at all. After; He drank black coffee and ate glutinous rice steamed in coconut milk with egg custard 3-4 times per week. In addition, he exercised for 10-15 minutes every morning.	1) -cholesterol 190 mg/dl -TG 190 mg/dl -HDL-C 62 mg/dl -LDL-C 108 mg/dl 2) 2.6% weight loss from baseline body weight. He lost 1.8 kg in 4 months (from 70 kg to 68.2 kg). 3) 10-year risk for CHD decrease from 20% to 6% due to he had lower cholesterol from 226 mg/dl to 190 mg/dl and had higher HDL-C from 38 mg/dl to 62 mg/dl.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
42 OPD Man 25 years old	1) obesity; -wt 80 kg -ht 169 cm -BMI 28.01 kg/m^2 -WC 95.25 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; He ate chicken curry, rice with stewed pig leg everyday. He drank 10 bottles of soft drink (280 cc per bottle), 3 thermoses black coffee, 4 bottles of sour milk (80 cc per bottle) everyday. In addition, he ate 2-3 packs of snacks everyday. He had a sedentary lifestyle and did not exercise. After; His mother could not control his diet and he had a same lifestyle.	1) 1.9% weight gain from baseline body weight. He gained 1.5 kg in 4 months (from 80 kg to 81.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
43 IPD Man 42 years old	1) dyslipidemia; visit 1 -cholesterol 210 mg/dl -TG 232 mg/dl -HDL-C 47 mg/dl -LDL-C 166 mg/dl visit 3 -cholesterol 200 mg/dl -TG 90 mg/dl -HDL-C 43 mg/dl -LDL-C 156 mg/dl (target LDL-C = 160 mg/dl) 2) obesity; -wt 80 kg -ht 173 cm -BMI 26.73 kg/m^2 -WC 99.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day.	Yes Yes	Before; He drank 1-2 cans of soft drink (325 cc per can), 2 bottles of sweet milk and ate 2-3 packs of snack per day. And he exercised for 10-15 minutes per day. This patient visited home on Saturday and Sunday, when he stayed at home, he drank 4-5 bottles of soft drink, 4-5 bottles of fruit juice and 6 cartons of sweet milk per day. In addition; he ate 2 fried eggs and 5 packs of snack per day. After; When he stayed at hospital, he ate only controlled diet, 1,800 kcal. He still exercised for 10-15 minutes per day. When he stayed at home, he drank only 1 bottle of soft drink, 1 bottle of fruit juice and 1 bottle of low fat milk per day. In addition; he ate 1 fried egg per day and stopped eating snack.	1) -cholesterol 204 mg/dl -TG 76 mg/dl -HDL-C 50 mg/dl -LDL-C 139 mg/dl 2) 16.3% weight loss from baseline body weight. He lost 13 kg in 4 months. His weight was reduced from 80 kg to 67 kg.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
44 OPD Woman 62 years old	1) metabolic syndrome; -WC 106.7 cm -HDL-C 39 mg/dl -BP 140/90 mmHg 2) severe obesity; -wt 68.4 kg -ht 150 cm -BMI 30.40 kg/m^2 -WC 106.7 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) after controlled diet for 2 months, TG increased from 101 mg/dl to 267 mg/dl; therefore, pharmacist informed psychiatrist to prescribe gemfibrozil 600 mg 1x1 pc.	Yes Yes Yes	Before; She ate 4 meals per day, her last meal was at 01.00 AM. She ate Pad-Thai or fried green mussel with flour everyday and she drank 1 glass of sweet drink per day. In addition, she ate 1 small bowl of dessert per day. She did not exercise at all. After; She is a Buddhist nun since she was discharged from the hospital. She stayed in a temple. Her son could not control her diet. She drank 3 bottles of sour milk, 1 glass of fruit juice per day. In addition; she ate ripe mangoes, durians, rambutans, mangosteens, jackfruits or litchis everyday. She still did not exercise but did household chores.	1) still had metabolic syndrome; -WC 116.8 cm -HDL 67 mg/dl -BP 130/80 mmHg -FPG 111 mg/dl (visit 1, FPG 109 mg/dl). 2) 4.5% weight gain of the initial body weight. She gained 3.1 kg in 4 months (from 68.4 kg to 71.5 kg). 3) TG 80 mg/dl.

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
45 OPD Woman 27 years old	1) severe obesity; -wt 72 kg -ht 147 cm -BMI 33.3 kg/m^2 -WC 101.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before ; She ate 4 meals per day , her last meal was at 11.00 PM, she drank 1 bottle of soy milk and ate steamed bun every night. She ate fried noodle everyday but she did not like to eat vegetable. She drank 1 bottle of soft drink (280 cc per bottle) per day. During the daytime, she stayed up in her room and slept 3-4 hours, or listened to the radio. She did not exercise and did not do housework. After; She ate 3 meals per day, her last meal was at 06.00 PM. She ate noodle with no oil instead of fried noodle. Moreover, she drank 1-2 bottles of soft drink per week. She did housework, such as cleaning, washing but she still did not exercise.	1) 10.4% weight loss from baseline body weight. She lost 7.5 kg in 4 months (from 72 kg to 64.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
46 OPD Woman 31 years old	1) obesity; -wt 54.7 kg -ht 145 cm -BMI 26.02 kg/m^2 -WC 87.6 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient did not eat rice at meal but she ate snack, bread and papaya salad during a meal. She ate 3 fried eggs per day. In addition, she drank 2-3 bottles of soft drink (422 cc per bottle) and 2-3 bottles of Yakult® per day. Besides, she ate 2-3 bananas or mangoes everyday. She did not exercise at all. After; She still drank soft drink but with lower volume (from 2-3 bottles per day to 1-2 bottles per week). In addition, she drank 1-2 bottles of sour milk (180 cc per bottle) and 1 bottle of soymilk everyday. In addition; she still ate 2-3 bananas or mangoes everyday. She exercised for 10-15 minutes everyday.	1) 0.9% weight gain from baseline body weight. She lost 0.5 kg in 4 months (from 54.7 kg to 55.2 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
47 OPD Woman 46 years old	1) obesity; -wt 62 kg -ht 149 cm -BMI 27.93 kg/m^2 -WC 94 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; She ate bread or steamed bun and drank soft drink at 11.00 PM every night. She ate fried noodle almost everyday. In addition; she ate 1 small bowl of ice cream, 1 small bowl of dessert and 3-4 packs of snack everyday. Moreover, she did not exercise at all. After; She drank low fat milk before go to bed instead of bread or steamed bun and soft drink. She ate fried noodle 2-3 times per week. And she decreased to eat snacks. She still did not exercise.	1) 4% weight loss from baseline body weight. She lost 2.5 kg in 4 months (from 62 kg to 59.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
48 IPD Woman 41 years old	1) obesity; -wt 63 kg -ht 159 cm -BMI 25 kg/m^2 -WC 97.8 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day.	Yes Yes	Before; The patient ate fried rice everyday besides the hospital's diet. And she drank 2 bottles of soft drink (422 cc per day), 2 bottles of sour milk and ate 10 pieces of candy per day. She exercised for 10-15 minutes everyday. After; She stopped eating fried rice. In addition, she drank 2 cans of diet soft drink instead of soft drink and drank 2 bottles of low fat milk. She still exercised for 10-15 minutes everyday.	1) 5.6% weight loss from baseline body weight. She lost 3.5 kg in 4 months (from 63 kg to 59.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
49 OPD Man 33 years old	1) dyslipidemia; visit 1 -cholesterol 252 mg/dl -TG 250 mg/dl -HDL-C 40 mg/dl -LDL-C 189 mg/dl visit 3 -cholesterol 149 mg/dl -TG 189 mg/dl -HDL-C 36 mg/dl -LDL-C 98 mg/dl (target LDL-C = 160 mg/dl) 2) obesity; -wt 69.5 kg -ht 161 cm -BMI 26.81 kg/m^2 -WC 95.3 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital. 3) recommended psychiatrist to prescribe simvastatin 10 mg 1x1 pc in the evening.	Yes Yes Yes	Before; The patient ate 10 plates of steamed rice per day. He ate bread with egg custard, chicken curry and 1-2 fried eggs everyday. In addition; he drank 1 bottle of soft drink (422 cc per day), 2-3 bottles of Red Bull®, 3-4 cups of coffee and 1 bottle of sweet milk per day. He did not exercise at all. After; He ate 7-8 plates of steamed rice per day. He ate 3-4 fried eggs per week and he ate bread with egg custard and chicken curry 5 times per week. In addition, he drank 2-3 bottles of soft drink, 2-3 bottles of Red Bull® and 3-4 cups of coffee per week. Moreover, he stopped drinking sweet milk. Nevertheless, he still did not exercise.	1) -cholesterol 211 mg/dl -TG 142 mg/dl -HDL-C 36 mg/dl -LDL-C 151 mg/dl 2) 0.4% weight loss from baseline body weight. She lost 0.3 kg in 4 months (from 69.5 kg to 69.2 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
50 OPD Man 39 years old	1) IFG; -FPG 110 mg/dl -HbA_{1c} 6.2% 2) obesity; -wt 74.2 kg -ht 171 cm -BMI 25.38 kg/m^2 -WC 91.4 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; Patient's mother always cooked high volume of high caloric food, such as chicken curry, fried pork, vegetable soup with pork skin, banana in coconut milk and stewed pig leg. Therefore, patient ate those foods almost everyday. In addition, he drank 1 bottle of sweet milk and ate 2 small bowls of glutinous rice steamed in coconut milk with ripe mangoes every night and ate 2 fried eggs everyday. He did not exercise at all. After; His mother stopped cooking chicken curry and stewed pig leg, she sometimes cooked fried pork, vegetable soup with pork skin, banana in coconut milk. In addition; he drank low fat milk instead of sweet milk, 1 piece of bread every night and he ate 3 fried eggs per week. He still did not exercise.	1) -FPG 109 mg/dl -HbA_{1c} 5.8% 2) 0.4% weight gain from baseline body weight. He gained 0.3 kg in 4 months (from 74.2 kg to 74.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
51 OPD Man 42 years old	1) obesity; -wt 91 kg -ht 175 cm -BMI 29.71 kg/m^2 -WC 111.8 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient is a Muslim, do not eat pork. He drank 2 bottles of soft drink (422 cc per bottle), 2-3 cups of iced tea or black coffee, added 2-4 teaspoons of sugar per glass, everyday. He usually ate chicken curry, fried noodle, fried beef and chicken skin. In addition, he ate 3 packs of snack and 3 pieces of bread with custard cream everyday. He rode bike for 30-60 minutes everyday. After; He drank 1 bottle of soft drink and 1 glass of iced tea everyday. He occasionally ate chicken curry, fried noodle, fried beef and chicken skin. In addition, he ate 1 pack of snack and 1 piece of bread with custard cream everyday but he ate a half kilo of rambutans or litchis twice a week. He still rode bike everyday.	1) 4.4% weight loss from baseline body weight was observed. He lost 4 kg in 4 month (from 91 kg to 87 kg). 2) metabolic syndrome appeared; -WC 106.7 cm -BP 130/90 mmHg -FPG 125 mg/dl (Visit 1; -WC 111.8 cm -BP 110/70 mmHg -FPG 103 mg/dl).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
52 OPD Woman 47 years old	1) DM; -FPG 126 mg/dl -HbA_{1c} 6.8% 2) obesity; -wt 61 kg -ht 145 cm -BMI 29.01 kg/m^2 -WC 94 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient ate steamed chicken rice or fried noodle everyday. She drank 4 bottles of soft drink (280 cc per bottle). She did not exercise at all. After; She stopped eating steamed chicken rice and fried noodle but she ate fried chicken or pork almost everyday. In addition, she still drank soft drink but with lower volume from 4 bottles to 2 bottles per day. She walked 4 km everyday.	1) -FPG 116 mg/dl -HbA_{1c} 6.6% 2) 1.6% weight loss from baseline body weight was observed. She lost 1 kg in 4 months (from 61 kg to 60 kg). 3) metabolic syndrome appeared; -WC 95.3 cm -TG 150 mg/dl -FPG 116 mg/dl (visit 1; -WC 94 cm -TG 114 mg/dl -FPG 126 mg/dl).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
53 IPD Woman 52 years old	1) obesity; -wt 58.5 kg -ht 152 cm -BMI 25.32 kg/m^2 -WC 95.3 cm 2) metabolic syndrome; -WC 95.3 cm -TG 152 mg/dl -HDL-C 49 mg/dl	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day.	Yes Yes	Before; Although the patient admitted to hospital, she ate hospital's diet only in the evening because her husband bought fried noodle, steamed chicken rice or fried rice for her breakfast and lunch. In addition, he bought 1 glass of sweet drink and 1-2 kinds of dessert for his wife everyday. The patient exercised for 10-15 minutes everyday. After; She still ate hospital's diet only in the evening. Her husband still bought the same food for the patient. But he did not buy sweet drink for her. The patient still exercised for 10-15 minutes everyday.	1) weight stable (58.5 kg) 2) metabolic syndrome disappeared; -WC 96.5 cm -HDL-C 47 mg/dl -TG 115 mg/dl

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
54 IPD Man 27 years old	1) hypertriglyceridemia; visit 1 -cholesterol 196 mg/dl -TG 408 mg/dl -HDL-C 28 mg/dl -LDL-C 125 mg/dl visit 3 -cholesterol 199 mg/dl -TG 115 mg/dl -HDL-C 40 mg/dl -LDL-C 156 mg/dl 2) obesity; -wt 66 kg -ht 155.5 cm -BMI 27.3 kg/m^2 -WC 95.3 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day. 3) informed psychiatrist to prescribe gemfibrozil 600 mg1x1 pc.	Yes Yes Yes	Before ; The patient ate 9-10 plates of steamed rice everyday (he ate meal every 1-2 hours). In addition, he ate fried chicken skin, pork fat, 2-3 fried eggs, 1 bowl of dessert and 3-5 fried buns everyday. In addition, he exercised for 10-15 minutes per day. After; The patient ate 5-6 plates steamed rice per day and he stopped eating fried chicken skin, pork fat and fried bun. In addition, he ate 2-3 fried eggs per week and dessert 2-3 times per week. He still exercised 10-15 minutes everyday.	1) -cholesterol 221 mg/dl -TG 138 mg/dl -HDL-C 47 mg/dl -LDL-C 160 mg/dl 2) 3.8% weight loss from baseline body weight. He lost 2.5 kg in 4 months (from 66 kg to 63.5 kg).

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
55 OPD Man 31 years old	1) severe obesity; -wt 79 kg -ht 161 cm -BMI 30.48 kg/m^2 -WC 100.3 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient drank 4 bottles of soft drink (422 cc per bottle) and 1 bottle of sweet milk everyday. In addition, he ate 2-3 packs of snack, 4 packs of cookie, 4 pieces of cake and 4 fried eggs everyday. He always ate fried pork, fried chicken, sausage and chicken skin. He did not exercise at all. After; He drank 2 bottles of soft drink per day and he drank 1 bottle of low fat milk everyday instead of sweet milk. In addition, he ate 1 pack of snack, 2 packs of cookie, 2 pieces of cake per day. However, he ate 2 fried eggs per week. He walked to the temple for 20-30 minutes 3-4 times per week.	1) 4.2% weight loss from baseline body weight. He lost 3.3 kg in 4 months (from 79 kg to 75.7 kg). 2) metabolic syndrome appeared; -TG 150 mg/dl -HDL-C 33 mg/dl -FPG 116 mg/dl (visit 1, -TG 271 mg/dl -HDL-C 30 mg/dl -FPG 86 mg/dl)

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
56 OPD Man 37 years old	1) known case DM and was treated with metformin 500 mg 1x2 pc from other hospital.(FPG 132 mg/dl, HbA_{1c} 6.7%) 2) obesity; -wt 88.5 kg -ht 173 cm -BMI 29.57 kg/m^2 -WC 104.1 cm 3)) known case HT and was treated with atenolol 100 mg 1x1 OD (BP120/70 mmHg)	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day.	Yes Yes	Before; The patient ate rice with stewed pig leg everyday. In addition, he ate 1 small bowl of dessert in syrupy ice and 1 small bowl of ice cream everyday. In addition, he drank 2-3 bottles of soft drink (422 cc per bottle) and 2-3 glasses of black coffee everyday. He did not exercise at all. After; His sister could not control the patient's diet, he still ate as same as first visit. In addition; he still did not exercise.	1) -FPG 139 mg/dl -HbA_{1c} 6.7% and still received metformin 500 mg 1x2 pc from other hospital. 2) 3.6% weight gain from baseline body weight. He gained 3.2 kg (from 88.5 kg to 91.7 kg). 3) BP 120/70 mmHg

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
57 OPD Man 32 years old	1) IFG; -FPG 115 mg/dl, -HbA_{1c} 7.1% 2) obesity; -wt 82 kg -ht 166 cm -BMI 29.76 kg/m^2 -WC 99.1 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient is a gardener, he grown mangoes, papayas, lemons, jack-fruits and bananas. Therefore, he ate 5 bananas, 2 ripe mangoes everyday. In addition, he drank 4-6 glasses of sweet drink, 1 glass of black coffee and 2 bottles of sweet milk everyday. Moreover, he ate an egg everyday. He slept for 16 hours per day and he played football for 1 hour everyday. After; He still ate as same as first visit but he did not play football because his mother was afraid that her son had a terrible quarrel with his friends.	1) -FPG 141 mg/dl -HbA_{1c} 8.4% 2) 1.2% weight gain from baseline body weight. He gained 1 kg in 4 months (from 82 kg to 83 kg). 3) metabolic syndrome appeared; -TG 158 mg/dl -HDL-C 36 mg/dl -FPG 141 mg/dl (visit 1;-TG 110 mg/dl -HDL-C 42 mg/dl -BP 130/80 mmHg -FPG 115 mg/dl)

Case	Problems	Intervention	Doctor acceptance	Compliance in 4 months	Results (after 4 months treatment)
58 OPD Man 36 years old	1) dyslipidemia; visit 1 -cholesterol 237 mg/dl -TG 137 mg/dl -HDL-C 58 mg/dl -LDL-C 173 mg/dl visit 3 -cholesterol 240 mg/dl -TG 116 mg/dl -HDL-C 57 mg/dl -LDL-C 168 mg/dl (target LDL-C = 160 mg/dl) 2) obesity; -wt 70 kg -ht 158.5 cm -BMI 27.86 kg/m^2 -WC 92.7 cm	1) advised patient and her relatives to control diet and increase time for exercise. 2) discussed with dietitian to reduce meal calories to 1,800 kcal per day during admission in the hospital.	Yes Yes	Before; The patient ate curry and a ripe mango everyday. She drank 1 bottle of soft drink (422 cc per bottle) per day and drank 3-4 bottles of orange juice per week. She did housework, such as ironing, cleaning and washing but she did not exercised. After; She still ate curry and one ripe mango everyday. She still drank soft drink but with lower volume (from 1 bottle per day to 2-3 bottles per week) but she stopped drinking orange juice. In addition, she ate 4-5 small bowls of glutinous rice steamed in coconut milk with egg custard per week. In conclusion, he had a same lifestyle.	1) -cholesterol 259 mg/dl -TG 150 mg/dl -HDL-C 55 mg/dl -LDL-C 174 mg/dl 2) 5% weight loss from baseline body weight. She lost 3.5 kg per 4 months (from 70 kg to 66.5 kg). 3) metabolic syndrome appeared -WC 90.2 cm - TG 150 mg/dl -FPG 126 mg/dl (visit 1; -WC 92.7 cm -TG 137 mg/dl -FPG 98 mg/dl)

Appendix XI

The example of menus with 1,800 kcal/day

ตัวอย่างรายการอาหาร 1,800 กิโลแคลอรี่ต่อวัน

ตัวอย่างที่ 1

เช้า	ข้าวต้มไก่หั่นไม่มีหนัง
	ไข่ลวก
	นมพร่องมันเนย
กลางวัน	แกงป่าลูกชิ้นปลากราย
	ผัดผักคะน้าหมู
	ไก่อบไม่มีหนังกระเทียมพริกไทย
	ผลไม้
เย็น	ต้มเกี้ยมฉ่ายไก่ไม่มีหนัง
	ยำวุ้นเส้นแครอทไก่บดกุ้งแห้ง
	ผัดหน่อไม้ฝรั่งกุ้ง
	ผลไม้
ก่อนนอน	นมพร่องมันเนย

ตัวอย่างที่ 2

เช้า	ข้าวต้มขาว
	อกไก่ผัดขิงหอมใหญ่เห็ดหูหนู
	ยำเกี้ยมฉ่าย
	นมพร่องมันเนย
กลางวัน	ต้มมะระยัดไส้หมู
	น้ำพริกมะม่วงผักสด
	ปลาทูนึ่ง
	ผลไม้
เย็น	ผัดแตงร้านไข่
	ปลาสำลีนึ่งเต้าเจี้ยว
	หมูบดต้มเค็ม
	ผลไม้
ก่อนนอน	นมพร่องมันเนย

Appendix XII The example of food pictures

BIOGRAPHY

NAME	Miss Jintana Pratyasanti
DATE OF BIRTH	24 October 1975
PLACE OF BIRTH	Bangkok, Thailand
INSTITUTE ATTENDED	Chulalongkorn University, 1993-1997 Bachelor of Science in Pharmacy Chulalongkorn University, 2002-2004 Master of Science in Pharmacy (Clinical Pharmacy)
POSITION&OFFICE	Department of Pharmacy Somdet Chaopraya Institute of Psychiatry Bangkok, Thailand Position: Pharmacist