

# **Hunteria Umbellata Folk Medicine's Potency for Treating Obesity and Metabolic Syndrome Diseases.**

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## **ABSTRACT**

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**Background:** For ages, people from Eastern and Western Nigerian have used *Hunteria umbellata* (HU) as an effective folk medicine for treating various diseases, and in recent times there is growing evidence from clinical studies performed on humans and animals showing its efficacy in providing treatments for several diseases owing to its macro and micronutrients composition as well as phytochemical, anti-nutritive constituents, and nutraceutical components.

**Study design:** A Systematic review.

**Aim:** to investigate peer-reviewed evidence that used epidemiological standards of study to investigate claims and justification of the efficaciousness of using HU in treating diseases, essentially metabolic syndrome diseases that are claiming millions of lives, causing pain, disabilities, and economic burden.

**Methodology:** A systematic review-community approach to preventive services was used to study peer reviewed literatures supporting or debunking the claims and use of HU as a potent agent for treating diseases. Only epidemiological peer reviewed studies were selected, assessed, reviewed, and analyzed in synthesis with some traditional claims as effective medicine for diseases. Sample size n =22 studies. Google scholar, google, Firefox search engines were used to search for scientific evidence. Search words were, *Hunteria Umbellata*, proximate composition of *hunteria umbellata*, phytochemical composition of *hunteria umbellata*. The summary of the findings was reviewed consisting of title, objectives, findings, and conclusions

**Results:** Studies conducted locally and internationally strongly support that HU is rich in macro and micronutrients, phytochemical, and nutraceuticals components that suggest it to be an effective medicine for treating various diseases.

**Conclusion:** HU is a potent agent for treating diseases including metabolic syndrome-related diseases.

*Keywords: Hunteria umbellata, obesity control, obesity treatment, metabolic syndrome disease control, metabolic syndrome disease treatment.*

## **1. INTRODUCTION**

Why conduct this study on *Hunteria umbellata*? *Hunter umbellate* has been used in Africa as an ancient folk medicine for treating a range of diseases such as metabolic syndrome-related diseases namely obesity, diabetes, cholesterol, and hypertension (1, 22, 23, 27, 28). Today metabolic syndrome-related diseases remain a pandemic plague to humanity, claiming lives, causing pain, disabilities, and economic burden (2, 14); any affordable source

of significant and sustainable overweight and obesity intervention remedy is a necessary global public health problem

-solving intervention that should be encouraged.

HU is a small tree of West African origin, precisely Southern Nigeria that grows on average up to 10-15 meters high. It belongs to a family of plant called Apocynaceae, English name is perinari excelsa, (1, 12, 17, 18, 19). The plant's stem has a diameter that ranges from 40 - 55 cm. HU extract is used in Nigeria as native medicine for treating a wide range of diseases, curable and incurable ones alike. The fruits, leaves, stem, bark, and root have medicinal values (1). Though, a highly medicinal plant, all parts of the plant have been linked with some fatalities incurred out of wrong or misuse. Thus, clinical evidence about this plant and its use for medicine, including facts and fictions need to be clearly established to educate and discourage or encourage not just use but proper use.

The purpose of this community guide to preventive intervention services also called a systematic review saves clinicians time to go through many related studies to determine the facts and make informed decisions (2, 3, 8, 14, 16, 39). It will also help to make the facts about the claims succinctly available and accessible to consumers (13).

In 2010, an estimate of 3.4 million lives were lost to overweight and obesity (2, 3, 8). Also, overweight and obesity caused 3.8% years of life lost to disability globally (2, 8). The continuous increase in obesity has prompted a global call for regular monitoring of overweight and obesity prevalence across all populations and age demographics (2, 3, 8, 9). Scientific information about obesity trends and concentration in children and adults from 1980 to 2013 (2, 3, 8) was conducted to determine its effect on population health and to support decision making and prioritization of action and plans (2, 3, 8). In search of affordable solutions to obesity and metabolic syndrome diseases we deemed this investigation worthy to determine whether there is sufficient evidence to support HU as an effective medicine for treating obesity, and metabolic syndrome-related diseases.

Regardless of large amount of obesity, and metabolic syndrome diseases interventions performed globally, the prevalence of obesity across the globe remains resilient, and all human demographics are affected; so, any affordable, accessible, less harmful agent to control or prevent it is a noble and lifesaving course (3, 4, 14). This is essentially critical because obesity and overweight is linked with many chronic diseases namely, cancer, type II diabetes Mellitus, dyslipidaemia (fat elevation in the blood), ischaemic heart diseases that have claimed millions of lives across the globe (5). Also, the cost of treatment is not affordable for poor and rich countries alike. The highest impact of lack of affordability is largely experienced among poor countries, which cause unspeakable pains, disability, loss of scarce income spent on its expensive treatment and millions of preventable deaths (3, 4, 5, 14).

Globally, between 1980 and 2013, adults who have body mass index (BMI) of 25 kg/m<sup>2</sup> or higher rose from 28.8% in 1980, to 36.9% in 2013 (2, 6, 7, 8). This figure represents 29.8% among men and 38.0% among women (2, 8). There is high prevalence among children and adolescence from rich countries with 23.8% prevalence overall: boys accounting for 22.6% and girls accounting for nearly 24.7% of overweight and obesity in 2013 (2, 8). In the poor or developing countries overweight and obesity prevalence among children and adolescents ranged from 8.1% in 1980 to 12.9% in 2013, with boys rising from 8.4% in 1980 to 13.4% in 2013, and girls 13.0% in 1980-13.9% in 2013 (2, 8, 9). The above data may seem obsolete however, the 2016 facts sheet of WHO on obesity and overweight is not different. WHO in 2016 suggested that the global obesity has nearly tripled since 1975, with 1.9 billion adults, which is 39% aged 18 years and above having overweight, and 650 million out this figure were overweight, which is 13% of the global population, and larger population of the global communities live in countries where the cause of death is more of overweight and obesity than underweight (40). Sad enough children were not left out. In 2020, 39 million children aged 5 and below were either overweight or obese, and higher than 340 million of children and youth aged 5-19 years were either overweight or obese in 2016 (40).

It is clear that there is no significant success story globally in dealing with the obesity plague, which is totally preventable. In this systematic review, the objective of the authors is to conduct a review of all relevant and accessible epidemiological studies so far performed about HU and the justification of its use as effective medicine for treating various diseases traditionally.

## 2. METHODS

This study is a systematic review also known as a community guide to preventive Intervention services used to investigate peer reviewed studies performed by researchers following epidemiological methods of qualitative and quantitative studies (14, 16, 39). The objective is to review and assess supporting or debunking claims of use of HU as a potent agent for treating diseases, the purpose is to encourage or discourage its use for disease control. Criteria for inclusion were, epidemiological peer reviewed studies that examined the HU plant including, leaf, seed, bark, and root, that indicated study limitations, respected ethics, and assessed, reviewed, and analyzed a traditional claim that HU was an effective medicine for diseases. Sample size  $n \geq 22$  studies minimum. Non-peer reviewed studies were excluded (14, 15). Google scholar, google, Firefox search engines were used to search for scientific evidence. Search words were, *Hunteria Umbellata*, proximate composition of *hunteria umbellata*, phytochemical composition of *hunteria umbellata*. There were two phases of this study, pre-assessment phase and ranking of the articles were performed on the abstracts to select relevant quality studies. Randomized studies and systematic reviews were rated as high quality with two (++), all qualitative and observational studies were rated good quality with one plus (+) and studies that failed to indicate methodology, limitations, bias, and did not respect ethics were rated as low quality (14, 15, 16, 39). In phase II, selected studies were analyzed to determine the results upon which the discussion was synthesized, and conclusion drawn.

## 3. RESULTS

Chemical composition of ten medicinal plant seeds in West Nigeria.

In this study, the proximate, mineral and phytochemical components of ten plant seeds, including *Hunteria umbellata* traditionally used as medicines were analyzed. Results showed that HU compositions included, moisture, carbohydrates, protein, fat, fibre and ash. HU was also rich in inorganic micronutrients namely, potassium (K), Sodium (Na), Calcium (Ca), Magnesium (Mg), iron (Fe), and manganese. The investigated HU was rich in phytochemicals namely, Flavonoids, Phenols, steroids, tannins, steroids, reducing sugar, alkaloids, glycosides-saponins, anthraquinone, saponins, and alkaloids.

Conclusion: rich phytochemical composition of HU namely alkaloids, glycosides, reducing sugar, ployphenols, phenols and flavonoids suggests a strong pharmacological properties making it a suitable medicine for treating diseases in human and animals, and its macronutrients composition offers hope for food for humans and animals. Similar studies were performed and similar outcome suggested by (12, 17, 19, 20). Rated as high quality ++ (18).

Phytochemical analysis and anti-hyperlipidemic potential of ethanolic extract of *hunteria umbellata* seed.

The authors performed this study to screen, analyze, and access the anti-nutritive and phytochemical components of HU to determine its potentials for using it to treat hyperlipidemia in view of finding affordable solutions using herbal remedies to control obesity. It was a double blinded study. Results revealed that HU is composed of rich phytochemical and anti-nutrient factors occurring within allowable limits. Thirty rats were examined. They were split into groups, in the control group were normal rats fed with a normal rat diet, the experimental group was split into groups and fed a high fat diet (HFD). Of the four experimental groups, one group did not receive HU ethanol extract or cholesterol lowering medicine, while the study lasted. One group received standard clinical cholesterol treatment medicine called Orlistat, the remaining two groups received 200 mg/kg, and 400 mg/kg respectively of HU.

The HFD rats that did not receive HU ethanol extract showed significant increases in their body weight and cholesterol concentration but those treated with 200 mg/kg and 400 mg/kg of body weight ethanol extract of HU showed significant reduction in their body weight as well as triglycerides, cholesterol, LDL (low density lipoprotein), and total cholesterol, and those treated with 200 mg/kg body weight showed significant reduction in in creatinine levels in the urine, while those not treated with HU ethanol extract did not. There was higher reduction in cholesterol levels, body weight and creatinine concentrations in the urine among

those treated with HU extract than those treated with standard medicine- Orlistat. Conclusion: Rats treated HU ethanol extract showed the highest significant reduction in cholesterol. HU was deemed to be a safe composition of phytochemical and anti-nutrient factors with the potential to be used as an anti-hyperlipidemic agent, while macro and micronutrient minerals offer further nutrients for health and wellbeing to the body, Rated as high quality ++ (22)

A systematic review of medicinal plants used in Nigeria for hypertension management. This was a systematic review study. The authors performed it in search of evidence about the efficacy of plants used as medicine for treating hypertension in Nigeria because of the prevalence and growing incidence of hypertension in Nigeria and globally, and its poor management in Nigeria. The authors investigated a total of 136 plants used for treating hypertension and other diseases in Nigeria. The findings were, that most of those plants including HU are predominantly rich in a wide range of health protective phytochemical and anti-nutritive agents such as, alkaloids, flavonoids, saponins, terpenoid, tannins, glycosides, steroids, phenols, polyphenols, anthraquinone, and some paleobotanics, which explains why people use them traditionally to treat hypertension and other diseases; however, there is not sufficient evidence on clinical trials to determine the mode of each plant's activities in preventing or controlling hypertension. More studies were recommended to determine clinically how the phytochemical components function to control hypertension and other diseases.

Conclusion: Plants used to treat hypertension and many other diseases in Nigeria are many. Available studies on the mechanism of these plants' phytochemical components' mode of action on hypertension were conducted outside Nigeria, and because of variations in plant compositions owing to difference in species, soil composition and fertilizer, as well as environment, authors recommended that more studies be sponsored and conducted in Nigeria to buttress the facts about the efficacies of medicinal plants in treating diseases including hypertension. (23). Rate as good quality +

Anti-obesity and antihyperlipidemic effect of *Hunteria umbellata* seed extract in experimental hyperlipidemia.

The objective of these authors was to investigate the justification of using water extract of HU as a native medicine for hyperlipidemia and obesity treatment and the goal was to encourage its use if justification was found. In this double blinded study the authors examined the hypolipidemic and anti-obesity functions of HU extract on rats as well as the mechanism of action of lowering lipids concentration in the body and preventing or reducing obesity in comparisons with standard medicine used for lowering obesity and lipid in the body. The normal, triton-induced, and olive-induced hyperlipidemic rats were placed and various groups and treated with three levels of Hu extract starting from 50 mg/kg, 100 mg/kg, and 200 mg/kg. Also one group was treated with the standard medicine simvastatin, 20 mg/kg and another control group treated with 10 ml/kg of distilled water. The treatment lasted for 28 days and 24 hours. The results showed that various mgs 50, 100, and 200 per kg significantly lowered the body weight, coronary artery, atherogenic and Lee's indices. The mechanisms of function were through intestine lipid and triglycerides absorption, and inhibition of cholesterol synthesis by the liver. Conclusion. HU extract through inhibition of fat and triglyceride absorption in the intestine and prevention of cholesterol synthesis in the liver, manifested the potential for using it as therapy for obesity, hyperlipidemic control as well as for cardiovascular diseases prevention such as atherogenesis (4). Rated as high quality double blinded study ++

Further evaluation of antihyperglycaemic activity of *hunteria umbellata* (K. Schum) Hallier f. Seed extract

This researcher investigated the ethnopharmacological relevance of African traditional medicine seeds of water extract of HU to treat diabetes mellitus. The objectives of this study were to examine the effects of using water extract of HU seeds to treat diabetes using epidemiological standard of testing efficacy of potential medicine. The experiment animals-hyperglycemic rats were induced with alloxan, high fructose as well as dexamethasone and orally administered a single dose of HU water extract per day with 50 mg/kg, 100 mg/kg, and 200 mg/kg, and standard medicine for treating hyperglycemia 1 g/kg of glibenclamide for two weeks, three weeks, and eight weeks. There were six groups; group I was a control group

called normoglycemic, which means that the rats were normal and has no sugar problem and were treated with 10 ml/kg of distilled water daily only. Group II was another control hyperglycemic group not treated but administered with 10 ml/kg per body weight of distilled water daily. Group III were hyperglycemic group treated with standard medicine - 1 g/kg of glibenclamide. Groups IV, V, and VI were treated with 50 mg/kg, 100 mg/kg, and 200 mg/kg of HU daily while the study lasted. Alloxan monohydrate injection 120 mg/kg raised the fasting blood glucose (FBG) of untreated rats, and same rats when treated with standard medicine glibenclamide and HU extract showed significance reduction on FBG concentration, with 200 mg/kg HU extract showing the most significance reduction. The group that received subcutaneous injection of dexamethasone sodium phosphate daily showed a significant increase in FBG and serum triglycerides and total cholesterol higher than the group that did not receive this injection. When this group was treated with daily oral dose of HU extract 200 mg/kg and glibenclamide FBG, triglycerides, and total cholesterol concentrations were reduced although glibenclamide reduction was highest in this test. The outcome of these treatments as well as that with high fructose treatment on glycosylated hemoglobin level suggests that HU seed extract possess strong hypoglycemic and hypolipidemic properties through insulin resistance reduction functions mediated by HU rich concentration of phytochemical namely, flavonoids, alkaloids, tannins, and saponins and hypoglycemic and hypolipidemic properties. Conclusion: HU seed extract has hypoglycemic and hypolipidemic properties achieved by increase in sugar absorption and reduction in insulin resistance thus, its use as native medicine for treating diabetes is justified. Double blinded study rated as high quality ++ (26). In similar studies performed by (33, 34) HU seed extract effectively controlled diabetes.

GC-MS and molecular docking studies of *Hunteria umbellata* methanolic extract as a potent anti-diabetic. Informatics in Medicine Unlocked.

These authors used Gas Chromatography Mass Spectrometry (GC-MS) and molecular docking to determine phytochemical components of HU, particularly to examine the peroxisome proliferator-activated receptor gamma (PPAR- $\gamma$ ) agonists concentrations of the phytochemical compounds because those compounds are known to be effective for treating diabetes and sugar through insulin sensitization and inhibition of sugar production in the liver. The results showed that 21 phytochemical compounds were detected from seed and leaf extract including 2,2-Benzylidenebis (3-methylbenzofuran). The 2,2-Benzylidenebis of the seed scored 11.3 kcal/mol for fitness and this compound has strong anti-diabetic property. Conclusion. The 2,2-Benzylidenebis and phytochemical compounds of HU seed extract showed a significant anti diabetic effect on PPAR- $\gamma$ , and the molecular binding interaction recorded in the in-silico data confirms specifically that 2,2-Benzylidenebis binds to PPAR- $\gamma$  suggesting it to be a potent compound for treating diabetes. More In-vitro and in-vivo studies to determine mechanisms of action on type II diabetes was recommended. (34)

Hypoglycaemic effects of the aqueous seed extract of *hinter umbellate* in normoglycemic and glucose and nicotine-induced hyperglycemic rats.

Africans used dry seeds of *Hunteria umbellata* K. Schum as a native medicine for treating different types of diseases namely, obesity, diabetes, hypertension, and other diseases. These researchers examined the science behind using HU seed extract to treat hyperglycemia and obesity. In this study, rats with normal sugar scientifically called normoglycemic rat, and rats whose high blood sugar was caused by high fructose diet or high alcohol consumption were tested. The rats were given 50 mg/kg, 100 mg/kg and 200 mg/kg doses of Hu extract daily for a period of the study.

Also, investigated was the oral toxicity of HU seed extract. Preliminary or pre-test as well as intervention test of that employed OECD/OCDE Up and Down Procedures Test Guidelines to determine oral toxicity. The results revealed that the extract was rich in phytochemical compounds namely, flavonoids, tannins, alkaloids, and glycosides. There was progressively significant decrease in the blood glucose of the Hu extract treated animals based upon dose. The higher the dose, the greater the blood sugar level reduction, and Hu sugar reduction was significantly higher than that caused by standard diabetes medicine- glibenclamide. HU lowered sugar concentrations through inhibition of sugar absorption in the intestine and hepatic synthesis of sugar. At treatment doses no toxicity was observed but at extremely high doses of LD50 1020 mg/kg were slightly toxic. Conclusion. Based upon the outcome of this study, there is scientific evidence behind the use of HU seed extract for treating obesity

and type II diabetes, HU extract caused significant reduction in blood sugar concentrations and weight of the experimental animals. Toxicity did not occur with the experimental doses but, only slightly occurred on extremely high dose of 1020 mg.kg thus, the use of HU as a native medicine for treating type 2 diabetes and obesity is justified (2). The studies of (24, 37) suggested similar outcome. Rated as high quality ++

Alpha-glucosidase inhibitory activities of 1beta-D-glucopyranosyl-8-methyl-3-iridene-4, 7-carbolactone and N4-chloromethylakuammine isolated from seeds of *Hunteria umbellata* K. Schun. (Apocynaceae).

These authors studied the anti-diabetes claims of HU seeds extract because they believed that at the time of their study and based upon the information available to them that anti diabetic claims on HU seeds extract were based upon opinion and investigations on this claim were yet to be completed. Thus these authors thoroughly investigated the scientific evidence behind the claim of HU seeds extract as an antidiabetic agent, with particular focus upon two compounds scientifically known to be potent inhibitors of alpha-glucosidase namely, N4-chloromethylakuammine and 1beta-D-glucopyranosyl-8-methyl-3-iridene-4, 7-carbolactone. The authors noted that these two compounds were isolated from HU extract. Thus, a clear indication on a molecular basis of HU seeds extract having the capability to prevent diabetes, and that justifies its native use as native medicine, and in the author's own words, HU seeds extract "could serve as templates for new antidiabetic alpha-glucosidase inhibitors". The results of this study indicate that HU seeds extract has the established potential to promote diabetes inhibition (38). Rated as high quality study ++

*Hunteria umbellata* Fruit Picture



Fig 1 *Hunteria umbellata* Fruit

## DISCUSSION

From the 22 studies selected as core evidence for this investigation, which actually involved over one hundred other previous studies it was established that HU extract be it from the seeds, husks, leaves, stems or root barks are efficacious Nigerian native medicine for treating various diseases namely obesity, diabetes and sugar reduction, cholesterol and fat reduction, and it is relatively non-toxic to the body, except in extreme case of overdose or prolong use.

Conversely to the general statement of (23, 29) about insufficient clinical studies on the efficacies of herbal plants, although that could be true at the times of those studies; it is now evident that there is sufficient scientific data to support HU's efficacy. These researchers

hope to eliminate fears, educate, and encourage proper use of HU extract for diseases treatment (23).

In Nigeria, HU seed extracts are used as native medicine for treating diabetes (1, 2, 8). Two compounds established by evidence that inhibit alpha-glucosidase function which cause diabetes namely, N4-chloromethylakuummine and 1beta-D-glucopyranosyl-8-methyl-3-iridene-4, 7-carbolactone, were isolated from HU extract. Thus, a clear indication on molecular basis that HU seeds extract has a capability of preventing diabetes (anti diabetes), and that justifies its use as native medicine for treating diabetes, and in the author's own words, HU seeds extract "could serve as templates for new antidiabetic alpha-glucosidase inhibitors".

However, phytochemical concentration of HU seed extract is very high containing LD50 of 1020mg/kg, which is slightly toxic. The phytochemical compounds in HU seed extract are Alkaloids, flavonoids, tannins and glucosides, which explains why it is traditionally used in Africa to treat diabetes type II and obesity (10). Its consumption significantly lowers blood sugar level and increases the activities of glucose digesting enzyme called glucakinese. HU is rich in alkaloid, when tested- orally administered on hyperglycemic rat it showed significant hyperglycemic potency action. It significantly decreased fasting blood sugar level on the tested rat for oral glucose tolerance. (2, 11).

Sugar and cholesterol have been a huge threat to humanity, causing overweight and obesity to individual. A person with obesity has a disorder of fat and carbohydrate or sugar metabolism. A disorder of fat and carbohydrates metabolism results in deposition of fat in adipose (fat) tissue, and major internal organs namely, heart, liver, pancreatic islet, and muscles of the skeleton (3, 4, 12). HU seed extract lower glucose level by preventing sugar absorption in the intestine and by inhibiting sugar digestive enzyme activity called alpha-glucosidase (2, 4, 6, 11). The use of HU extract as folk medicine for treating diabetes is justified

HU seed extract has anti-obesity and overweight properties achieved through anti-glycemic and anti-lipidemic actions. Through lowering blood sugar and cholesterol levels, and inhibition of their absorption, weight gain is prevented and controlled (2, 4, 6, 7, 11). Anti-obesity and ant-lipidaemia potency is achieved by preventing fat absorption in the intestine, and inhibition of fat production. It is high in phenol compounds, and alkaloids, their combined action contributed to sugar and fat lowering actions (2, 6, 7). Weight loss was achieved through high fiber diet, and herb rich in phytochemical namely, alkaloids and phenols, the latter is true with HU. Alkaloid concentration in HU is higher than other phytochemical compounds (2, 6, 11). HU seed extract resulted in decreasing liver enzyme, hydroxyl-3-methylglutanyl-coenzyme A called reductase and acetyl coenzyme A or cholesterol acyltransferase, which significantly raise the activities of adipose tissue fat digestive enzyme called lipase, to increase fat digestion and weight loss (6, 11). The use of HU extract as folk medicine for weight loss is justified.

HU seed extract treatment did not only reduce the blood plasma cholesterol, it also, decreased the triglycerides level and increased the ratio of high-density cholesterol/total cholesterol in the blood (6, 7). This effect prevents atherogenesis - building up of fat plaques in the arteries (6, 7); thereby exhibiting significant protective action on the cardiovascular system and coronary arteries. High concentrations of alkaloids lowers blood sugar concentration, which is a strong hypoglycemic activity, and alkaloid potency against blood sugar forms synergy when combined with other phytochemical compounds and minerals that occur in high concentrations in HU, making it more efficient (2, 11). The use of HU extract as native medicine for treating cholesterol, atherogenesis, and cardiovascular diseases shows significant potential.

Just like every other medicine, overdoses cause body reactions and adverse effect, HU can only cause thrombosis, or slight tissue proliferation on over dose or prolonged usage (2, 24, 25, 26, 34, 36), which can only be a rare occurrence. It is non-toxic to the body at treatment, moderate and non-prolonged doses, and it is hepatoprotective (37). HU extract is safe for treating diseases if safely used under professional supervision (2, 21, 22).

#### **4. CONCLUSION**

In this review, a series of studies performed to examine the efficacies of HU extracts for treating obesity and metabolic syndrome diseases was investigated to gain knowledge about the claims of HU high potency against diseases. The nutritional, chemical, phytochemical

composition of HU Fruit, seeds, leaves, bark, and root of HU were studied to generate a link between HU composition, and its efficaciousness against sugar, fat, diabetes Mellitus type II, weight gain, atherogenesis, cholesterol, and results showed that HU components and properties offered it the capacity to prevent, control or treat the acclaimed diseases and indeed it is a potent medicine for treating obesity, and metabolic syndrome diseases, thus, justifying its use as native medicine for treating various diseases.

## ETHICAL APPROVAL

Not applicable (N/A) No Institutional review Board (IRB) was required. This study was conducted in accordance with the Helsinki Declaration in 1964.

## NOTE:

The study highlights the efficacy of "Hunteria Umbellata" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

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## ABBREVIATIONS

HU: Hunteria umbellata.