

PDF - EVALUATION OF THE BIOCHEMICAL AND HISTOLOGICAL EFFECTS OF TAPINANTHUS PREUSSII LEAF AQUEOUS AND ETHANOLIC EXTRACTS ON STREPTOZOTOCIN INDUCED DIABETIC WISTAR RATS - researchcub.info **CHAPTER ONE**

INTRODUCTION

1.1 Background

Clinical features similar to diabetes mellitus were described about 3000 years ago by the Third Dynasty Physicians of ancient Egyptian decent. The term "diabetes" was first coined by a Greek doctor known as Aretus of Cappodocia (81-133AD). Later, the word mellitus (honey sweet) was added by Thomas Willis, a British in 1675 after rediscovering the sweetness of urine and blood of patients, first noticed by the scholars of both ancient Indian and Chinese decent. It was only in 1776 that Mathew Dobson an English doctor first confirmed the presence of excess sugar in urine and blood as a cause of their sweetness. In modern time, the history of diabetes coincided with the emergence of experimental medicine. An important milestone in the history of diabetes in 1857 by the French scientist Claude Bernard is the establishment of the role of the liver in glycogenesis, and the concept that diabetes is due to excess glucose production. The role of the pancreas in pathogenesis of diabetes was discovered by Mering and Minkowski of Austria in 1889. Later, this discovery constituted the basis of insulin isolation and clinical use by two Canadians, Banting and Best in 1921. Trials to prepare an orally administrated hypoglycemic agent ended successfully by first marketing of tolbutamide and carbutamide in 1955 (Ahmed, 2002).

Although there is paucity of data on the prevalence of diabetes in Nigeria and other African countries, available data suggests that diabetes is emerging as a major public health problem in Africa, including Nigeria (Mbanya *et al.*, 1996). However, its prevalence and that of other non-communicable diseases is on the rise in African communities due to the ageing of the population and drastic life style changes accompanying urbanization and westernization (Gwatkin *et al.*, 1999). Diabetes is no longer rare, and is higher in populations of African origin who have migrated to Western countries compared to Caucasians living in the same countries (Mbanya *et al.*, 1999). Type 2 diabetes is the predominant form, yet, a classification problem persists for a high proportion of the patients (Elbagir *et al.*, 1998). There are numerous reports in populations of African ancestry, of clinical presentations of diabetes, which do not easily fit with the definition criteria of the main known types. Apart from classical type 1 and type 2 diabetes, tropical diabetes and ketosis-prone atypical diabetes have been described (Gautier *et al.*, 2001). Moreover, diabetes mellitus is associated with a high rate of long-term complications in populations of African origin. Therefore, it will represent a growing burden of health care systems of African countries, most of which already face difficult economic conditions. However a prospective approach of this burden and possible prevention strategies has been hindered by the scarcity of data on diabetes in Africa. Thus, the design and implementation of appropriate strategy for early diagnosis and treatment, as well as population based primary prevention of diabetes in these high-risk populations is therefore a public health priority.

There is an increasing demand for medicinal plants and plant products as alternatives to orthodox medicines especially in developing countries (Murray, 1998). The use of plants and their natural products in Nigeria as either extract or infusion is a widespread practice in the treatment and management of diseases (Iwu, 1980). Medicinal plants contain accumulated natural products, biologically active materials and ingredients which have various effects. These active ingredients representing the value in use are produced by biological synthesis in the plant in very small concentrations of the dry material content of the plant (Hornok, 1992).

Some of these active ingredients accumulate in certain parts of the plant like roots, stem, leaves, bark, fruits and flowers. It is only those portions of these plants that contain active ingredients that are used for therapeutic purposes. The part that contains the active ingredient is taken in the form of extract, infusion and decoction (Odebiyi and Sofowara, 1979).

1.2 Aim and Objectives of the Study

The aim of this study was to evaluate the biochemical and histological effects of *Tapinanthus preussii* leaf aqueous and ethanolic extracts on streptozotocin induced diabetic wistar rats in order to ascertain its hypoglycaemic potentials and safety.

The objectives of the study were as follows:

Determination of the elemental, proximate, phytochemical composition and in vitro antioxidant activities of the crude aqueous and ethanolic leaf extracts of *Tapinanthus preussii*.

Evaluation of the acute toxicity profile of the crude aqueous and ethanolic leaf extracts of *Tapinanthus preussii*.

A sub-chronic study on the effects of *Tapinanthus preussii* crude aqueous and ethanolic leaf extracts on some biochemical and haematological indices in normoglycaemic albino wistar rats.

Evaluation of the antidiabetic effect of *Tapinanthus preussii* crude aqueous and ethanolic leaf extracts as well as some biochemical and haematological indices in streptozotocin induced diabetic albino wistar rats.

Histopathological studies on some vital organs of the normoglycaemic and streptozotocin induced diabetic wistar rats treated with *Tapinanthus preussii* crude aqueous and ethanolic leaf extracts.

1.3 Justification

The incidence of diabetes is increasing in the world and is assuming epidemic proportions (Chougaleet *et al.*, 2007). According to the world Health Organization the number of diabetics which is about 160 thousand has doubled in the past few years and is expected to double by the year 2025 (Eliziane *et al.*, 2003). Hence it is one of the most prevalent conditions with spontaneous manifestations characterized by hyperglycemia, deranged metabolism of carbohydrate, protein, fats, water and electrolytes predominantly affecting the vasculature. Due to its high prevalence and potential deleterious effect on the physical and psychological state of patients which generally results in a morbid condition, it is therefore a major medical concern (Halpern *et al.*, 2000; Macedo *et al.*, 2002). Hence the search for newer drugs is on the rise.

Although insulin and oral hypoglycaemic agents are the mainstay of the management of diabetes, they have prominent side effects (like gastrointestinal discomforts, hepatotoxicity, lactic acidosis, anorexia etc) and fail to alter the course of diabetic complications. The high cost of these hypoglycaemic agents and their potential side effects have led to the focus on the use of medicinal plants to manage this ravaging disorder. For centuries people the world over have believed in the ability of herbs to treat different illnesses. Hence the search for diabetes treatments has led to the use of many herbs to help combat this disease that has afflicted millions. The World Health Organization has estimated that one third of the diabetic patients in the low income African families used alternative medications especially herbal mixtures since they are considered readily affordable, available and efficacious (Sarika *et al.*, 2006). Therefore the World Health Organization (WHO) has recommended the use of alternative medicine for treating diabetes mellitus (WHO, 1980), hence providing an impetus for research in this area. Currently the focus of research in diabetes includes discovering newer antidiabetic agents as well as isolating the active compounds from herbal sources that have been documented to have antidiabetic properties described in some ancient texts

(Tripathi, 1998).

According to ethno-botanical information, more than eight hundred plants including the African mistletoe are used as traditional remedies in one form or another for the treatment of diabetes (Alarcon-Aguilara *et al.*, 1998), though only a few have been evaluated scientifically. Several traditional plants have shown antidiabetic properties when assessed in experimental models of diabetes though rarely in clinical studies. But still these antidiabetic herbs have not gained enough momentum in medicine due to absence of specific standardized raw materials and extracts for formulation of phytomedicines as well as content uniformity and therapeutic effectiveness. Hence it was worth while investigating the hypoglycaemic effect as well as the lethal dose toxicity of *Tapinanthus preussii* as reflected in some biochemical and haematological parameters in normoglycaemic and streptozotocin induced diabetic wistar rats (experimental model) since cellular and biochemical mechanisms are involved in diabetes. This study may go a long way to elucidate the mechanism of action of this widely used plant parasite, *Tapinanthus preussii* and therefore its safety and efficacy in alleviating diabetes.

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