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An Overview of Herbal Medicine Research and Development in Nigeria

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Abstract: The research pattern in medicinal plants and traditional medicine practices in Nigeria is largely unknown. Hence this study examined such research patterns with a view to determining how the country fared in herbal medicine research and development and also to assess the implication of such findings on the health care system in Nigeria. Factors that mar herbal medicine research were discussed. Descriptive analytical technique was adopted in analyzing the secondary data obtained from the book of abstracts of published research findings on Nigerian medicinal plants and traditional medicines practices for 35 years (1970-2005). Results showed that the most researched areas were in the anti-infective drugs, gastro-intestinal tract drugs, analgesics, cardiovascular drugs, hypoglycemic and mollucicidal in that order. The study also revealed that much research is yet to be done in other vital areas such as hormones, anti-viral agents, Ear Nose and Throat (ENT), hemorrhoids and neurological disorder. Thus, it recommended among other things that herbal medicine research and development should be intensified in the above mentioned least-researched areas if Nigeria intends to meet the health challenges of the 21st century especially the Millennium Development Goals for 2015.

Key words: Medicinal plants, patterns, traditional medicine practices, hormones, anti viral agents, Nigeria

INTRODUCTION

The 21st century is witnessing serious scientific effort to discover major active ingredients in medicinal plants through research and development (R and D). This perhaps may be sequel to the inability of orthodox medicine to comprehensively address most disease conditions plaguing mankind or it may be a response to the clarion call by the World Health Organization that developing countries should endeavour to develop and utilize local medications that are most appropriate to their local circumstances especially for Primary Health Care (PHC) in order to cut down on huge cost associated with incessant drug importation (WHO, 1996). However, in the academia, the widely held view for the sudden rise in research work in herbal medicine has been linked to the quest to meet research mandates and perhaps earn routine promotion.

Whatever reason that may be ascribed to this increase in R and D activities in medicinal plants, one thing is instructive which is that herbal medicine is beginning to take the center stage in the management of health-related problems in the Nigerian health care system. Continuous R and D may be on the increase due to incessant changes in and the quest for new technology especially in this era of globalization.

Technological R and D therefore has been defined as that complex process of activities aimed at acquiring new knowledge, improving new engineering designs and functions and creating new products, all with a view to some ultimate application (Girifalco, 1991). In fact, the results of most research outputs from R and D are beginning to form the basis for measuring the degree of industrial, technical and economic development of any nation (Koleosho, 1989).

Through technological R and D, countries of the Far East Asia such as China, South Korea and India have been able to develop and upgrade the quality of their herbal medicine. China for instance is the World leading producer and exporter of herbal medicine. In 1993 the total sales of herbal medicine in China amounted to $2.5 billion. In Japan, there was a 15 fold increase in herbal medicine sales when compared to 2.5 fold increase of pharmaceutical products between 1974 and 1989 (WHO, 1996). The countries of the Far East Asia have been able to meet 75% of their health care needs through the development and utilization of herbal medicine and traditional medicine practice.

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Meanwhile, only 40% of herbal medicines consumed in Nigeria are produced locally and the remaining 60% are imported from foreign countries. Again, the commercial interest to mass produce herbal medicine through R and D and make them available for local and international use is lacking (Ohuabunwa, 1998) and it would probably take a longer time for this to improve and grow significantly. In Nigeria, effort at local herbal medicine R and D is yet to yield the desired benefits due to low funding of R and D activities, lack of adequate infrastructural facilities, non-commercialization of most research results, low demand that constraints R and D investment and problems faced by herbal medicine researchers (Oyelaran-Oyeyinka, 1996; Ilori *et al*., 2005).

The main aim of this study is to chronicle the trend of research results in herbal medicine from published scientific studies in Nigeria. The specific objectives are to examine the pattern of such research outputs; highlight some technical developments in herbal medicine production with emphasis on barriers to herbal medicine research and recommend policy changes that would guide and improve future research effort especially in areas where much research appears not to have been adequately carried out.

Literature review: Nigeria is a rich gene developing country for medicinal plants and the country is home to approximately 5, 000 plant species thus making it the 11th largest in terms of plant genetic diversity in Africa. Around 205 of these species are endemic in nature with Northern, Western, Central and Eastern Zones of the country being home to most of the endemic species (FEPA, 1992).

Herbal medicine in the simplest form are medicines or drugs made from herbs or plants and can be said to process several synonyms all of which refer to plants as the raw materials for medicine namely, phytomedicines, plant medicines, green medicines, traditional medicine portions, traditional remedies plant drugs and forest health products among others (Elujoba, 1998). The World Health Organization also defined herbal medicine as finished labeled medicinal products that contain as active ingredients aerial or underground parts of plants or other plant materials or combinations thereof whether in crude juices, gums and fatty oils and other substances of this nature. Herbal medicine may contain standard excipients in addition to the active ingredients. Medicines containing plant material combined with chemically defined active substances including chemically defined isolated constituents of plants are not considered to be herbal medicine. Exceptionally, in some countries herbal medicine may also contain by tradition, natural organic or inorganic active ingredients which are not or plant origin (WHO, 1996).

A Traditional Medical Practitioner (TMP) has been defined as a person who is recognized by the community in which he lives as competent to provide health care by using vegetable, animal and/or mineral substances and certain other methods based on the social, cultural and religious background as well as the knowledge, attitudes and beliefs that are prevalent in the community regarding physical, mental and social well-being and the causation of diseases and disability (WHO, 1996).

The production techniques or processing or herbal medicine in Nigeria is still largely antediluvian and therefore, benefit of the use of modern technology. Hence, the current debate in academic circle on the safety, efficacy and quality of herbal medicine. Before now, bare hands were used to pick dirt and separate unwanted parts of plants (Garbling) and grind herbs into powdery forms.

These have been replaced by special machines that help pick or sort the desired herbs and mill them with the aid of hammer, knife or teeth mills (Trease and Evans, 1978).

An overview of some of the processes employed in the production of herbal medicine and the equipments (machines) that perform these functions are becoming more scientific and complex (Tsumura, 1991). The use of analytical techniques is employed to collect plants from their natural habitats in order to ensure that only the desired plants are collected.

The seasons for collecting active ingredients in medicinal plants are a matter of considerable concern and importance. Research has shown that rubarb contains no anthraquinone derivatives in winter but contains anthranols which on the arrival of warmer weather are converted by oxidation into anthraquinones. Daily variations of the alkaloids of the poppy, hemlock, the solanaceous plants and ergot have been reported (Trease and Evans, 1978). So, plants should be harvested when the part of the plant being used contains the highest possible level of active compounds (Sofowora, 2008). Extraction process for making tinctures, fluid and solid extracts has been technologically improved upon. The old technique of maceration has been replaced for example with a counter-current extraction process, fluid extracts are concentrated by thin layer evaporations while freeze-drying and spray drying (atomization) are modern drying techniques that are in vogue.

Research in the development of drugs from herbs has enable scientists to manufacture potent preparations that aided the recovery of man from a state of chemical and structural unbalance (Odukoya, 1998). This feat was

achieved by identifying and isolating bioactive compounds from plants and their co-generic species with the use of modern methods such as chromatographic separation, use of paper and silica gel, High Performance Liquid Chromatograph (HPLC) and spectrometer for on-line measurement among others. For example, a semi-purified herbal preparation may be assayed for a particular group of constituents e.g., total alkaloids in Belladonna or Cinchona bark or total glycosides of digitalis. Also specific identifiable components may be evaluated or assayed e.g., reserpine content as distinct from the total alkaloid content of Rauwolfia species or morphine in opium (Olaniyi, 1998). Therefore, quality assessment that covers the three areas of quality assurance of herbal medicine i.e., quality, safety and efficacy are now possible through the use of modern technology-base analytical techniques. This has helped to broaden the frontiers of knowledge in herbal medicine standardization and evaluation.

However, intense debate surrounds the issue of how to conduct clinical trials of herbal medicine according to Western Pharmaceutical Clinical Standards. Also there is an inherent problem with the single-active-ingredient approach preferred by pharmaceutical companies that are actively involved in herbal medicine research. Isolating a single compound may not be the most appropriate approach in situations where a plant's activity decreases on further fractionation (separation of active ingredients by using solvents) or where the plants contain two or three active ingredients that must be taken together to produce full effect (Chaudhurry, 1992). Beckstrom-Sternber and Duke (1994) have documented several cases where synergy has been lost by using the single ingredient approach to developing drugs from plants.

Evidence reveals that there are a host of barriers to herbal medicine research in general. In Nigeria, Sofowora (2008) identified other barriers to scientific research in herbal medicine namely:

- Cost of acquiring information
- Distrust of researchers by practitioners
- The desire to pass down information only to off springs
- Restrictions due to cult/trade membership
- A lot of unwritten knowledge resides in the hands of healers in many societies

In addition, most healers bring in some other elements of traditional medicine practice such as incantation into herbal medicine practice. Sometimes healers may claim that to enhance the efficacy of their herbal medicine, some funny parts of an animal are to be used in preparing medicines. Such things may include legs of a worm, the bones of fly, the penis of a snake, fatty tissue of a female mosquito, breast of a chamelon among others. At times, the healer will claim to have used or direct the patient to provide as part of the ingredients for preparing a potion, hardly accessible materials such as the teeth of a virgin leopard, saliva of a young bat, sperm of a fertile lion and egg of a crocrodile. Such a mix-up of herbal medicine practice with traditional medicine tends to mar effort in herbal medicine research.

The above restrictions Adesanya noted, actually affected the level and type of information revealed to researchers to the extent that in most books, only the plants are mentioned, the methods of preparation are often missing. In addition, most of the herbalists that would have given useful information to herbal medicine researchers are getting older and vital information is being lost (Elujoba, 1998; Sofowora, 2008).

Even traditional medicine knowledge which is mostly tacit in nature is passed on from one person to another based on rules of age, gender or lineage. These restrictions are mainly in place to ensure that the knowledge remains an aspect of group identity.

In spite of the above mentioned barriers, a lot of progress in herbal medicine research has been recorded in China, Japan and other countries of the Far East Asia where in the past 20 years have witnessed a tremendous increase in herbal research into the use of standardized, semi-purified herbal extracts called phytomedicines (WHO, 1996). Scientific researchers over the years have been conducting researches on Nigerian medicinal plants along various disease states with the available infrastructural facilities at their disposal.

MATERIALS AND METHODS

Data for this survey were generated from the book of abstracts of published research findings on Nigerian medicinal plants and traditional medicine practices for 35 years (1970-2005). Out of a total of 1050 abstract of published research findings, 702 research works were on biological areas. These were then categorized along disease states where the efficacies of the herbal preparations were established. Then the number of research findings in each disease area was determined and computed as a percentage of all research outputs for the period under review. The percentages were ranked in a decreasing order of magnitude.

RESULTS AND DISCUSSION

As shown in Table 1, the high points in herbal medicine R and D activities within the period under investigation are in anti-infective drugs or anti-microbial drugs (32.48%), Gastro-Intestinal Tract (G.I.T) drugs (9.69%), analgesics, antipyretics and non-steroidal anti-inflammatory agents (8.69%) cardiovascular agents (5.41%), toxicity studies (5.27%), hypoglycemic agents (4.27%) and molluscicidal (3.85%).

Other areas where research activities were moderately undertaken are in oxytocic agents (2.85%), dermatological agents (2.71%), insecticide (2.42%), anesthetics (2.28%), drugs affecting the blood (2.28%) and tranquillizers (2.14%).

Areas that were least researched into are anti-convulsants (1.57%) anti-viral agents (1.57%), hypatoprotective agents (1.28%), psychotherapeutic drugs (1.00%), anti oxidants (1.00%), hormones (0.85%), respiratory system drugs (0.43%), diuretics (0.43%) dental agents (0.43%) and hemorrhoids (0.14%). The above three classified research levels with respect to research intensities represent the biological area.

However, the isolation and characterization of natural products from Nigerian medicinal plants without biological testing yielded several compounds of novel structure and constituents which could serve as templates or precursors for the development of new drugs in the areas where much research in terms of drug development has not been adequately carried out.

In Table 1, the pattern of research outputs is skewed in favour of anti-infective drugs, G.I.T drugs among others. This may be due to the rate of occurrence or the preponderance of certain diseases that are common or endemic among Nigerian population. This may also have triggered a plethora of research interests into such areas with the hope of finding new and improved method of

Table 1: Categorization of herbal medicines discovered through scientific research on medicinal plants and traditional medicine practices in Nigeria (1970-2004)

Disease state	Number of scientific research results published N = 702 = 100%	Percent	Rank
Anti-infective drugs	228	32.48	1
Gastro Intestinal Tract (G.I.T drugs)	68	9.69	2
Analgesics, antipyretics and non-steroidal anti inflamatory agents	61	8.69	3
Cardiovascular drugs	38	5.41	4
Toxicity/toxicology	37	5.27	5
Antidiabetics/hypoglycemics	30	4.27	6
Molluscicidal	27	3.85	7
Antineoplastic and immunosuppressive drugs	27	3.85	7
Oxytogic	20	2.85	8
Dermatological drugs	19	2.71	10
Insecticide/insect repellant/insect control	17	2.42	11
Anesthetics	16	2.28	12
Drugs affecting the blood	16	2.28	12
Tranquilizers/antxlolytic drugs	15	2.14	14
Anti-viral	11	1.57	15
Anti-convulsants	11	1.57	15
Antihepatotoxic/hepatoprotective	9	1.28	17
Phychotehrapeutic drugs	7	1.00	18
Anti-oxidants/cytoprotective	7	1.00	18
Homones	6	0.85	20
Immunolgicals (antisnake venom)	4	0.57	21
Anti-allergics	3	0.43	22
Dental drugs	3	0.43	22
Diuretics	3	0.43	22
Respiratory system drugs	3	0.29	22
Ophthalmological drugs	2	0.28	26
Poisoning	2	0.14	27
Neurological disorders	1	0.14	28
Ear Nose and Throat (ENT) drugs	1	0.14	28
Haemorhoids/pile/lubricant	1	0.14	28
Bone healing	1	0.14	28
Wound healing	1	0.14	28
Learning condition	1	0.14	28
Insect attraction	1	0.14	28
Hirudicinal activities	1	0.14	28
Proriasis	1	0.14	28
Pharmacokinetic study	1	0.14	28
Anti nutrition	1	0.14	28
Anti bilirubin	1	0.14	28

Computed from book of abstracts of published research findings on Nigerian medical plants and traditional medicine practices. Vol. 1 (2005)

obtaining lasting cure. Secondly, it would be as a result of inadequate infrastructural facilities needed to conduct researches in other areas. Again, the nature and type of in-house R and D, the availability of funds, chemicals, analytical materials and even technical know-how of research personnel may limit the scope of research activities too. The wisdom in treading along known part or by concentrating research activities within or around certain established areas may be informed by the need to minimize risk or failure, gain time and perhaps increase the probability of achieving better results by improving on past performances. Meanwhile, in doing so the possibility of duplicating research effort or results is indeed high. Lack of mentorship could also pose a big challenge. If there were no personnel to teach, guide and direct researchers on how to conduct researches into unfamiliar areas that are posing big health problems such as HIV/AIDS then not much research activities would take place in such areas.

CONCLUSION

This study is set out to establish the trend in research into Nigerian medicinal plants and traditional medicinal practices. An understanding of this trend is critical for the design of policies guiding research in herbal medicinal plants and traditional medicinal practices. However, there is need for further study especially in vital areas that have recorded less research outputs.

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