

Research Article

HUNTERIA UMBELLATA FOR CONTROLLING DISEASE PATHOGENS

* Dr. N. E. Ahajumobi and Dr. Peter B. Anderson

Walden University, College of Health Sciences, Walden University, 100 Washington Ave. South, Minneapolis, MN 55401.

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ABSTRACT

Aims: To investigate peer-reviewed evidence conducted using epidemiological standards about the claims of *Hunteria umbellata*'s control of disease pathogens. Also sought in this study was to determine the chemical and phytochemical components of *Hunteria Umbellata* that may provide the connection to its control of pathogens. **Study design:** A Systematic Review. **Place and Duration of Study:** faculty of Health Science, Walden University, between April 2021 and November 2022. **Methodology:** A systematic review of assay peer reviewed literature supporting or debunking the claims of use of *Hunteria Umbellata* as an agent for treating disease pathogens. Only studies performed using the epidemiological standard, which were peer reviewed were selected for this review and assessment. Data was analyzed in synthesis with native claims of using *Hunteria Umbellata* extract as an agent for treating disease pathogens. Sample size, n=15 studies. Google scholar, google, Firefox search engines were used to search for scientific evidence. Search words, *Hunteria umbellata*, proximate composition of *Hunteria umbellata*, phytochemical composition of *Hunteria umbellata*, *Hunteria Umbellata* and microbial diseases, *Hunteria Umbellata* and parasitic diseases. Only the summary of some of the findings were presented, which constituted the objectives, findings, and conclusion. **Results:** Studies provide evidence that *Hunteria Umbellata* is rich in macro and micronutrients and phytochemical compounds, which provided the link between *Hunteria Umbellata* potency and control over various diseases caused by clinical pathogens, namely, parasites, fungi, and bacteria. The public, healthcare, public health, and researchers can benefit from this study. **Conclusion:** *Hunteria Umbellata* is effective for treating diseases-causing pathogens.

Keywords: *Hunteria umbellata*, Effective Against, Disease Pathogens, *Hunteria umbellata* and disease pathogens, *Hunteria umbellata* and microorganisms.

INTRODUCTION

[In Nigeria, *Hunteria Umbellata* extract is a traditional medicine for treating various kinds of diseases including diseases caused by pathogens; so, in this investigation an assay of evidence supporting or debunking *Hunteria umbellata* control over pathogens was performed to discourage its use if there is no scientific evidence supporting its use or encourage its use in a proper manner if evidence reveals scientific link. While rich countries can afford clinical or hospital visitation for disease treatment, over 80% of the people in poor countries rely on native medicine for disease treatment because clinical visitation is beyond the reach of many. Any affordable source of significantly sustainable remedies for treating diseases is a necessary public health problem-solving response, which should be encouraged. In addition to these objectives, the purpose of this systematic review is to save clinicians time going through too many related studies to make informed decisions (1, 2, 3, 4). Through this review, the facts about pathogen control claims will be made available and accessible to everyone (3). Among the top ten killer diseases, six infectious diseases were implicated among children 10 years of age and below. Among them, lower respiratory illnesses, ranked 2nd, diarrhea, ranked third, malaria following in a fifth position, meningitis, ranked 6th, whooping cough ranked 9th, and sexually transmitted diseases occupying the tenth position (5). In a search for affordable disease control and preventive solutions, we will also discuss the composition of *Hunteria umbellata* to further explore any link between *Hunteria umbellata* extract and parasites and disease-pathogens control. From the global disease index of communicable disease of public health encyclopedia from 1990 to 2000, infectious and parasitic infestations ranked number one for diseases disability-adjusted life years across the global communities

rich and poor nations inclusive, causing over 31.4% of global disease burden with rich countries having only 4.3% disease burden. Poor nations had as high as 35% of the burden in 1990 and in 2000, ten years later, the global burden dropped only slightly to 29.7% with rich nations having only a 0.3% reduction to 4.0% and the poor nations having a drop of 3.1% to 31.9% (7). While disease burden of some rich nations lies on government purses, in poor countries the reverse is the case. Nearly 90% of disease burden rests with individuals whose purse is constantly overstretched by unemployment, underemployment, rapid inflation on food, housing, utilities, and basic necessities of life as well as out of reach high school and post-secondary education tuition. While there is a growing use of herbal remedies as a low-cost and effective therapy for disease treatment, evidence to validate, or debunk efficacy of *Hunteria umbellata* for diseases treatment is not as sufficient as the synthetic medicines hence, we deemed necessary to take action in response to this gap (8, 9). Having established that infectious and parasitic diseases are significant global health risks with high prevalence in poor or developing countries including Africa and Asia. Low income in these nations was also implicated as a major cause, due to affordability reasons; thus, a knowledge of any effective and affordable native alternative source of communicable diseases control is noble and could help control the diseases and save lives to promote good public and community health. The World Health Organization encourages alternative native sources of disease control, since it accounts for about 80% of disease treatment in low-income nations (8, 9). **Methods:** This is a community guide to preventive services study performed to determine whether an assay of peer reviewed studies previous authors conducted about *Hunteria umbellata* following epidemiological methods using quantitative and systematic review approaches would support the use of *Hunteria umbellata* in the control of disease pathogens. Also included in this analysis are studies about the composition of *Hunteria umbellata* to review the potential link to its disease treatment potency. The criteria for selecting and including evidence reviewed in this study upon which

*Corresponding Author: Dr. N. E. Ahajumobi,
Walden University, College of Health Sciences, Walden University, 100
Washington Ave. South, Minneapolis, MN 55401.

conclusions were drawn were, relevant peer-reviewed studies performed following epidemiological standards about *Hunteria umbellata* plant including, leaf, seed, stem and root barks. Only epidemiological peer reviewed studies were selected, assessed, reviewed, and analyzed in synthesis with some traditional claims of its use as effective medicine for controlling parasites and pathogens. Non peer reviewed and non-epidemiological studies were excluded to achieve the results and conclusion of this study (15, 17). Sample size $n=15$. The search engines used for evidence search were Google, Google Scholar, and Firefox. Search words were, *Hunteria umbellata*, proximate composition of *Hunteria umbellata*, phytochemical composition of *Hunteria umbellata*, *Hunteria umbellata* and microbial diseases, *Hunteria umbellata* and parasitic diseases. This research was performed in two phases. Phase I involved the pre-assessment of the abstracts of peer-reviewed articles for evidence and data selection. The second phase of this study involved the analyses of the results of the interventions to determine the result of this systematic review and its conclusions. Only the summary of the findings of this very studies are presented in the result sections. The objectives or purposes, methods, outcomes and conclusions of the evidence constituted the summaries. The focus of this investigation was on if *Hunteria umbellata* extract is an effective agent against parasite organisms, namely, the helminths, and mollusks, against Microbes and disease-causing pathogens, namely, *penicillium notatum*, *candida*, *albican*, and *Aspergillus Niger*, and four bacteria namely, *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*. Also, investigated was the toxicity of HU extract use to the body or if it is a hepatoprotective agent to expose the negative and positive outcomes.]

METHODS

[This is a community guide to preventive services study performed to determine an assay of peer reviewed studies previous authors conducted about *Hunteria umbellata* following epidemiological methods using quantitative and qualitative approaches. The objective of this systematic review is to review an assay of accessible evidence to assess supporting or debunking claims about the native use of *Hunteria umbellata* as a potent agent for treating parasitic and microbial disease-causing pathogens, and the purpose is to discourage its use if there is no scientific backing to its use for treating diseases, or encourage not just its use but proper use for controlling parasitic and microbial pathogens. Also included in the analysis of the studies about the composition of *Hunteria umbellata* to buttress its efficacy facts and provide the link to its disease treatment potency. The criteria for selecting and including evidence reviewed in this study upon which conclusion was drawn were, relevant peer-reviewed studies performed following epidemiological standards about *Hunteria umbellata* plant including, leaf, seed, bark, and root were included. Conditions for inclusion are, indications that a study respected ethics, and Only epidemiological peer reviewed studies were selected, assessed, reviewed, and analyzed in synthesis with some traditional claim of its use as effective medicine for controlling parasites and pathogens. Non peer reviewed and non epidemiological studies were excluded. Sample size $n =15$ studies minimum. Non-peer reviewed studies were excluded from the studies analyzed to achieve the results and conclusion of this study (14, 16).

On grounds of journal word limitation, only a few of the reviewed studies were presented here. The search engines used for evidence search were Google, Google Scholar, and Fire fox. Search words were, *Hunteria Umbellata*, proximate composition of *Hunteria umbellata*, phytochemical composition of *Hunteria umbellata*, *Hunteria umbellata* and microbial diseases, *Hunteria umbellata* and parasitic diseases. This research was performed in two phases. The

phase I involved the pre-assessment of the abstracts of peer-reviewed evidence for evidence data selection. The second phase of this study involved the analyses of the results of the interventions to determine the result of this systematic review and its conclusion. Only the summary of the findings of the reviewed studies were presented in the result sections. The objectives or purposes, outcomes and conclusions of the evidence constituted the summaries. The focus of this investigation was on if *Hunteria umbellata* extract is an effective agent to treat parasitic organisms, namely, the helminths, and molluscs, and against Microbes and disease-causing pathogens, namely, *penicillium notatum*, *candida*, *albican*, and *Aspergillus niger*, and four bacteria namely, *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*, *Sphenocentrum jollyanum*, or if *Hunteria umbellata* is toxic to the body or hepatoprotective agent.]

RESULTS/DISCUSSION

[The chemical composition of *Hunteria umbellata* seed is composed of macronutrients namely, moisture, carbohydrates, protein, fat, fiber, and ash. The presence of ash signaling presence of inorganic elements, which is also called micronutrients namely, potassium (K), Sodium (Na), Calcium (Ca), Magnesium (Mg), iron (Fe), and manganese and a small amount of vitamin C. Phytochemical compounds are significantly high in HU (10, 11, 12, 13, 14). The analyses of *Hunteria umbellata* seed showed that it is rich in nutrients namely, phytochemicals, macro, and micronutrients that can provide food for human and animal needs, as well as healing agents for bodily diseases and cures for health maintenance. *Hunteria umbellata* is rich in nutrients and the nutrients could be used to treat hypertension, and diseases developed by lack or deficiency of nutrients in the body, as well as parasitic and microbial disease pathogens (10, 11, 12, 13, 14). Quaternary Alkaloids of the stem and root bark of *Hunteria Eburnea* Pichon.HU seed is composed of nine alkaloids, leaves composed of eight. The highest concentrations of alkaloids are located at the root and stem barks comprising 14 tertiary, and 16 quaternary bases. Three types of *Hunteria eburnea* Pichon genus were studied, namely, *Hunteria*, *eburnea*, *Hunteria corymbosa*, and *Hunteria Umbellata*.

The leaf is composed of five alkaloids, and the seed constitutes four alkaloids. *Hunteria eburnea* showed the highest concentration of indole alkaloids. Indole alkaloids, occur in two forms namely, having tryptophan residue or tryptophan equivalent combined with terpene derivatives that has 10 carbon moieties, or having tryptophan residue or equivalent modified with alkyl or ring end, in some cases it is modified by fusion to mevalonic or anthranilic acid residue. *Hunteria umbellata* is composed of corymine- first class positive and negative hexacyclic indole alkaloids, acetylcorymine, Isocorymine, +Eburnamine, and + Eburnamenine. Alkaloids, Acetylcorymine, Desformocorymine, corymine, erinine, Erinicine, Geissoschizol, and Eburnaphylline were isolated from the leaves. Other species of *Hunteria* namely, *Hunteria eburnea* contain Hunterine, hunteramine and multiple other phytochemical compounds are contained in the stem and rook barks. Evidence has established that these compounds have the potency for controlling diseases, which justifies its native as medicine for treating various diseases (15). Phytochemicals, proximate, mineral element composition, and microbial activity of some selected medicinal plant seeds (14). This was an investigation conducted on the mineral, proximate and phytochemical composition of ten plant seeds traditionally used as medicine for treating various diseases in West Africa. In this investigation, effect of these seeds extract on seven standard clinical diseases-causing pathogens including three fungi; *Penicillium notatum*, *candida*, *albican*, and *Aspergillus niger*, and four bacteria

namely, *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*. *Hunteria umbellata* and *Sphenocentrum jollyanum* were examined. Results indicated that all the seeds were rich in inorganic micronutrients minerals namely, potassium (K), 2.14 -8.12 mg/L, Sodium (Na), Calcium (Ca), 3.25-68.55 mg/L, Magnesium (Mg), iron (Fe), 0.22-1.90 mg/L, Zinc (Z), 1.38 - 5.53 mg/L, and manganese, 0.14- 1.40 mg/L, were also present in high, moderate, and low concentrations in all ten seeds including *Hunteria umbellata*. Varying levels of macro nutrients such as moisture, 12.51 - 26.70%, carbohydrates, 15.79 - 59.38% protein, 8.65 - 48.09%, fat, 2.65 - 18.10 %, fiber, 2.69 - 12.66%, and ash, 3.26 - 11.45%, ranging from low to high concentrations were found. There was a strong presence of phytochemical compounds, namely, alkaloids, saponins, and flavonoids in all the seeds including *Hunteria umbellata*, and Steroids, tannins, cardiac glycoside and reducing sugar were equally present in some of the seeds, which offer it potency against diseases including microbes including, bacteria, viruses, and parasitic diseases-causing organisms, including, malaria, and helminths. Alkaloid is a strong agent against malaria, and it is a pain killer (analgesic). It has direct effects on the nervous system; thus, it is used as a stimulant. Although, free anthraquinone and phylobatannin were not detected, high concentrations of flavonoids, and glycosidic moieties such as saponins, cardiac glycosides, and anthraquinone offer it the capacity to control depression and can be used as an antidepressant and prevent tumour growth and kill cancer cells and parasites (8). All examined seeds including *Hunteria umbellata* showed strong antimicrobial properties against the seven clinical pathogens mentioned above. *Sphenocentrum jollyanum* indicated maximum pathogen inhibition. Conclusion: All the seeds studied, including *Hunteria umbellata* have capacities to be used as medicine for treating diseases including those caused by the pathogens reviewed in this study, and it can be used as a good food supplement, and healthy food for animals and humans (7).

Phytochemical Analysis and mineral composition of ten medicinal plant seeds from South- West Nigeria (14). In this study, 10 plant seeds including *Hunteria umbellata* used as traditional medicine were examined to determine the phytochemical, mineral and proximate components, and the implications of that as effective medicine for treating microbial infections, and source food nutrients to humans and animals. The findings indicated that macro nutrients such as moisture, carbohydrates, protein, fat, fibre and ash are components of *Hunteria umbellata*. Inorganic micronutrients minerals namely, potassium (K), Sodium (Na), Calcium (Ca), Magnesium (Mg), iron (Fe), and manganese, were also present in high, moderate, and low concentrations in all the analyzed seeds including *Hunteria umbellata*. Micronutrients minerals are essential nutrients for healthy growth, skeleton and muscle formation and functions. Nutrient deficiencies have always resulted in body system malfunction and in illnesses. Magnesium is essential for absorptions that occur in the stomach, and body chemical reactions, potassium and sodium are vital for fluid balance and nervous transmissions, and calcium is good for strong and healthy bone formation and maintenance. While iron is essential for blood formation and prevention of anemia and diseases caused by low blood also, iron and copper promotes distribution of oxygen and nutrients in the cells and cellular activities. Phytochemical compounds namely, Flavonoids, Phenols, and steroids were present in high concentrations in *Hunteria umbellata* seeds. Others were, tannins, steroids, reducing sugar, alkaloids, and glycosides-saponins, anthraquinone, and saponins. Among the tested seeds, only *Megaphrynium macrostachyum* has no saponins. Free anthraquinones and phylobatannin were absent and only *Hunteria umbellata* showed presence of polyphenols. These phytochemical compounds have antibacterial properties, and further, the alkaloids have antimalarial agents, analgesics properties, and are

stimulating agents. And the moieties of glycosides namely, saponins, cardiac glycosides, flavonoids and anthraquinone prevent and kill tumour or cancer cells, kill parasites- anti parasite, and control depression -antidepressant. Conclusion: On the accounts of the rich phytochemical composition of all seeds studied including *Hunteria umbellata* namely, alkaloids, glycosides, reducing sugar, phenols, terpenoids, tannins and flavonoids that are strong pharmacological properties and have been found to be significantly effective against diseases-causing agents-pathogens, example enteric organisms-parasite, bacteria, and viruses infecting the intestine; making it a suitable medicine for treating diseases in human and animals, and its macronutrients composition makes it a healthy food for animals and human alike (14). Keeping in mind the four pieces of evidence above about *Hunteria umbellata* extract nutritional, chemical and phytochemical composition, which connects it easily with multiple - diseases control, next, let's examine a little clinical evidence about *Hunteria umbellata* potency against disease-causing pathogens. Derivatives as Antimicrobial Agents: Synthesis, Computational and Biological Evaluation In this study, authors investigated the in-vitro anti-microbial, anti-bacterial and antifungal activities of some pharmacological compounds against eight gram negative - *Escherichia Coli*, *Enterobacter*, cyanobacteria, *Staphylococcus*, and *Acinetobacter* and gram positive bacteria, namely, *Bacillus*, *Clostridium*, *Enterococcus*, and *Lactobacillus*. This investigation assay was performed using thiazolyl blue tetrazolium bromide MTT test. Results showed that the investigated compounds were all significantly potent against the eight studied micro organisms and they were more potent than Ampicillin and Streptomycin. *Staphylococcus* was the easiest bacteria to be killed, and *Lactobacillus monocytogenes* was most resistant and hardest to be killed. The compound studied was (Z)-N-(5-((1H-indol-3-yl)methylene)-4-oxo-2-thioxothiazolidin-3-yl)-4-hydroxybenzamidee and it was analyzed against commercial antibiotics for treating fungal example bifonazole and ketoconazole, as well as bacteria infections medicine such as, streptomycin. (Z)-N-(5-((1H-indol-3-yl)methylene)-4-oxo-2-thioxothiazolidin-3-yl)-4-hydroxybenzamidee showed the highest antibacterial function. The minimum inhibition concentration (MIC) range was 37.9-113.8 (µM), which lowered the bacteria concentration to 57.8-118.3 µM, which is also called minimum bacteria concentration (MBC). These compounds were tested on organisms with highest antibiotic resistance, namely, Methicillin resistant *Staphylococcus aureus* (MRSA), *Escherichia Coli* (E. Coli), and *Pseudomonas aeruginosa*, and result showed that (Z)-N-(5-((1H-indol-3-yl)methylene)-4-oxo-2-thioxothiazolidin-3-yl)-4-hydroxybenzamidee was more effective than ampicillin, and the MIC range was 248-372 µM, and the MBC range was 372-1240 µM, while streptomycin failed to achieve MIC inhibition at 43-172 µM, thus the minimum bacteria concentration (MBC) activity was 86-344 µM. (Z)-N-(5-((1H-indol-3-yl)methylene)-4-oxo-2-thioxothiazolidin-3-yl)-4-hydroxybenzamidee also, achieved greater effectiveness than ampicillin in controlling or inhibiting the growth of *Pseudomonas aeruginosa* strain, which is usually resistant to antibiotics.

It was very interesting to discover that the all new compounds tested were more significantly stronger and more effective in fungal growth inhibition than the antibiotic medicine used as reference or standard, namely, bifonazole, which has minimum inhibition concentration (MIC) of 480-460 µM, and maximum concentration function (MFC) of 640 -800 µM, and ketoconazole with MIC 285-475 µM and MFC or 380-950 µM in comparison with the new tested compound agents. In all analyses, a fungus called *Trichoderma viride* tolerates temperature like human beings from 15oC to 40oC making it hard to kill by heat and more easily killed or inhibited by the newly tested agents. On the other hand, *Aspergillus fumigatus*, from humans, was revealed to be the most resistant fungus in this experiment. In the thiazolyl blue

tetrazolium bromide MTT assay, the newly tested compounds activities were largely selective on the microbes, and they all showed low cytotoxicity to the kidney of human embryo. In the docking rest which showed anti-bacteria action, *Escherichia Coli* was among the bacteria inhibited, and in the antifungal inhibitions result was revealed in CYP51 test by all the tested four new compounds. Conclusion. The tested compound inhibited the growth of bacteria and fungi microorganisms studied in this investigation more significantly better than the reference standard antibiotic medication for treating infections caused by those organisms (16). A critical question may arise from this study about its link to *Hunteria umbellata* extract potency against microbes. If this question arises it is in order; however, the link here is that at least one of the tested compounds is also isolated from *Hunteria umbellata* extracts. Thus, if this clinical suggests those to be potent against disease-causing microbes, then, the claim or clinical evidence about *Hunteria umbellata* extract potency against disease pathogens is further buttressed (16). Phytochemical screening mathematical Analysis and Antimicrobial Activity of methanolic seed extract of *hunteria umbellata* (17). This was a three-month evaluation of in vitro antimicrobial activity of *Hunteria umbellata* against *Escherichia Coli*, *Staphylococcus aureus*, and *Streptococcus Sp*. In this study the phytochemical composition of *Hunteria umbellata* was also investigated. The result showed that *Hunteria umbellata* methanol extract is rich in secondary metabolites namely flavonoids, tannins, steroids, phenols, saponins, alkaloids, reducing sugar, anthraquinone, cardiac glycoside, phenol compounds, and sterol. The result showed a significant inhibitory effect in vitro of *Hunteria umbellata* on the microbes- *Escherichia Coli*, *Staphylococcus aureus*, and *Streptococcus sp* that were examined. Inhibition was observed at minimum *Hunteria umbellata* concentrations of 250 mg/ml-1, 125 mg/ml-1, and 31.25 mg.ml-1 respectively. *Hunteria umbellata* alcohol extract has potency against *Escherichia. coli*, *Staphylococcus aureus*, and *streptococcus Sp*. Conclusion: *Hunteria umbellata* alcohol extract have potency for treating *Escherichia coli*, *Staphylococcus aureus*, and *streptococcus Sp* and *Hunteria umbellata* have a capacity to prevent diseases caused by microbial pathogens studied in this clinical experiment in vitro (17). Evaluation of the Antimicrobial Properties of the Ethanol Extracts of Some Medicinal Plant Seeds from South-West Nigeria (18) The word antimicrobial means an agent, which has a capacity to kill or prevent the growth of microbes namely, fungi, virus, and bacteria. The authors investigated the antimicrobial properties of African plant seeds used as native medicine namely, *Hunteria umbellata*, *Hydrocotyle asiata*, *Canna bidentata*, *Ceasalpinia bunduc*, *Megaphrinium macrostarchym*, *Solanum dasyphyllum*, *Sphenocentrum jollyanum*, *Cola millennia*, *Perinari excelsa*, and *Rauwolfia vomitoria*. Authors performed clinical assay of the ethanol extracts of the seeds on seven microorganisms referred to as disease pathogens. Of these organisms three were fungi namely, *Candida albican*, *Aspergillus niger*, and *Penicillum notatum*; and four were bacteria pathogens namely, *Staphylococcus aureus* (*S. Aureus*), *Pseudomonas aeruginosa*, *Escharichia Coli* (*E. Coli*), and *Bacillus subtilis*. Methods: This was a cold ethanol extraction of the seeds conducted on agar well diffusion method of test. Results: The results showed that these ten seeds including *Hunteria umbellata* that inhibited all the diseases pathogens tested and *Solanum dasyphyllum*, which showed maximum capacity to inhibit the growth of all tested pathogens at doses of 19 mm to 26 mm, with concentration of 200 mg/ml and 25 mg/ml. At dose 12.25 mg/ml it prevented *E. Coli*, and at 25 mg/ml it was effective against *S. aureus*. Also, *Sphenocentrum jollyanum* inhibited the growth of *Bacillus subtilis* at a concentration dose of 25 mg/ml. *Megaphrinium macrostarchym* showed the least strength in terms of microbial growth inhibition, which it achieved at doses of 12 mm to 20 mm for 200 mg/ml concentration. *Sphenocentrum jollyanum* prevented the

growth of all pathogens at various doses from 25 mg/ml to 200 mg/ml. HUinhibit the growth of all the pathogens at various doses at concentration of 100 to 200 mg/ml, and it was the only seed that was able to inhibit the growth of *Penicillum notatum*, *E. Coli*, and *Bacillus subtilis* at dose 50 mg/ml concentration, whereas other seeds achieved that at concentrations higher than 50 mg/ml. Conclusion: Ten seeds investigated were significantly potent agents against seven standard disease pathogens that were investigated, they possess antimicrobial, anti-fungal, and antibacterial properties and they can be used to formulate medicines for treating pathogenic microorganisms (18). Comparative antimicrobial activities of some plant extracts and commercial antibiotics against some selected pathogens of food origin (19). In this research, the authors performed clinical experimental study on three medicinal plants 'ethanol and methanol extracts pharmacological potency against five food-borne bacteria listed as, *Streptococcus Sp*, *Lactobacillus specie*, *Proteus vulgaris*, *Shigella Specie*, and *Bacillus specie*. The three plants were *Hunteria umbellata*, *Morinda lucida*, and *Momordica charantia*. Results showed that ethanol extracts were more potent than methanol extract. Also, the inhibitory range of the three plants ethanol extract was 0-36 mm, and the minimum inhibitory concentration range was 20 mg/ml to 100 mg/ml, with *Momordica charantia* showing the highest strength, showing significant inhibition at only 20 mg/ml to specifically, *Bacillus Sp* at 20 mg/ml, whereas, *Hunteria umbellata* ethanol extract inhibited the same organism at 50 mg/ml, and *Morinda lucida* ethanol extract, achieved the inhibition of the same bacteria at 100 mg/ml. On the other hand, *Hunteria umbellata*, showed stronger bacteria growth inhibition for more bacteria than the rest two plants. *Hunteria umbellata* ethanol extract inhibited *Streptococcus Sp* at 20 mg/ml, while it took 30 mg/ml of *Momordica charantia* to inhibit the same organism, and 60 mg/ml of *Morinda lucida* to inhibit the growth of the same organism. Additionally, *Hunteria umbellata* ethanol extract inhibited the growth of *lactobacillus Sp* at 40 mg/ml, whereas, it took 50 mg/ml of *Momordica charantia* ethanol extract to inhibit the growth of the same bacteria, and 80 mg/ml of *Morinda lucida* to achieve growth inhibition of the same organism. *Hunteria umbellata* and *Momordica charantia* ethanol extracts inhibited *Shigella Sp* both at 50 mg/ml. Additionally, in another organism, *Momordica charantia* ethanol extract was stronger than *Hunteria umbellata* ethanol extract at inhibiting the growth of *Proteus Sp* achieving that at 60 mg/ml, while HUachieved that at 70 mg/ml. These three plants extracts were compared with standard commercial antibiotics and the three plants extracts activities suggested being more potent against tested organisms than the commercial antibiotic medicine used for treating those microorganisms. Conclusion: *Hunteria umbellata*, *Morinda lucida*, and *Momordica charantia* ethanol extract revealed significant pharmacological properties that were potent against the tested organisms and their potency surpasses that of standard commercial antibiotics. Assay of toxicology of the plants to determine safety of use, and if it is safe for use, it is recommended for use as active agents in antibiotic drug production (19). After the next evidence about *Hunteria umbellata* and helminths, some clinical information about *Hunteria umbellata* toxicity was also examined.

The Anthelmintic activity of HUK. Schum (FAM. Apocynaceae) extracts (20). In this double blinded clinical investigation, these authors examined the anthelmintic effects of *Hunteria umbellata* water and alcohol extracts of the seeds, leaves, and stem bark, while the highest function occurred with alcohol extracts, but the greater effect occurred with water extracts of the seeds than the leaves and stem bark as well as with methanol extract of both seeds, leaves and stem bark at doses 10 ml, 20 ml, 30 ml, and 40 ml and Saline 50 ml and distilled water 50 ml. Overall, at 30 ml dose for water extract of *Hunteria umbellata*, anthelmintic activity was strongest with an

average mortality time of 88.33 minutes. Conclusion: Water and methanol extracts of *Hunteria umbellata* seeds, leaves and barks revealed significant anthelmintic- negative effective function against earthworms and mollusc with the seeds having the greatest effect at doses 10 ml, 20 ml, 30 ml, and 40 ml than Saline, which is standard medicine for helminths, and distilled water scoring last (20). The clinical experiments indicated the nutritional, chemical, and phytochemical compositions of *Hunteria umbellata*, which scientific evidence have connected with pharmacological potency against various diseases including those caused by disease-causing pathogens. Also, presented in this study is clinical evidence about *Hunteria umbellata* potency against helminths or parasitic worms, and *Hunteria umbellata* was more effective than salt, which is the standard medicine against helminths. In one of the clinical investigations, the investigators suggested determining the toxicity of *Hunteria umbellata* to ensure that the safety of its use is determined. Next, we examined some clinical evidence performed about *Hunteria umbellata* toxicity. Evaluation of the toxicity and reversibility profile of the aqueous seed extract of *Hunteria umbellata* (K. Schum) Hallier F. In Rodents (22). In this research, authors examined the justification of use of *Hunteria umbellata* water extract as native medicine for treating diabetes, obesity, anemia, stomach ulcers, pain and labour pains and ascertained the possible toxicity and reversibility of the toxicities, and the purpose was to provide cautionary clues to ensure the safety of users. Through the study of *Hunteria umbellata* water extract oral and intraperitoneal- cavity or intestine injection of the substance were conducted to determine *Hunteria umbellata* toxicity. Result, although serum alkaline phosphatase (ALP) concentration increased during treatment, which is an indication of vascular calcification (hardening), and yet, *Hunteria umbellata* extract effects on serum glutamic-oxaloacetic transaminase (AST) or (SGOT) and serum glutamic-pyruvate transaminase (ALT) or (SGPT) were low and not significant, which suggests strongly that *Hunteria umbellata* extract has no adverse effect on liver functions and the positive effect of *Hunteria umbellata* extract on serum electrolytes, creatinine, and urea strongly suggested that there is oral safety of a use of *Hunteria umbellata* water extract on kidney function showing a potential to protect the nephritis-kidney inflammation that cause difficulty with waste removal from the body. Chronic use showed low concentrations of bicarbonate, which is an indication of potential for metabolic acidosis. Meaning that overuse or chronic use should be avoided. Also chronic use indicated low level and reversible presence of histological lesions. And high concentrations of phytochemical compounds namely, flavonoids and alkaloids were the multiple reasons for liver and kidney protection because these compounds have significant evidence of preventing tissue peroxidation through free-radical and antioxidant ion function thereby providing protection to kidney and liver tissues. Following the anabolic theory of *Hunteria umbellata* extract, also, oral ingestion of *Hunteria umbellata* extract indicated an enhancement of testicular spermatogenesis causing a significant increase in relative weight of the male testis and male fertility enhancement. Prolong use is discouraged and expert guidance is necessary to ensure that proper use is promoted and over use or prolonged use is discouraged. The results about tissue proliferation raised some questions about the accuracy because, the magnifications of pictures of the various pictures of the organs were not harmonized, some were magnified by 40, some 400 raising some questions about the claim of tissue proliferation, also the inter peritoneal *Hunteria umbellata* administration is not practical with human but more practical with animals. Conclusion: *Hunteria umbellata* water extract is relatively safe for acute and chronic use but high caution is required for prolonged use to avoid tissue proliferation (21). There was no marked toxicity of both *Hunteria umbellata* extracts on the tested animals thus, at doses of 50 mg/2kg -100 mg/2 kg body weight, Water and

alcohol extracts were safe and non-toxic to the body. Further study recommends investigating the effects of prolonged use (22). Also treatment doses of 400 mg/kg or less, *Hunteria umbellata* fruit extract is not toxic but above 400 mg/kg and prolonged used blood clotting or thrombosis may occur. *Hunteria umbellata* doses at 400 mg/kg is safe to the human body (23). And *Hunteria umbellata* has a capacity to protect the liver; so, *Hunteria umbellata* ethanol extract offers protection to the liver and kidney and it did no harm to it, and Ethanol extract of *Hunteria umbellata* has a capacity to protect the liver and kidney so, *Hunteria umbellata* is hepatoprotective (24). The four clinical studies highlighted above suggested that *Hunteria umbellata* is not toxic to organs or the body. Antipyretic and analgesic effects of the aqueous extract of fruit pulps of *Hunteria umbellata* K. Schum (Apocynaceae) (25). These authors sought to determine if there was a justification for West African use of *Hunteria umbellata* fruit pulp water extract for fever treatment, these authors examined the science behind its use and mechanism by which this substance controls fever. The authors injected 105 of *Escherichia Coli*/kg into the experimental rabbit through the veins to cause pyrexia-cause fever and increase in the body temperature after that. Then, 250 mg/kg and 500 mg/kg of *Hunteria umbellata* fruit water extracts were monitored at 30, 60 and 90 minutes intervals to determine the body temperatures of the rabbits. The temperature monitoring was conducted through the rats 'rectum, using acetic acid-induced writhing evaluation tests of mouse. Authors used acetic acid-induced mouse writhing test to perform the evaluation. Also, they used agar diffusion to evaluate antimicrobial activities of *Hunteria umbellata* fruit water extract on *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Escherichia coli*. The results showed that saponins, flavonoids, simple sugar, steroids and alkaloids were predominantly present. Unlike the seed extract that was potent against seven disease-pathogens, *Hunteria umbellata* fruit extract did not kill the microbes studied at doses 250 mg/kg, and 500 mg/kg but it significantly reduced fever for up to 60 minutes and significantly decreased the number of writhings by the rabbits and the outcome is as effective as Aspirin. Conclusion: *Hunteria umbellata* fruit extract is an effective antipyretic and analgesic agent thus, justifying its use as a native medicine for treating fever and pains (25). It is worthy, of note that while *Hunteria umbellata* seeds extract inhibited the growth of seven standard disease-causing microbes better than standard antibiotics, namely organisms three were fungi namely, *Candida albican*, *Aspergillus niger*, and *Penicillium notatum*; and four were bacteria pathogens namely, *Staphylococcus aureus* (S. Aureus), *Pseudomonas aeruginosa*, *Escherichia Coli* (E. Coli), and *Bacillus subtilis* from doses 50 mg/kg to 400 mg/kg (18, 19, 20), water extract of *Hunteria umbellata* fruit did not inhibit or kill microorganism. Rather, it showed a strong antipyretic and analgesic strength or potency against fever and pain (25).

It was established in this assay of clinical evidence investigation that *Hunteria umbellata* extracts are rich in nutritional, chemical and phytochemical compounds, and the compositions have pharmacological properties, which science has established to have capacities to control diseases. *Hunteria umbellata* extracts have the capacities or potency to kill or inhibit disease-causing pathogens, it is not toxic to the body at doses less than 400 mg/kg and it is safe for use and it offers protection to the tissues, liver, and the organs (24). With the knowledge of the results in mind, next, is about the discussion of the results. Discussion In this systematic review study, it was established through clinical evidence from local and international studies that *Hunteria umbellata* is a potent agent against parasites and disease pathogens, and any critique yet in doubt is welcome to perform further investigation about the fact that *Hunteria umbellata* extract have a capacity to treat parasite and microbial diseases. *Hunteria umbellata* is an efficacious native medicine for treating

parasitic and microbial diseases especially, those caused by parasites example helminths, and disease-causing pathogens namely bacteria, and fungi. Also investigated was the nutritional, chemical and phytochemical composition of *Hunteria umbellata* to further make a connection why *Hunteria umbellata* was effective in controlling diseases (26). Any substance that boosts the body immunity is sure to protect the body against all diseases including, pathogenic organisms namely, viral, bacterial, and fungal diseases. Others are parasitic organism such as helminths, malaria, as well as chronic diseases (18, 19, 20), From the 15 studies selected as core evidence for this investigation, and out of those, only nine were presented here, which actually involved many other previous studies suggesting that *Hunteria umbellata* extract be it seeds, husks, leaves, stem and root barks are efficacious West African native medicine for treating various diseases mentioned above. From the evidence above you could see that *Hunteria umbellata* extracts are kidney and liver protective. Essentially it is non-toxic to the body at treatment, moderate and non-prolonged use (21, 22, 23, 24). While clinical evidence suggested that *Hunteria umbellata* is a potent agent against parasites, helminths, and seven standard disease-causing pathogens, it is necessary to note that *Hunteria umbellata* fruit water extract did not kill the microbes at doses of 250 mg/kg, and 500 mg/kg(25). But the seed, leaf, and stem extracts suggested that *Hunteria umbellata* extract were potent against many diseases-causing pathogens namely, candida, albican, and *Aspergillus niger*, and four bacteria namely, *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Bacillus subtilis* (8, 15, 36, 37). Since many clinical studies suggested that *Hunteria umbellata* extracts except the fruit were potent against microbes, and recent clinical study has established that at least one of the compounds composed of *Hunteria umbellata* has pharmacological potency against seven standard microbial pathogens and *Hunteria umbellata* extract showed more effectiveness in treating parasites and disease-pathogens than standard medicine; so, *Hunteria umbellata* extract is potent against microbes. Hence, West African use of *Hunteria umbellata* for treating parasitic, and pathogenic diseases such as microbial, bacterial, and fungal diseases is in the right places. This could be seen as a bit of digression; however, it is worthy of mention that also, learned in this study was that *Hunteria umbellata* is rich in ebumamomnine and hunterine, where *Hunteria umbellata* derived its name from, and these substances possess cardiovascular healing properties. ebumamomnine and hunterine, are composed of sympathomimetic substances that are used for treating mental illnesses (1, 15, 34,). A sympathomimetic substance that mimics and stimulates sympathetic nerves. It activates the adrenergic receptors by raising the level or concentration of norepinephrine and epinephrine, which mediates or moderates the levels of symphatho-adrenal system (adrenaline for sympathy) (25, 32, 36). *Hunteria umbellata* seed is rich in water-soluble alkaloid called abreamines (38), which further provides a hint about its anti-oxidation capabilities. *Hunteria umbellata* is rich in alkaloids containing as many as 20 indole alkaloids, and they are largely located at the root and stem bark. In medicine, strychnine is used for treating cerebrovascular diseases (36). *Hunteria umbellata* is rich in a substance that is as effective as strychnine in treating cerebrovascular diseases called ebumamomnine. Ebumamomnine is predominantly present in *Hunteria umbellata* seed. It is a strong central nervous system stimulant. Additionally, ebumamomnine has strong anti-hypertension and sedative properties (15, 36,). Clinical studies indicated that *Hunteria umbellata* extract has strong antimicrobial properties, which were strong against *Escherichia coli*, *staphylococcus aureus* and *Proteus*, Specie (15, 36, 37, 38). Aside from the huge health benefits of *Hunteria umbellata*, it is appropriate to mention that it has a high potential for financial or economic value but, it is yet to be popular or recognized as an economically viable plant; thus, all concerned are invited to promote the importance of

Hunteria umbellata. Humanity including farmers, business investors, nutrition scientists, pharmacologists, healthcare, and the governments need to recognize this and rise to the occasion of tapping from the huge economic and health resource *Hunteria umbellata* offers to the world. Authors of this research are convinced that following up these findings with action will be significantly beneficial to the public, healthcare and various governments. In this study the nutritional, chemical, phytochemical composition of *Hunteria umbellata* fruit, seed, leave, bark, and root of *Hunteria umbellata* were examined, then, the efficaciousness of their extracts against microbial pathogens and parasitic diseases, pain and fever. Clinical evidence suggests that *Hunteria umbellata* is an effective therapy for controlling parasitic and microbial disease-causing pathogens. Thus, the fear about the use of *Hunteria umbellata* to inhibit parasites and disease pathogens is eliminated because clinical evidence clears the air and instills confidence in the use of *Hunteria umbellata* for treating parasitic and microbial diseases. It is safe, affordable, and it can make the world healthier, happier, more productive, and economically more viable (26).

CONCLUSION

[*Hunteria umbellata* seed, leave, stem, and root bark extract is rich in nutrients, chemical and phytochemical compounds that are high in pharmacological properties, which easily link it to its capacity to treat diseases. Clinical evidence examined in this study suggested that it has strong potency against the diseases tested namely, helminths, molluscs, malaria, and standard clinical microbial disease pathogens namely, three fungi such as, *Candida albican*, *Aspergillus niger*, and *Penicillium notatum*, and four bacteria pathogens namely, *Staphylococcus aureus* (*S. Aureus*), *Pseudomonas aeruginosa*, *Escherichia Coli* (*E. Coli*), and *Bacillus subtilis* and it is more effective than standard medicines used for treating those diseases. *Hunteria umbellata* toxicity was only implicated in misuse, overdose, and prolonged use without breaks, which is common with all medications. However, professional guidance may be necessary to avoid misuse. *Hunteria umbellata* extract is also hepatoprotective and it is safe for liver, kidney, vascular system. It is also an effective mental stimulant because of its high concentration of Ebumamomnine.]

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Competing interests

Authors have declared that no competing interests exist.”

Authors' Contributions

“ ‘Author A’ designed the study, performed the analysis, wrote the protocol, managed literature search, wrote the first draft of the manuscript, and in the manuscript reviewing ‘Author B’ managed the analyses of the study, and participated in manuscript drafting, and reviewed manuscript. All authors read and approved the final manuscript.”

Consent (where ever applicable)

Consent not applicable.

Ethical approval (where ever applicable)

Not applicable, 1994 Helsinki Declaration was respected.

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