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Efficacy and constituents of locally formulated anti-arthritic remedy produced from coconut oil and *Sida acuta*

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Abstract

Medicinal plants have been utilized since antiquity in the treatment and management of epidemics, pandemics and plethora of illnesses including their usage in physical and manipulative medicine. The information's on their healing properties and potentials has been handed down or transmitted from generations to generations through hundreds of years within and among human groups, cultures and traditions in folklore medicine without proper documentation. This study investigated the phytochemicals composition and efficacy/potency of locally prepared anti-arthritis remedy. Coconut oil and *Sida acuta* leaves were used for the formulation of the remedy. *Sida acuta* plant was collected at 6:00am, the leaves were removed and washed thoroughly with tap water and rinse with distilled water and dry in a shade for two weeks before being pulverized into fine powder. The coconuts were slide into pieces and blended into a paste, mixed with clean warm water and filtered, then poured into a pot to boil for about an hour, the coconut oil was obtained and allowed to cold before transmitted into air tight container. The coconut oil was poured into a clean pot and heated for five minutes, the pulverized *Sida acuta* leave was added to the heated coconut oil and allow to boil for few minutes until it turned greenish-black. The mixture was allowed to cold and then filtered with a new handkerchief or cheese clothes; the filtered oil was stored in a well labeled air-tight containers before being distributed to our volunteers with established cases of arthritis. The remedy was given to one hundred (100) already diagnosed patients with osteoarthritis for topical application/massage. The application was done twice daily for three (3) weeks and questionnaires were used as a tool to obtained feedback from our volunteer (Patients). The phytochemical result showed the presence of tannins, flavonoids, alkanoids, saponins, terpenoids alongside many essential fatty acid/oils as shown by the GCMS result. The feedback from our tool used (questionnaires) showed that 65% of our volunteers reported complete disappearance of inflammations and its associated pains while 35% reported drastic reduction but slight pains and mild inflammations associated with arthritis still persist. This may have been as a result of the presence of various flavonoids, terpenes, alkaloids etc alongside the presence of essential fatty acids/oils in the preparation as confirm by the GCMS result. Conclusively, from our labouratory screening and report/feedback from our four liked scale questionnaires, the locally made anti-arthritic remedy prove to be effective in reducing the pains and inflammation observed among arthritic patients and movement restored for those who could not move for a long time due to associated pains and inflammation(s).

Keywords: Anti-Arthritic, Remedy, Coconut-Oil, *Sida acuta*, Phytochemicals

Introduction

The use of the traditional plants combating microbial and non-microbial disease has become the focus of numerous studies (Bhavnani and Ballow, 2000). About 60 to 80% world populations currently rely on plant based medicine which are used in traditional health care practice and systems. Natural product has been an integral part of the ancient traditional medical systems (Doughari, *et al.*, 2009). It is now known that the medicinal values in of these plants lie in their bioactive photochemical constituents which produce definite and predictable physiological effect on human body.

Herbal medicine is a part and parcel of and sometimes synonymous with African traditional medicine and it is the oldest and still the most widely used system of medicine in the world today and it is also called botanical medicine, vegetable medicine or phytomedicines. As defined by World Health Organization (WHO) refers traditional medicine to herbs, herbal materials, herbal preparation and finished herbal products that contain whole plants, parts of plants or other plant materials including leaves, bark, berries, flowers and roots or their extracts as active ingredients intended for human therapeutic use or for other benefits in human and sometimes animals. (WHO, 2021); Phua *et al.*, 2009 ^[27]. Large percentage of global population have been using one form of herbal medicine for the treatment, control and management of variety of ailments (Philippeon, 2003) and evidence abound that man have been using plants and herbs of several sources for medicinal purpose; these plants are still used all over the globe for medicinal purposes.

Ancient China is a source of information about the early use of medicinal plants, a Chinese pharmacopoeia published around 600BC contains list of several medicinal plants and their uses including the shrub that introduced the drug ephedrine to the modern medicine (kinghorn and Balandrin 1993). The Egyptians also used plants such as mandrake for pain relief and garlic for the treatment of heart and circulatory disorders (Kong, *et al.*, 2003) and medicinal plant has been identified and used throughout human history. Plant have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions and to defend themselves against attack from predators such as insects, herbivorous animal etc. They produce a diverse range of bioactive molecule making them rich source of different types of medicines and remedies. Most of the drugs today are obtained from natural sources used in the traditional systems of medicine (Sukanya, *et al.*, 2009). Medicinal plant has found their way to pharmaceutical field and they are often useful due to wide range of substances present in plants which have been used to treat various disease (Okigbo *et al.*, 2009). This enables herbal medicine to be as effective as conventional medicines but also give them the same potential to cause harmful side effects. (Tapsell, *et al.*, 2004). It is also a well-known fact that over 75% global population reside in rural areas and this percentage of rural dwellers use and depends on herbs in one way or the other as their primary health measure (Tolu, 2008).

Traditional medicine base on the herbal remedies has always played a key role in the health systems of many countries. In Nigeria, the natives exploit variety of herbs for effective curing and management of various ailments. However, the knowledge of herbal medicine is gradually perishing although some people are still practicing the art of herbal healing effectively for treatment of various disease (Balunas, *et al.*, 2005) ^[7]. Medicinal plants are not only used in the treatment of disease but also a potential material for maintenance of good health and these important bioactive compounds are responsible for attributing the medicinal value to plants eg.; alkaloids, flavonoids, tannins and phenolic.

This study aimed at preparing local anti-arthritis remedy and evaluate its phytochemical, essential oil constituents alongside its efficacy in the management of arthritis.

Arthritis is more common among adults of age 65 years or older but it can affect people of all ages including children as observed in recent past since there are is no one stop

treatment for arthritis. There are several pharmaceutical compounds available in the market to manage the various types of arthritis but none is found to be fully effective and safe.

There are lots of locally prepared anti-arthritis remedy (homemade/local naturopathic anti-arthritis preparations) in varying localities in Nigeria and these local therapies which are basically herbal has Poor scientific backup and documentation. Hence, our study is justify by the fact that it has provided scientific information and added to the body of data and to the pool of scientific knowledge to back up the therapeutic claim of *Sida acuta* and coconut oil in the management of arthritis in folklore medicine practice.

Methodology

Collection, preparation and extraction of plant materials

Sida acuta plants were collected from local farm at Ndele in Emuoha Local Government Rivers State at early hour of 6.00am and was authenticated by a Botanist in the Department of Botany, Faculty of science, University of Port Harcourt, Rivers State Nigeria and the plant material was deposited in the herbarium. The leaves were removed and washed thoroughly with tap water and rinsed with distilled water and dried in the shade for two weeks to dry before being pulverized into fine powder and kept in an air-tight container. The coconut fruits were gotten from Otuoke market, Otuoke, Ogbia Local Government Area of Bayelsa State, South-South Nigeria and were sliced into pieces and blended into a paste using electric blender. The paste was mixed with water and filtered using a clean filter and the coconut water obtained was kept at room temperature for 24 hours in other to separate the coconut oil from water. After 24 hours the coconut oil was poured into a clean pot and boiled for about an hour to separate the particles from the pure coconut oil and allowed to cold before transferring into an air-tight container. The coconut oil was poured into a clean pot and heated for five minutes, the pulverized leaves of *Sida acuta* were added to the heated coconut oil and allow to boil for few minutes until it turns greenish-black. The mixture was later allowed to cold and then filtered with a new and clean cheese clothes. The filtrate was stored in an air-tight container.

Population of the study

The population used for this study covers volunteers' of age bracket of 40 years and above who has history and are currently suffering from Osteoarthritis with visible inflammations and associated pains. One hundred (100) volunteers; 40 male and 60 females were used for the study. The application of our preparation lasted for a period of three weeks (21 days).

Instrumentation

The questionnaire was used as a major tool in gathering the significant data from the respondents who were given the preparation for use. This was designed in a simple way in viability with questions related to the study to be answered by our volunteer (osteoarthritis patients). The questionnaire was on a five (5) liked scale and the descriptive survey which basically uses questionnaire to gather this research data was most suitable method for this study since it described the level of effectiveness of our remedy in the treatment/management of their condition (osteoarthritis). The research also involved the collection of data of answered questions concerning the current status of the subject under

study after using our preparation.

Validation

The questionnaire was referred to Dr Fredrick Awhien of the Department Education of the University of Calabar, Nigeria an expert in research instrumentations for correction, modification and validation. The improvement and refinement of instrument were assessed in term of its construction, organization, structure and purpose. Therefore, the validity content of instrument was valid for this study as it was in line with standard and best practices.

Sampling Technique

The sample population used based in this study was based on volunteer patients having arthritis in Bayelsa and Rivers State. Hundred (100) questionnaires were given and were correctly filled and retrieved successfully. This was done following individual patient's giving their consent.

Preliminary qualitative phytochemical screening

Phytochemical assessment was carried out on our locally remedy employing standard phytochemical.

Procedures as described by Harbon, 2002 and GCMS assessment was also done to ascertain the essential volatile compounds presence.

Statistical Analysis

The data obtained were analyzed by one-way analysis of variance (ANOVA) using statistical package for social science version 21(SPSS) and data were presented as Mean+Standard Error of Mean (SEM). The level of significance was considered at $p < 0.05$ in comparison with control.

Results

The result from the study of the research work is presented in tables below and the GCMS result is as attached. The data analyzed was based on the correctly filled/successfully retrieved one hundred (100) questionnaires that were distributed.

Results of the phytochemical screening of our anti-arthritic remedy showed the presence of various phytochemicals at various concentration and they includes; Tannins ($12.59 \pm 0.30\%$), Flavonoids ($9.42 \pm 0.24\%$), Alkaloids ($2.45 \pm 0.03\%$), Saponins ($2.19 \pm 0.01\%$), Terpenoids ($3.16 \pm 0.02\%$).

The GCMS result is attached below.

Discussion

The use of crude plant extracts for treatment of diseases dates back to antiquity in history. This is because plants serve as the source of biologically active compounds. Certainly, several modern drugs in use today were developed from plants and currently, certain health challenges have defiled orthodox medications and interestingly a good number are responsive to traditional herbal preparations, sources of which are in most cases concealed as patents. The dependence on herbal medication has continued to increase over the past few years. What is more disturbing is that emphases are often placed on efficacy of the herbal extract or products with little and in most cases no attention is directed to any possible harmful effects and scientific documentation. Most traditional practitioners of herbal or folklore medicine lack any formal education and they identify their herbs based

only on evidence of their efficacy on certain health challenges over a period of time and in most cases as inherited from some predecessors in the practice. Herbal substances and products are often administered as water extracts or tinctures (using local gins) and in many cases as blends of mixture of different plants believed to work in synergy. Unfortunately, many of these herbal blends are not scientifically resolved. Hence, we continue to process identifiable species of commonly used medicinal plants and assessing their margin of safety as well as efficacy by monitoring the effects of administration of such extracts on essential biochemical markers.

Sida acuta has been shown extensively to possess rich medicinal properties. Hence, it is as important to exploit the rich pharmacological potentials of this natural resource that have decorated our environment which also bears numerous inundations of diseases, some of which have no defined orthodox remedies till date. Consequently, despite the ability of *Sida acuta*, as for many other plants' crude extracts to effectively cure ailments, the best approach consists in extracting the active principles and incorporating them into formulations of refined medications is very key and essential. The medicinal properties of the plant could be attributed to the presence of various bioactive compounds in the extracts under study. The phytochemicals; tannins, saponins, alkaloids, flavonoids, terpenoid were found to be present in *Sida acuta* leaves and are in amounts to be of medicinal value. Many plants containing alkaloids and flavonoids have diuretic, antispasmodic, anti-inflammatory and analgesic effects. Alkaloids are capable of reducing headache associated with hypertension. It has been reported that alkaloids can be used in the management of cold, fever and chronic Catarrh. Flavonoids are known for their antioxidant activity and hence they help to protect the body against degenerative diseases of which arthritis is one. Tannins are known to show evidence of antiviral, antibacterial and antitumor activities. Saponin is used as hypercholesterolemia, hyperglycaemia, antioxidant, anticancer, anti-inflammatory and weight loss agent. It has also been reported to have antifungal properties. Terpenoid are very important group of organic compounds that have been reported as potent drugs used in treatment of wide range of ailments (Jindal *et al.*, 2012).

Essential oil are volatile and are liquid aromatic compounds from natural sources, usually plants. The essential oil are form in the chloroplast of the leaf, vesinogenous layer of cell wall or by the hydrolysis of certain glycoside. They may be found in different parts of the plant, some could be in leaves, seed, flower, peel, berries, roots and bark. Essential oil from different part of the same plant may have completely different scents, properties as well as functions. More so, the quality and quantity of essential oil extracted from plants is determined by many interrelated factors, climatic, seasonal and geographical conditions (Pannizi *et al.*, 1993). The yield and quality of oils from these plants can also be affected by the stages of the plant growth.

Science regard essential oils in terms of functionality as chemical weapons of the plant world as their bioactive compounds may defer (Federspil *et al.*, 1997). Medical professionals are more interested in the medicinal properties of essential oils as many oils shows antibacterial, anti-fungicidal, relaxant, stimulating, antidepressant effect and can be very effective therapeutic agents. Essential oils are known for their therapeutic properties hence, used in the

treatment of various infections and also used as pain relief in the case of arthritis (Barocelli *et al.*, 2004). The extraction of essential oil from *Sida acuta* and coconut oil were used by the patients twice a daily for minimum of three weeks and report from all the subjects used shows that the pains and swelling associated with arthritis completely disappear after using the product. This is as a result of the presence of essential oil present in the preparation as confirmed by the GCMS result.

Gans and Kauwell, (2017) state that coconut oil has the ability to suppress or reduced inflammation due to many unsaturated fatty acid present example; linoleic acid which is known to promote relaxation, this is in line with our study where reduction of inflammation among our arthritic patients is due to the presence of linoleic acid and other essential oil in our preparation as confirmed by our GCMS result. Furthermore, the reduction in the pain could have been due to the presence of alkaloid present in *Sida acuta* and it has been reported by Edeoga and Okwa, (2005)^[14] that alkaloid present in the pigment of phenol is a strong analgesic (pain relief).

Table 1: Qualitative result of phytochemical screening of leaves of *Sida acuta*

Phytochemicals	Values (%)
Tannins	12.59±0.30
Flavonoids	9.42±0.24
Alkaloids	2.45±0.03
Saponins	2.19±0.01
Terpenoid	3.16±0.02

Conclusion

Since the global scenario is now changing towards the use of non-toxic plant products having traditional medicinal use, development of modern drug from *Sida acuta* should be emphasized for the treatment of various non-infectious diseases. The plant *Sida acuta* holds tremendous potential for pharmaceutical products of industrial standards. Different naturopathic preparation have been in the management of arthritis, however there have been little or no scientific documentation on the efficacy of those locally made remedies. Our studies has evaluated the efficacy of coconut oil and *Sida acuta* in the preparation of anti-arthritic remedy for the management of osteoarthritis, it associated pains and inflammations. Hence it can be concluded that our locally made preparation showed high level of efficacy in the management of osteoarthritis and it associated discomfort with promising potentials for the development of new drugs in this area. However, more investigations should be carried to ascertain the appropriate mechanism of action of the remedy in achieving the observed result(s).

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