THE RELEVANCE OF MEDICINAL PLANTS IN THE 21ST CENTURY AND BEYOND

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BY

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CERTIFICATION

This is to certify that this review seminal was written

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DEDICATION

To the great God our father and to our Lord Jesus Christ the giver of wisdom and understanding.

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ABSTRACT

Therapeutic plants extracts have been found to contain; phytochemical substances such Alkaloids, Tannins,Saponins, Anthranoids, Phlobatannins, Polyphenol, Cardiac glycosides. These extracts are used in their crude form and they have been found useful in the treatment of diseases caused by pathogenic bacteria and fungi. Their actions include inhibition of the following pathogens: - Staphylococcus aureus, Pseudomonas aeruginosa, Proteus species, Klebsiella, Pneumoniae, Escherichia, coli, Streptococcus mutants, Neisseria gonorrhoea, Candida albicans, Aspergillus species, Fusarium species. The use of herbs have been cost effective and solution to a lot of diseases that are predominantly associated with the third world where the economical viability of the individual is very low.

CHAPTER ONE

INTRODUCTION

Medicinal plants are plants that contain substances in one or more of their organs (root, stem, bark, branches or leaves and flowers) which can be used for therapeutic purposes or act as precursors for the synthesis of drug (Sofowora, 1982). Today, many plants and plant products have been found to contain substances capable of inhibiting the growth of, or killing the test organisms (i.e Bactriostatics or bactericidal respectively). Antibiotic substances toxic to one or more microorganisms have been detected in some plants of the following families; Equisetaceae (Pteridophytes) ,Guppрescaceae (Gymosperms),Baxacease (Angiosperm)(Ekong and organ, 1978).

Natural herbs has been used for decades especially in rural areas to diagnose, prevent or even eliminate disease worldwide these natural herbs are generally of natural origin mainly plants. The herbalist uses them without sufficient scientific knowledge often rely exclusively on past experience and observations handed down from generation to generation verbally or in recent times in writing. (Sofowora,1982) Natural herbs, as defined by the world health organization, [W.H.O 1976] Is the sum total of all knowledge and practices, whether explicable or not used in diagnosis eliminator and preventor of physical, mental and social imbalance.

Natural herbs is therefore, a blending together of dynamic medical knowledge solidly founded on ancestral experience. Other terms like "Traditional medicine are used as a substitutes for "Natural herbs" are less precise, less satisfactory and not to be preferred In additional to providing the animal kingdom its food, fuel and shelter, plants accumulate other Phytoconstituents- the secondary metabolites, which are, produced as by products which are not directly useful to them. These secondary metabolite give plant their medicinal value and they include alkaloids, tannins Saponins, flavonoids, anthraquinones, glycosides, volatile oils, terpens and a host of others. Many of the secondary metabolites have profound effect on animal systems and some possess important therapeutic properties which can be and have been utilized in the treatment and cure of human and other animal diseases since time in memorial (Ghani, 1985). A medicinal plant has therefore been described as one, in which one or more of its organs contain substances that can be used for therapeutic purpose (Sofowora, 1982). It may be inform of vegetables drug which may either be organized, (material which possess a cellular structure e.g leaf, bark petal e.t.c) or

unorganized drug (cellular structural medicinal agents such as gums, balsams, latex etc). Such plants materials may be utilized in the forms of de-concoctions in cold water, or boiled and cooled water, or concoction preparations of soup, drinks etc made usually from many ingredients. They can also be used as infusions often made by pouring on a specified plant material and allowing the mixture to stand for about 15 minutes.

The enormous potential of plant as the principal source of medicaments in the form of traditional preparations or as the pure active principle have widely acknowledged. The actual number of medicinal plants is not known, neither is an accurate data available in other to access the value and extent of use of plants, or active principles derived from them in medicine. Even Dr, salmon's Dispensary of 1696 included seven hundred and thirty-seven medicinal plants (shellard, 1979). By the end of the eighteenth century however, many of these had been discarded. In the process some useful medicinal plants were also eliminated, especially those which contained toxic substance which unless used in small doses could be considered poisonous. Not until the nineteenth century, when active principles were first isolated, that these plants were restored to popular use. As technology advanced, more efficient methods of plants analysis have been developed and effectively utilized to isolated an ever-increasing number of medicinals substance from plant sources.

A survey by the United Nation Commission for Trade and Development (UNCTAD) indicated that about 33% of drugs produced in the developed countries are derived from plants (UNCTAD/ GATT, 1974) and that if microbes are added, 60% of medicinal products are of natural origin (sofowora, 1982). According to some sources almost 80% of present day medicines are directly or indirectly derived from plants (Myers, 1982). Another recent study established that about one in four of all prescription drugs and almost 7,000 different medicaments, contain compounds of plant origin, their commercial value being put at about & 40billion annually (Lewington, 1990). It has also been assumed that between 35,000 and 70,000 different plant species, have been used as medicines by various people of the world, This figure is between 60-85% for Nigerians and African that are dependent on plant based traditional medicaments (Farn Sworth, 1996), and as Western medicines continues to be unaffordable or in many instances in appropriate, this pattern of dependence on local herbal cure is set to rise. Surprisingly, the large quantity of modern drugs mentioned comes from less than 15% of the plants, which are known to have been investigated pharmacologically, out of an estimated 250,00 to 5000,000 species of higher plants growing on earth (Farn Sworth and Bingle, 1997). Farn Sworth,(1996) asserted that the 120 or so plant based drugs prescribed for use world

wide are obtain from just 95 plant species. Many reasons can be attributed to the level of development of plant based drug and these can not be far fetched when the statistic of medicinal researches involving plant is taken into consideration for example about $50-$100 million is needed to make a new plant-based drug coupled with the ten years it takes it takes to develop it (lewington, 1990).

In Africa and indeed other developing countries of the world, a large number of people die daily of preventable or curable diseases, because of the absence of simple health care. The situation is further aggravated by the perpetual state of poverty and the continued rising trend in their population-In recognition of the fact and since herbal drugs and western drugs should ideally complement each other, W.H.O has attempted to incorporate natural herbs officially into the health care systems to the developing countries by stressing the importance of these plants in primary health care and the great potentials of the plant kingdom to provide new drugs.In the light of these, the need to carry out research into locally occurring plant species is therefore crucial as this will enhance their contributions to the health care of the populace. The advantages derivable from such research is enormous because such plant sources are cheap and more accessible to most of the population. Again, such medicines enjoy a wider acceptability among people than those orthodox medicine.This could be due partly to the in accessibility of orthodox medicines as stated above, but the major contributory factor, is the fact that traditional medicine blends readily the socio-cultural life of the people in which culture it is deeply rooted (Sofowora, 1982). It is not uncommon therefore to observe patients irrespective of their social status patronizing, orthodox doctors concurrently with traditional medical practitioners. Naturally plants are a potential source of new drugs, a cheap source of known drugs such as reserpine from Rauwofia species. There is also the possibility of discovering new and revolutionary drug for treating such diseases as cancer and even AIDS (Hahn et. al, 1981). The development is resistance to synthetic chemotherapeutic agents is common in orthodox medicine e.g. the resurgence of chloroquine resistant varieties of Plasmodium parasites. The cinchona plant extract is known to cure such resistant malaria due to the combined actions of the almost 36
different alkaloids it contains (Lewington, 1990). Microbial resistance to antibiotics is also wide spread.

These organisms, particularly klebsiella aerogenes and proteus- species are resistant to antibiotics (e.g. Ampicillin and Cotrimodazole) commonly used in the treatment of urinary tract infections UTI'S (Ijah and sar,1996). This may be the reason a large number

of people in Nigeria rely on local herbs as cures for their disease and illness especially urinary tract infections. There are reports that extracts of herbs found in the Nigerian environment inhibits the growth of pathogenic bacteria. For instance, Ebana et al (1991) reported that alkaloids and cardiac glycosides from Garcinia kola, Borreria ocymoides, kola nitida and citrus aurantifolia inhibited bacteria in UTI'S and Gonorrhea.
Similarly, Ijah and sar (1994) reported that extracts of Trema gwuinensis, Bridelia sp, Nauclea latifolia, Lophera lanceolata exhibited inhibitory effects on Klebsiella aeruginosa and proteus mirabilis. These organisms causes UTI'S

PHYTOCHEMICAL SCREENING

The first stage elucidation of the active principle of a given medicinal plants is phytochemical screening. These is an approach which includes the use of various analytical methods for the detection of various phytochemical classes of compounds
present in the plants and their effects on animal systems (Harborne 1973).

The knowledge of biological activities of plants or their chemical constituents or both immensely desirable, not only for the discovering of new therapeutic agents but also for the fact that it provides valuable information in disclosing new sources of such economic materials as tannins, industrial oils, gum, precursors for the synthesis of complex chemical substances e.t.c. The chemicals isolated from plant sources whose structure are known often prompts the chemist to a successful series of modified semi-synthetic compound e.g. gatropine to humatropine, morphine to N-allylmorphine. Such semi synthetic compounds have some desired medicinal properties distinct from the parent compounds (Frank and Blaschke, 1963).

A more rational and specific basic for the treatment of plant poisoning both humans and animals requires acknowledges of chemical constituent of the so-called toxic plants.

Phythochemistry is also applied in the study of fossil plants it will play on increasing role, for example in testing various hypothesis on the early origins of land plants. Phythochemistry is also applicable in plants ecology, plant genetics and plant systematic (Herbone, 1973).

SOME PLANTS AND THEIR THERAPEUTIC USES

PLANT	PLANT ACTIVE CONSTITUENT	USES
a. Cinchona Species b. Azadirachta Indica (Neem)	36 different alkaloids but Quinine, Quinidine, Cinchonine and Cinchonidine are the most active Nimbolide and Gedunin (Limonoid derivatives)	Antimalarias
a. Salix alba b. Papava Somniferum	Salicin, Morphine, Cordeine	Aches and Pains
Rauwolfia (Snake root) e.g R. Serpentina, R. Vomitora	24 different alkaloids rescinamine, deserpine and reserpine	Antihypertensive
Ocimum gratisimum	Thymol Mangeferine	Antidiarrhoea
Vernonia amygdalina (bitter leaf)	Papain, cerpine and Pseudocarpine	Anthelmintics
Ephedra Species	Ephedrine	Asthma and Allergies
a. Mint Species b. Thyme	Methanol Thymol	Cough and Cold
a. Plantago ovata b. Cassia species, Cassia angustifolia	Mucilage	Laxative
Erythroxylum coca(coca brush)	14 different alkaloids but cocaine is the most active	Anaesthetics

CHAPTER TWO
DISCUSSION

ANTIMICROBIAL ACTIVITIES OF MEDICINAL PLANTS

Antimicrobial chemotherapy has been in use from antiquity primitive men had long recognized the healing power of certain herbs on some diseases, but what they failed to recognized was the mechanisms of action of those herbs, attributing their actions instead to supernatural forces (smith and conant, 1978).

Medicinal plants have been found as the only effective cure for a few diseases that are essentially tropical. In some cases plants offer an alternative for the treatment of diseases which will involve modern surgical operation and in other cases, where the patients are poor or are far away from the hospital the therapeutic plants are the only answer to curing ailments and disease (Akinsanya and Adegoke, 1973).

Infective hepatitis, a variety of jaundice has no permanent modern treatment. The patient is simply confined to bed and placed on glucose drink. An oral application of the aqueous extract of the tube of Zingiber officinale effects a permanent cure within a week (Akinsanya and Adegoke, 1973). The use of antibiotic for the treatment of sickle cell disease does not offer a lasting solution. Patient suffering from this disease are often relieved by oral application of the alcoholic extract of the root of Fagara xanthoxyloides (Sofowora, 1982). Recurrent bone pain has no permanent cure, in modern therapy. The effect of pain relieving tablets such as Panadol and Cafenol on the disease is only temporary. This is so because the black blood disease often evades successful diagnosis. Here traditional therapy offers a solution permanently, therapy has been reported often by an oral application of the aqueous extract of the root of Clausene onisata (Akinsanya and Adegoke, 1973).

Emerua (1980) reported that the fruit and seed of Carica papaya contained an antibacteria substance which is bacteriocidal on several species of gram negative and gram positive bacteria, particularly staphylococus aureus, Bacillus cereus ,E.coli, Pseudomonas aeruginosa and Shigella flexneri. Higher plants contain an antiviral substances, Bedows and Haffield, (1982) reported that aqueous substances (podophyllotoxin) of Podophyllum peltatum obtained from the rhizome after freeze drying was found inhibiting the replication of measles and herpes simplex I virus. Similarly, Elwin-lewis (1974) reported that deconcoction of Acalypha phleoides has been used as mouth wash sore gum. Akindubi (1983) reported that extract of Acalypha torta and Bixa orreleana inhibited the growth of

staphyococus aiireus, E-coli and Bacillus sp, the investigator compared, the antimicrobial properties of the two plants with those of some commercial antibiotic and found that the extract compared favourably in their inhibitory activities with ampicillin, tetracyclin and penicilin.

Charles and William (1978) reported the inhibition of the growth of Staphylococus aureus, Bacillus substilis and Mycobacterium smegmatis by athanolic extract of Uvaria chamae. Also El said et al (1971) reported the use of series of chewing sticks such as Fagara Xanthoxyloides and Terminalia glaucoscene in the treatment of oral infections.
A concoction made from a mixture of papaw leaf and other materials like lemon, leaf of guava and lemon grass is very effective in the treatment of malarial parasite (sofowora, 1982). Lombo, (1973) reported that the main types of venereal disease are gonorrhea and syphilis if they are poorly treated they may cause inflammation in the uterus and this disturbs pregnancy. It will be more acute if contracted by a girl at first appearance of her monthly period or when it cause abortion. Serious damage would be done to the uterus and surrounding tissues. The commonest symptoms are yellowish discharge after three or five days infections, swelling of the vulva and abdominal pain especially at the lower part, there is also difficult to pass out urine. The best herb for the treatment of this condition are leaves, root and flowers of Asunrin tree. The aqueous extracts of the roots of Cryptolepsis senguinolastus when tested on 3 pathogens inhibited the growth of the N, gonorrhoeae, P. aeruginosa, and C. albicans. However, the effect on P. aeruginosa was light (Daniel, 1983). Ottoh, (1982) showed that extract of the Piptodencastrum africana and Munia whiter inhibited S aureus, P aeruginosa and E.coli which bacterial agent of Urinary Tract Infections.

Both washed and unwashed Vernonia amygdalina (bitter leaf) showed the presence of very high concentration of alkaloid. Alkaloid have immense effect as neutrophilic agent and contain high amount of quinine, it has been known to be used as an anti malarial agents since 1939 (Godwin and Mecer 1990) and was also used for treatment of fever, diarrhoea, itching, ringworm and others parasitic skin diseases. It also contain cardiac glycosides in low concentration presence of this phytochemical which has medicinal effect on heart muscle agree with literature finding that bitter leaf is used as treatment for internal disorders and for muscle building in horses (kerharo and Bauquet 1981). It also contain tannins in low concentration both washed and unwashed, samples Godwin (1990) indicated, that tannins are presence in plants as antimicrobial agent and phytoallexins.

Unwashed and washed bitterleaf contain high concentration of saponins .Saponin are capable of distingrating membranes of cell organells which may be responsible for the used of bitter leaf by some women for vicarious prevention of worms in infants, saponins could act on the membrane of the cell and caused their lysis which result in death of the worms. Unwashed bitter leaf contain sesquiterpenes in high concentration but was absent in washed sample because of its high solubility in aqueous solution and they are also heat labile which may be responsible for their loose after washing. Sesquiterpenes act as allelopathic and have the ability to increase appetite. This may be the reason why bitter leaf is used as an appetizer and digestive tonic. The presence of polyphenols in the plant thus confirm the local used of bitter leaf extract for the control of excessive bleedling. (Okunola , 1998)

N.B.De et al(1999)reported that mango juice can be preserved using extracts of Hyphaene thebaica and Zingiber officinale.the ethalolic extracts of both H thebaica and Z officinale posses significant antimicrobial activties against S. avium, C. perfringes, B coagulans, E coli, A . niger and A. flavus.

The aqueous extract also posses antimicrobial activities against the test organisms but to a lesser extent compared to the ethanol extracts. The photochemical screening showed that both plants contain phenolic compounds and tannins and saponins the ethanol extracts of both plants specially Hyphaene thebaica significantly reduced the growth rate of microorganisms, as well as limiting the reduction in protein, sugar and ascorbic acid content of mango juice.

Acalypha wilkesiana has been found to contain saponins, tannins, and tested positive with phosphotungstic acid having a moderate precipitation. Adegoke, (1968) reported that Acalypha wilkesiana contains alkaloids. The hot water extract of the leaves has been found to have some antifungal activity by reducing the growth rate of Trychophyton rubrum and Trychophyton mentagrophytes (Sofowora, 1988).

Adeshina et al (1980) reported that crude extract. of Acalypha wilkesiana has also proved to be strongly inhibitory to the growth of Bacillus subtilis, Escherchia coli, klebsiella pneumonia and candida albicans.

Akinyanju et. Al. (1986) reporter that hot water extract of leaves of acalypha torta was shown to have significant inhibitory effect in vitro on staphylococcus aureus, pseudomonas aeruginosa, Escherichia coil, klebsiella sp, Salmonella parathyphi, proteus sp, serratia marcescens ,Yersinia sp, Acinetobacter sp, and Bacillus sp. The crude and purified ethanol extracts of the leaves also inhibited the same range of organisims as did hot water with the exception of pseudomonas aeruginosa and acinentobacter sp. Hot water extract of the leaves was also shown to have some antifungal activity – the growth rate of Trichophyton rubrum and Trychophyton mentagrophyte was reduced. Spvrulation of Aspergillus fumigatus was delayed and reduced in volume but no inhibitory effect was recorded against Aspergillus niger, Aspergillus flavus, microsporum audovini and candida _ albicans,. Thus, the leaf of Acalypha torta appears as a potential source of broad spectrum antibiotic and the leaf is used on the treatment of malaria, skin rashes in babies and against cutaneous fungi.

Akinde, (1983) in dated polyphenols from methanol extract of acalypha wilkesiana which posses greater antimicrobial activity against candida aibicans, E.coli, S. aureus than sesquiterpenes. The polyphenols turned out to be much potent than orthodox antifungal drug such as "canasten cream" containing biphenyl – 1 – imidazoyimethane,

Iseyemi, (1984) reported possible effect of hot water extract of Acalypha wilkesiana leaves on the growth of fungi, inhibited the growth of Tinea glabrosa (ring worm fungi) but encouraged the growth of A niger, A flavus, A fumigatus, Rhizopus sp, and Penicillium citrium Adeshina et al, (1980) reported that leave and stem of this plant are used for the treatment ofMeasles and malarial fever. The leaves and stem are usually boiled inside a pot and hot water and decocontion is drunk or used for bathing.

ANTIMICROBIAL ACTIVITES OF MEDICINAL PLANTS EXTRACTS ON SOME MOUTH FLORA

The extracts (aqueous, ethanol and acetone) of two African chewing sticks Axonopus compressus and Anogeissus leocerrus were examined for their antimicrobial activities on mouth flora (Lactobacillus sp, Pseudomonas sp, staphylococcus aureus, streptococcus mutant and candida albican isolated from randomly selected individuals. The phytochemical properties reveals that both extracts contain alkaloids, anthranoids, cardiac glycosides, polyphenols, saponins and tannins. The effects of this two plants extracts on

the isolates reveals that they can be used as oral mouth clensers (oyeleke and Adebayo 1998).

The use of higher plants and many shrubs including some vegetables were originally recognized as antiseptic for example thymol a simple phenol present in essential oils of several plants like Thymuz vulgaris and monardo, punctuate have both antibacterial and antiviral properties also acalypha indica has alcalphine used in the treatment of sore gum, it has expectorant and emitic properties (Bedow and Haffied (1982).

Medicinal plants has some inhibitory effect on oral plaques and gingivitis (Gazi et al, 1987). In Africa chewing stick are used frequently during the day because they act as a stimulant to the gum and this help to prevent gingivitis (Sofowora, 1984).

ACTIVITIES OF EXTRACTS OF MEDICINAL PLANTS AGAINST BACTERIAL AGENTS OF URINARY TRACT INFECTIONS

Ijahand Oyebanji, (1997) reported that extracts of Enantia Chloranthia, Kigelia africana, Bridelia ferruginea, Trema nitems, Drypetes gossweilerri exhibited antibacterial effects. The ethanolic sextracts however, showed greaster degree of inhibitory activity on the test organisms than aqueous extracts. The crude or the ethanolic extracts of the four medicinal plants were combined and tested on the organisms E-coli, S. aureus, Pseudomonas aeruginosa and Proteus sp, their inhibitory effects were enhanced. Phytochemical screening of four medicinal plants revealed that the plants contained alkaaloids, anthranoids, anthraquinones, cardial glycosides, phlobatannins,polyphenols, saponins, and tannins (Ijah and Sar 1996).

ANTIMICROBIAL ACTIVITIES OF MEDICINAL PLANTS ON ANTRITIS

Some of the organs of the pawpaw tree carica papaya offer tremendous assistance in the treatment of arthritis irrespective of its causes.

OTS: - The roots of the male carica papaya tree can be harvested fresh, washed and oiled, in plenty of water-A glass of this hot water taken by mouth thrice daily a meliorates n even cure arthritis (Komolafe, 1993).

FRUITS: Unripe pawpaw can be processed into a poultice or embrocation. To the poultice, the fresh fruit, is cut into small bits and left to ferment in water ned in a covered plastic bottle. The amount of water used should be of equal volume

with the weight of the pawpaw fruit. (I.e. if you use one kilogram of pawpaw fruit you should also use one k.g of water). Allow to ferment for about 3 weeks or till a pasty fairly yellowish paste is produced the resulting paste is very effective poultice that can be applied to acting or swollen joints (Komolafe, 1993).

FLOWERS: - Fresh flowers of male carica papaya roots. The resultant paste can be mixed with native soap or any toilet soap. The product generalized arthritis. If used just before going to bed at night the patient wake up a better person with less pains the following morning (Komolafe 1993).

Alcohol poultice made from Vernonia Amygdalina (better leaf) Ocimum gratissimum (efirin) and powdered Garcina kola (orogbo) has proved to be very useful in cases of Arthritis that are complicated by excess synovial fluid collection in joint like the knee and the ankle-firmly applied poultice of these products overnight have given wonderful result. Rigorous but skilled message of the affected joints with shea butter (ori) before the application of poultice has been found very rewarding. (Komolafe, 1993).

The presence of alkaloids, steriodal nucleus, tannins and flavonoids in the leaves and roots of carica papaya has been confirmed. The reported therapeutic actions and uses of the plant part in the treatment of skin infections, fever, pile, have been confirmed because the root extract of C. Papaya inhibited S.aureus, E.coli, P.aeruginosa which are pathogens.

The use of C. papaya leaves and root as an abortifacient can be substantiates due to the presence of the steriodal nucleus and their known relationship with sex hormone.

ALKALOIDS

The alkaloids comprise a large of basic nitrogenous compounds distributed widely, through in quantitatively minor amount in plant material.

Alkaloids are the secondary metabolities of amino acids. They constitute the largest and most diverse group of natural profound pharmacological activity e.g. morphine is an analgesic, quinine cures or alleviates malaria, colchicine is used for gout, reserpine is a anquilizer ad (+) –lysergic and diethylamide (LSD) is well known hallucinogen. They are ıer insoluble or sparingly soluble in water (with a few exceptions, such as colchicine) but ble in alcohol, chloroform, benzene, some in other and a few in petroleum either most em are physiologically active, some being extremely poisonously. They include the ıids of frogs of the genus phyllobates which constitutes some of the most poisonous

substance known to man. Some 200 alkaloids have been characterized from poisonous frogs and salamander, other alkaloids such as some those (e.g. the ghotoxins and chaetocins obtains from fungi containing sulphur. In most instances, they are medicinally important substances of the plants from which they are found.

Most alkaloids are well defined crystalline substances which unite with the acids to form substituted a minimum salts. The stability of these salts towards hydrolysis varies with the basic strength of the alkaloid and the nature of the acid used. In the plant, alkaloids may exist in the free state, as salts or as N-oxides, e.g. the quinollizodines of the Boraquinaceae. These cause extensive liver damage to animals using plant containing them as fodder.

TANNINS

The term tannins was introduced by Seguin in 1976 to described the chemical substances present in a number of vegetable extracts which are responsible for transforming putrescible hides and skin into non rotting stable vegetable tanned leather crust (Nguji, 1988). Later, it was demonstrated that those natural tanning materials contain large group of complex phenolic substances showing phenolic properties and were identified as tannins. Tannins can generally be defined as water soluble naturally occuring phenolic substances which have chemical and physical ability to form effective cross links with proteins and other polymers and having a molecular weight average between 300 to 3000. Tannins have the ability to precipate alkaloids and gelatins.

CLASSIFICATION OF TANNINS

Vegetable tannins are considered to belong to two broad groups the hydrolyzable tannins (pyragallol tannins) and the condensed tannins (atechol tannins). Hydrolyzable or paragallol tannins usually contain more organic and resulting in yellow coloured tan liquor of low pH and low as stringency. They normally give blue-black colour with ferricchloride and yield pyragallol when subjected to dry distillation at about 200^0C in the absence of air.. they do not form precipitate in the presence of formaldehyde HCL nor bromine water. Hydrolyzable tannins consists of a carbohydrate core whose hydroxyl groups are esterified rtially or wholly by gallic acid or ellagic acid. They are easily hydrloyzed by acid bases enymes to yield the sugar moiety and a number of isolable phenolic acid hydrolyzable ins are further subdivided into galotannins and ellagitannins. On hydrolysis, tannins yield gallic acid as the only phenolic moiety, while ellagitannins yield besides

gallic acid one or more of its derivations, of which gallic acid is the most important (Nguji, 1988).

Condensed tannins on their other hand are polymeric poly-phenolic (flavonoid) compound formed by condensation of hydroxyflaven and are resistant to hydrolysis. They give reddish tan-liquior which is usually more astringent than the hydrlozable tannins.

Tannins are widely distributed in the plant kingdom (Riberaayciayon, 1972) and tannins bearing that abound in both the tannins are located in various tissues such as leaves, pods, wood, root, heart woods bark of these tissue individually constitute local source of commercial tanning materials.

The Nigerians flora include many tanniferrous plants some of which can serve as local source of commercial tannins for use in various industries. Such plants includes Acacia nitotice var, adensonii (Bagaruwa): Anogeissus Schimperii syn Leiccarpus (Marke).

The major application of vegetable tannins in the country is in the leather industry where it is utilized in the process of preserving hides and skins vegetable tannins can be employed in the reduction of the viscosity of mud in oil well drilling. About 40% of tannins consumed in United States of America is utilized by the oil industry for this purpose. This principle is also employed when tannins are used as protecting coat for the drainage pipes as the complexes formed prevent further rusting (Nguji, 1988).

Vegetable tannins are also use in Agriculture in term of soil treatment measure, pollination and pest control. The polyphenolics and other organic acid which constitute vegetable tannins may be leached from dead leaves and degraded to build up acid humus in the soil and enrich it for agriculture (Dalziel 1948) vegetable tannins contributed to taste and flavours of food and therefore play a significant role in the acceptance of many food and beverages by consumers (Reeves et al 1987)..

STEROIDAL NUCLEUS

Steroids are classed together because of their structural similarity which due to their common biosynthetic origin. They are all biosynthesized from squalene probably via anosterol in animals and via cycloartenol in plants. The steroids and their modified rivatives have more diverse biological effect than other natural product (Tedder, et al 9). The steriodal nucleus (Cyclopentanoperhydrophenanthrene) is the parent structure l steroids. All sex harmone possess the fused ring structure. Steroids are also found in ts but they cannot synthesize the ring structure. They consume steroids in their diet

and convert them for their purposes. Cholesterol or some closely related sterol is therefore a vitamin for insects.

FLAVONOIDS

These are substances with the phenylbenzopyrone skeleton. They belong to a class of compound derived from the parent compound, flavone. The flavonoids which occur in the free state and a glycoside, are the largest group of naturally occurring phenols.

The flavones and their close relations are often yellow. They are widely distributed in nature but are more common in the cell Sap (Trease and Evans, 1978).

The classes of flavonoids include Anthraquinones, flavonones, isossflavonoids, and iso flavones. Some physiological functions attributed to flavonoids are pigment function, growth regulator, vitamin B activity, reduces capillary fragility and permeability. Protect against x-ray cure frost bite, has antibacterial activity, oestrogenic antitumor and anti oxidant activities.

CYTOTOXIC SESQUITERPENE LACTENES

Vernodalin and vernomydin, these play allelopathic roles (allelopathy is the dentrimental effect of one plant on another lower plant) in plants. (Goodwin and Mercer, 1990)

CARDIAC GLYCOSIDES

Cardiac glycosides are reported to be steroid glycosides with important pharmacological effects on heart muscles. They are either 23 compounds called cardenolides or 24 compounds called bufadienolides (Goodwin and Mercer 1990).

ANTHRAQUINONES

These are ubiquitous in most plant phenolic for example emodin has been reported to have effect on certain hormone in the sense that they effect enzyme systems related to hormone synthesis or action. This has been suggested to be factor responsible for the ability of anthraquinones to prevent hormones and enzymes that are linked with fungi growth from being functional.

POLYPHENOLS

Polyphenols are phenolic compunds that may be used as an astringent thus its use to control bleeding.

SAPONINS

These are glycosides (glycosides are compounds which on hydrlysis by enzymes or dilute acids yields one or more sugars and residual art called an aglycone) which form a soap like froth when shaken with water and are therefore employed for washing and a emulsifying agents. On hydrolysis, they yield sugars and sapogenins, which can be either steroids or terpenes. The term has always been associated with haemolysis and foaming abilities. In vitro, saponins are powerful haemolytics but large doses are needed to cause haemolysis intravenously because of the protective action of choloesterol and other lipids which bind the saponins (sodipo, 1989).

Information about the mode of action of saponins on fungi is scanty. Several investigators have suggested that saponins exert their fungicidal effect by precipitator sterols in the cell membrane. The findings that all saponins interaction between saponins and membranol sterols. This interaction may lead to a drastic change in the membrane and total loss of cell contents. From all indications, the ability of saponins to compete with membrane sterols seems to be the major mode of interaction in mycelia growth inhibition (Sodipo 1989).

RESINS

These are clear amorphous exudates from the bark of trees which harden or drying and burn with a smoky flame. They often are oxidation products of essential oils (Volatile). They melt when heated into a clear adhesive mass. This property is made use of in their local application as wound dressing and also as filling for cavities of carious teeth.

Some occur mixed with essential oils and used for the same purpose (carminatives, disinfectants of respiratory and irritating than essential oils and some important resins thus act as purgatives). Other occur combined with gums and form soothing gum resins. Certain toxic resins, which are not absorbed by the digestive tract or the skin, are used as ıtiparasitics. In many cases, the parasites are not killed but are violently stimulated and easily expelled from the intestine by subsequent purging. (Kafaru 1994).

SOME PATHOGENIC MICROORGANISMS

Microorganisms implicated in urinary tract infections, gastro enteric infections, gastro intestinal infection, skin infections, respiratory infections, otitis media infections includes staphylococcus aureus, E-coli, Klebsiella sp, Proteus sp, Streptococcus sp, Pseudumonas aeruginosa, salmonella sp, Candida albicans, Aspergillus fumigatus, Penicillin sp, Fusarium sp among others (Duguid et al, 1987). These organisms are discussed below.

STAPHYLOCOCCUS

Staphylococci are spherical cells about 1um in diameter diameter arranged in irregular clusters. Single cocci, pairs, tetrad and chains are also seen in liquid cultures. Young cocci stain strongly gram negative. Staphylococci are non motile and do not form spores. Under the influence of certain chemical (e.g. L forms, but they are not affected by bile salt (More, 1978).

The peptidoglycan of staphylococcal cell walls is characterized by unique pentaglycine bridge that link the tetra peptides attached to the muramic acid residue. The pentaglycine bridges are specifically susceptible to the action of the enzyme lystaphine, there by providing useful means of identifying the genus. Small colony variants of*Staphylococcus* ***aureus*** (G forms) occur when microbial growth is exhibited by a variety of agents including antimicrobial, but also may appear spontaneously.

Both L and G forms are resistant to many drugs especially those affecting the cell wall and it has been postulated that recrudescent *Staphylococcus aureus* disease is sometimes due to reversion of persistent dormant L or G forms to invasive potential organism (Tzagaloff and Novick, 1977). On solid media most strains of *Staphylococcus aureus* produce a characteristic golden yellow (aureus) carotenoid pigment. However, colonial coloration may vary from white to orange. Therefore, the occurrence and extent of haemolysis depend upon both the strain and the source of blood (Morse, 1978).

Staphylococcus aureus is responsible for a wide range of susceptible diseases varying from the least significant to the skin. The gastro intestinal, respiratory and urinary tracts, the brain, or the cardiovascular system. It may also cause the mutilating bone disease, osteonogelitis or food poisoning (Enyinnaya, 1975).

'SUDOMONAS AERUGINOSA

croscopically, *Pseudomonas aeruginosa* is a slender non-sporulating usually non sulate rod bearing a single polar flagellum. This bacterium presents three types of

colonies. The most common on 24 hours blood agar plates is low convex to flat and 1 to 5 mm in diameter with rough or frosted glass surface and an undulated or erose periphery. It may be B heamolytic on a 24 hours plate and usually shows diffuse B heamolysis on a 48 hours plate (Chung and Collier, 1977). Most strain form a water or chloroform soluble phenazine pigment, pyocyanin (from the Greek, blue pus) which usually impacts a green or blue green colour to the medium surrounding the colony other brown to black phenazazin pigments are also occasionally formed. Flourescein, a water soluble, pale yellow green pigment is formed by nearly all strains of Pseudomonas and is an important feature for identification of this species. Flourescein is not apparent on blood agar medium, a special medium enriched with magnesium and phosphates should be used, and detection is by fluorescence under ultraviolet light (Chung and Collier, 1977).

Pseudomonas aeruginosa is aetiologically significant in many diseases and particularly associated with post burn sepsis and other nosocomial infections, cystic fibrous and septicemia in patients with immunodefficiencies. Pseudomonas are widely distributed in nature and the hospital environment. This obligatively aerobic, gram negative, oxidase positive non-sporulating motile rod is common than all other fermentive bacilli (Chung and collier, 1977).

A selective medium is centrimide agar plates also used in the environmental epidermologic survey when only this species is being sought (Chung and Collier, 1977).

ESCHERICHIA COLI

E-Coli are gram negative short rod- variously motile and possesses petrichous flagella. It ferments glucose with gas production. The colony has pink colour, entire margin, raised and convex elevation on macConkey agar. Three groups of spec *E-Coli* strains are associated with three types of intestinal disease. The enterotoxigenic *E-Coli* species cause diarrhoea in piglets and calves, traveller diarrhoea in man and cholera like disease in the people living in the warm climates of developing countries. Another group of special *Escherichia* serotype which are related to certain serotypes of *Shigella* is invasive into the epithelia like disease. These serotypes have also been associated with food (Edward and Ewing, 1977). The third group of special serotypes is associated with iarrhoea in institutionalized infants in developed countries.

These special serotypes which are not found in normal intestine have been called entropathogenic *E-Coli* (Edward and Ewing, 1972).

Most of the K antigens are polysaccharides, but a few proteinaceous fibrial antigens which confers adheresiveness on enteroxigenic *E-Coli* are presently listed as K antigens. They may be established as a special group of antigens (F antigens). Since many O,K, and H antigens can be combined in different way the number of possible serotype is very high (Ewing, 1974). *E-Coli* is now the most common cause of septicemia in hospitalized patient. K1, K2, K3, K5, K12, and K13 antigens are the most common K types associated with infections of the urinary tract (Ewing, 1974).

PROTEUS SPECIES

Members of the genus Proteus occur widely both in nature and in men as part of the bacterial flora (Laskin and Lechavalier, 1982). Proteus species have pentrichous flagella, are highly motile and so grow in swarms on nutrient agar plates Proteus mirabilis, Proteus morganis, Proteus vulgaris and Proteus rottgerii have been implicated to urinary tract infections (Stamm and Tuck, 1980). Proteus mirabilis and Proteus vulgaris produce large amounts of hydrogen sulphide, as liquidfy gelatin and are greatly motile. Proteus morganis and Proteus rottgerii have been shown to be more susceptible to antibiotics than other species which are difficult to eliminate using common antibiotics (Laskin and Lechevalier, 1982).

Proteus species are important pathrogens of urinary tract as a result of their ability to rapid form ammonia from urea in urine.

In the kidney tissues, the ammonia may promote infection, while in the penis and bladder the alkalinity, causes the deposition of phosphate stones which promotes infection by increasing the retention of urine (Duguid et al, 1987).

KLEBSIELLA SPECIES

Klebsiella strains are mostly saprophytic but display opportunistic pathogenesis in men, causing respiratory tract infection, urinary tract infections, and both endemic and pandemic infections in hospital (Collee et al; 1980)

Klebsiella species share the characteristics of their other members of the enterobacteriaceae, but are never motile. Most ferment lactose, and so give pink colour on acConkey agar. They produce extra cellular slime so that the colonies are normally vary ucoid seventy two (72) serotype of Klebsiella have been documented, however serotype) and 10 have been shown to be most prevalent in urinary tract infections (Collee et al, 0).

SALMONELLA SPECIES

Salmonella is a gram negative, motile, non-sporing and non-capsulated bacillus. They are essentially parasites of the intestinal tracts of man and other animals. They grow readily on unenriched nutrient agar over a wide temperature range, with an optimum of 37^0C.

Approximately 2200 serotypes are recognized, some being adapted to specific host and largely restricted to them. E.g. S. Typhi in man, S. Dublin in cattle, S. cholerae-suis in pigs- some are host non specific and include those that are often associated with human food poisoning (Macrae 1997).

Salmonella are frequently found in sewage, polluted water and soil where they survive for weeks, months or even years if condition is favourable. The spreading of manure on agricultural land can also lead to environmental contamination. Animals both wild, and domestic play in important role in salmonella transmission. (Macrae, 1997).

Salmonella grow on selective media MacConkey agar, Deoxychocolate citrate (DCA), Xylose lysine deoxychocolate (XLD) and Brilliant green (BG) agars.

Confirmatroy test, involves assessment of urease and lysine decarboxylase activity, fermentation of dulcitol, indole production, growth in the presence of potassium cyanide and utilization of sodium malonate. These reactions, in combination with serological tests, are usually sufficient for identification. Antibodies against somatic (O) and flagella (4) antigens are used to confirm/identify salmonella-like isolates. Somatic antigens are composed of polysaccharide while those from the flagella are proteinanceous. Testing will usually comprise slide agglutinations with polyvalent 'O' and 'H' antisera followed by the use of sera raised against specific antigens (Macrae. 1997).

Salmonella typhi is responsible for enteric fever i.e. typhoid fever and food poisoning, due to:

(i) The endotoxin produced by these organisms

(ii) Their somatic antigenic complex

(iii) The effects of the vi-antigen

SPERGILLUS NIGER

It is a common saprophyte and frequently occurs in sputum is a contaminant. A er is one of the commonest causative agent of otomycosis (fungus infection of the ear)

and "fungus ball". Acute aspergillosis may result in following massive exposure the fungus.

SACCHAROMYCES CEREVISIAE

A genus of fungi and they are yeast-like cells that forms some filaments. It is wide spread in nature. S. Cerevisiae, is employed in many food industries. Special strains being used for the leavening of bread, as top yeast for ale, for wine and for the production of alcohol, glycerol and invertase. S. Cerevisiae is a commensal of the mouth, throat, vigina, gut and skin in man. Becomes pathogenic in some physiological and pathological states. Many, produce infections such as thrush, volvovaginitis and pulmonary diseases. Infection can result from disturbed flora due to use of wide spectrum antibiotics, steroids, contraceptive pills and cytotoxic drugs.

SUMMARY AND CONCLUSION

The photochemical components present indifferent plants extracts are the active ingredients that posses Antimicrobial property against microorganisms responsible for human ailments.

In some cases, the plant extracts shows high antimicrobial against the test organisms, when two or more extracts are combined. The enhanced antimicrobial effects exhibited by the combined extract may be due to synergestic reactions between the phytochemical components of the extracts as reported by [Stephen and barlow 1980] and [Duguid et al 1978] That when two drugs which produce similar effects are given Simultaneously, the size of the combined effect is not always related in the same way to the size of the effect of an individual drugs.

Natural herbs are cheaper and raw materials are always available in and around us.

In conclusion, it is important to carryout more work on the purification and identification of specific active principle so as to discover its efficacy in the treatment of different ailments and diseases.

- Effort should be made to determine its lathal dose
- Its effect in other tissues/organ should be closely studied so as to aid the degeneration of other vital organs.

  The general populace should be discouraged on the indiscriminate use of natural herbs.

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