PDF - DETERMINATION OF THE FERRITIN AND GLUCOSE LEVELS IN SERUM OF MICE TREATED WITH ETHANOLIC LEAF EXTRACT OF PHYLLANTUSAMARUS - researchcub.info**CHAPTER ONE**

1.0. Introduction

Traditional medicine is the total combination of knowledge whether explicable or inexplicable use in diagnosing, preventing or eliminating a physical, mental or social disease which may rely exclusively on past experience handed down from generation to generation (Boerio-Goates, 2001). A medicinal plant is any plant used for the extraction of pure substances either for direct medicinal use or for hemi-synthesis of medicinal compounds which can be used for the therapeutic purpose or as a precursor for the synthesis of useful drugs (Ponomarev and Migarskaya, 2000),).

The plant *Phyllanthus amarus* is one of the most important medicinal plants used in traditional medicine for treatment of diabetes and excessive body weight reduction.

Its hypoglycemic properties have been reported (Bunn and Higgins, 2011).

Ferritin is a class of iron storage protein distributed in virtually all living kingdoms. Proteins of this class commonly form spherical protein nanocages, each of which is usually composed of 24 similar or identical subunits (Oyaizu, 2006). This cage-like 24-mer has a large inner cavity and shows highly symmetrical architecture, i.e., the 24 subunits are related by four-, three-, and twofold symmetries (432 symmetry). A subunit of ferritin forms a four-helix bundle composed of helices A to D and a short fifth helix E, which is also a common structural feature of all ferritins. Many intersubunit interactions have been observed in the crystal structures of ferritin from various organisms, giving the ferritin superfamily its super thermal stability (Krikler and Heathcote, 2002).The ferritin superfamily can be divided into a vertebrate type, a plant type, a bacterial type, and so on. Bacterial ferritin can be further divided into heme-containing bacterioferritin (Bfr), nonheme ferritin (Ftn), and Dps (DNA binding protein from starved cells), the latter of which exceptionally forms a dodecameric protein shell with two- and threefold symmetry axes (mini-ferritin). Most of the ferritins possess a di-iron oxidoreductase site (ferroxidase site) responsible for iron oxidation in the center of the four-helix bundle of the monomeric subunit, except for mammalian L chain ferritin (Rucker *et al.,* 2009).

Glucose is a sugar with the molecular formula$C_6H_{12}O_6$. The name "glucose" (/??lu?ko?s/) comes from the Greek word ???????, meaning "sweet wine, must". Several active compounds have been identified in *P. amarus* were found to be potent inhibitors of rat liver cyclic AMP–dependant protein kinases (Fairclough and Houston, 2004),phyllanthin and hypo-phyllanthin present are reported to be hepatoprotective agents and protect hepatocytes against carbon tetrachloride and galactosamine induced liver toxicity in rats (Gailliot and Baumeister, 2007).

Phyllanthus amarus is a plant of the family Euphorbiaceae and has about approximately 800 species which are found in tropical and subtropical countries of the world (Coresh *et al.,* 2007). The name '*Phyllanthus*' means "leaf and flower" and named so because of its appearance where flower, fruit and leaf appears fused. *Phyllanthus amarus* is a branching annual glabrous herb which is 30-60 cm high and have slender, leaf-bearing branchlets, distichous leaves which are subsessile elliptic-oblong, obtuse, rounded base (Honeycutt *et al.,* 2013). Flowers are yellowish, whitish or greenish, auxillary, males flowers in groups of 1-3 whereas females are solitary. Fruits are depressed-globose like smooth capsules present underneath the branches and seeds are trigonous, pale brown with longitudinal parallel ribs on the back (Williams, 2010). *Phyllanthus amarus* is a small erect, annual monoeciousglabous herb that grows to 30-40 cm in height. It belongs to the family *Euphorbiaceae*with leaves that alternate distichous and crowded along lateral

branchlets (Foo and Wong 2012).

Phyllanthus amarus is a plant with reported medicinal properties and broad spectrum of pharmacological activities including antiviral, antimicrobial, anti-plasmodial, anti-inflammatory, anticancer, antidiabetics, antioxidant and diuretics properties among others. A number of active constituents of the plant are related to biologically active lignans, glycosides, flavonoids, ellagitannins and phenylpropanoids found in the leaf, stem and root of the plant along with common lipids, sterols and flavonols.[*Phyllanthus amarus* is a tropical shrub indigenous to the rainforest of Amazon and other tropical areas of the world (Foo, 2005).

Studies on extract of *Phyllanthus amarus* have shown anti hepatitis B activity, hepatoprotective (Georgieva *et al.,* 2002), anticancerous (Uriezee*t al.,* 2010), antimicrobial (Samraj (2001) and kidney stones dissolution properties (Stipanuk, 2000). Therefore, the present investigation was undertaken to study the ferritin and glucose levels in the serum of mice treated with ethanoic leaf of exract of *P. amarus* induced diabetic mice.

1.1. Statement of the Problem

Iron is important for lots of processes in the body; too much iron over a long period of time can be dangerous and cause a lot of problems with the function of body organs. Low levels of ferritin are seen in iron deficiency. Serum insulin levels have been researched in the general population as potential predictive biomarkers for all-cause and cause-specific mortality, but initial research has found mixed results. Subsequent studies have suggested that the more stable insulin precursor molecule, proinsulin, is a better predictive marker of all-cause and cause-specific mortality, in particular, cardiovascular mortality (Blacklock *et al.,* 2000). However, there have been few long-term prospective studies to evaluate this finding. Proinsulin and mortality from cancer has not been studied.

Raised serum ferritin can be caused by five main mechanisms: damage to ferritin-containing tissues, for example, the bone marrow and liver; inflammation or infection, because ferritin is an acute-phase protein; genetic iron-loading conditions; secondary iron-loading conditions, which are mainly due to blood transfusions but are also seen in African haemosiderosis due to the ingestion of large quantities of iron; and chronic anaemias caused by ineffective haematopoesis, for example, thalassaemias elimination (Hasrat*et al.,* 2004).

Low serum ferritin is a common problem in people with gluten intolerance. In celiac disease, antibodies first target the proximal small intestine (the earlier part of your small intestine), which is the part of your small intestine responsible for absorbing iron. Some forms of non-celiac gluten sensitivity (NCGS) also trigger antibodies that do damage to this part of your intestine, while other forms of NCGS trigger systemic inflammation, which may impede iron absorption. Low ferritin is most common and most severe in celiac disease patients (Koffi, 2007).

Diabetes mellitus (DM) is caused by inherited and/ or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced . This insulin deficiency results in increased concentration of glucose in the blood. Increase in blood glucose damages many of the body’s systems, in particular, the blood vessels and nerves. The hyperglycemia caused due to decreased insulin production is called Type-1 diabetes and hyperglycemia due insufficient insulin utilization is called Type-2 diabetes. Out of these two types, Type -2 diabetes is a major problem of today and it account for nearly 95% of total diabetic population of about 246 million. Since ancient times, plants have been an exemplary source of medicine (Konan *et al.,* 2006).

Phyllanthinis reported to be hepatoprotective agents and protect hepatocytes against carbon tetrachloride

and galactosamine induced liver toxicity in rats (Syamasundar*et al.,* 1985). In Nigeria, the plant is extensively used in traditional medicine to eliminate waste from the body, restore the activity of the liver and build up blood and innate defense system.

Phyllanthus amarus is a small herb common to central and southern India. It can grow to 30-60 cm in height and bloom with yellow flowers. All parts of the plant are used in ayurvedhic medicines because of their medicinal properties. Leaves of this plant are reported to contain lignans, alkaloids, flavonoids, galloatnoids and glycosides

It is noted that evaluation of this herb and herbal products in general faces major problems. First, is the use of mixed extracts (concoctions) and variations in methods of harvesting, preparing, and extracting the herb, which can result in dramatically different levels of certain alkaloids.

Despite the wide spread use of *P. amarus* much has not been reported about the biochemical effect in Nigeria. A recent work in Nigeria shows that the aqueous extract of *P. amarus* has hepatic cell function enhancement (Chen *et al.,* 1996). This work was therefore designed to evaluate ferritin and glucose levels in the serum of mice treated with ethanoic treated with extract of *P. amarus.*

1.2. Objective of the Study

The purpose of this study is to determine the ferritin and glucose levels in serum of mice treated with ethanolic leaf extract of *Phyllantusamarus* which may indicate an advantage or disadvantage

1.3. Scope of the Study

The study seeks to evaluate ferritin and glucose levels in the serum mice treated with ethanoic leaf extract of *phyllantusamarus* using mice model. A group of male mice induced with ferritin and glucose would be treated with leaf extract of *phyllantusamarus* and also would be treated with the juice extract of the plant on daily basis and another group who are otherwise healthy would serve as a positive control while an induced but not treated group would serve as a negative control for the experiment. The research will be carried out in the Animal Facility of the Faculty of Basic Medical Sciences of Delta State University Abraka.

1.4 Significance of the Study

The result of this study may be used to help determine the cause of hypoglycaemia (low glucose). The findings of this study will be of traditional usefulness in several health problems such as diarrhoea, dysentery, dropsy, jaundice, intermittent fevers, urinogenital disorders, scabies and wounds. This study will enlighten riverside communities of the potential danger they face and how to control it using the *Phyllanthus amarus*.

1.5. Limitation of the Study

This study is limited to leaf extract of *phyllantusamarus* for the treatment of ferritin and glucose levels in serum of mice which may indicate an advantage or disadvantage.

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