CHAPTER I

INTRODUCTION

Tropical nephrology is one of the fascinating medical subjects which attracts scientific investigations since it differs from nephrology in Western countries. In Thailand, major causative factors of tropical renal failure are infectious diseases, drugs, plant toxins, and animal toxins including snake venom. Acute renal failure from snake bite remains an important medical problem in our country; most cases are due to the bite of Russell's viper and green pit viper.

There are over 2700 species of snakes recognized in the world, 450 of which are poisonous but only a few are known to have medical importance. (Reid, 1982) Four families of venomous snakes have been classified as follow:

1. Elapidae This family includes cobras, kraits, mambas and coral snakes. Their venoms contain neurotoxin; the renal complications are uncommon.

2. Viperidae Three types of snakes in this family which have medical importance in Thailand include Russell's viper, green pit viper and Malayan pit viper; their venoms contain hemato-toxic effect leading to bleeding in victims. Renal failure can be found in cases bitten by Russell's viper and green pit viper but not Malayan pit viper.

3. Hydrophidae (sea snakes) Their venoms are both neurotoxic and myotoxic; the victims developed rhabdomyolysis, myoglobinuria and subsequent acute tubular necrosis.

4. Colubridae This family includes the boomslang and the bird snakes. Since the snakes in this family have backed-fang, they are usually harmless to humans. However,cases of fatal envenomation have been reported.

Russell's viper (*Vipera russelli siamensis*) , the most common snake causing acute renal failure in man, is found in almost region of Thailand. Its venom contains enzymes which are capable of activating factor X (Stuart factor), factor V (proaccelerin), and factor IX (Christmas factor) (Kisiel et.al.,1976; Lindquist,1978; Macfarlane,1967) resulting in widespread thrombosis, fibrinolysis, and thrombocytopenia. This clinical manifestation is compatible with disseminated intravascular coagulation (DIC) found in certain cases of sepsis and obstretic complications. Nevertheless, thrombocytopenia, commonly found after Russell's viper envenomation, is not only caused by DIC but also caused by direct platelet hydrolysis by phospholipase A_2 in the venom. Bleeding which may be local or systemic is the major manifestation; in severe cases, it results in hypovolemic shock, vital organ hemorrhage and death. Panhypopituitarism and neuromuscular manifestation have also been reported. (George et al., 1987; Proby et al., 1989)

Regarding the renal involvement, hematuria and proteinuria are common findings but acute renal failure is most significant. In Russell's viper bite, renal failure develops in 67 percents of cases. (Rampai Suvanapha and Visith Sitprija, 1992) In patients who had renal failure, oliguria or anuria usually developed within 2 to 72 hours. Renal histopathology usually revealed predominant changes of tubular necrosis. (Visith Sitprija et. al.,1976) However, in India and Srilanka, high percentage of cases developed acute cortical necrosis (Chugh, 1986; Jeyarajah, 1984). Rare renal pathology in cases of Russell's viper bite includes interstitial nephritis, necrotizing arteritis, thrombophlebitis

and extracapillary proliferative glomerulonephritis. (Suchart Indraprasit and Vijitr Boonpucknavig, 1986; Visith Sitprija et. al. 1974; Visith Sitprija et. al., 1982; Visith Sitprija and Vijitr Boonpucknavig, 1980) The varieties of renal pathological changes led to many experimental studies; however, few experimental studies in renal pathology have been reported. Morever, most of the histological changes were unremarkable. Since these studies were usually carried out in a short peroid of time , it could be too early to detect any pathological changes.

Objectives

This study was therefore designed to elucidate the effects of Russell's viper on renal histopathological changes at varying dosages and at various intervals. It was hoped that the findings would be basic data and might be relevant to pathophysiology in snake bite nephropathy.