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Original Research

Herbal medicines supplied by community pharmacies in Lagos, Nigeria: pharmacists' knowledge

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ABSTRACT[*]

Background: The use of herbal medicines is on the increase globally and they are usually supplied in pharmacies as non-prescription medicines. Pharmacists are, therefore, responsible for educating and informing the consumers about rational use of herbal medicines.

Objectives: To evaluate the knowledge of pharmacists in Lagos, Nigeria with regards to the herbal medicines they supplied by their pharmacies.

Methods: Pharmacists in charge of randomly selected 140 community pharmacies from 20 Local Government Areas in Lagos were required to fill out a self-administered questionnaire. We gathered information on their knowledge of the indications, adverse effects, potential drug-herb interactions and contraindications of the herbal medicines they supply in their pharmacies.

Results: Of the 140 questionnaires distributed, 103 (72.9%) participants completed the questionnaire appropriately. The majority (74; 71.8%) of the participants were males and 36-50 years (56; 54.4%). The pharmacies supplied mostly Yoyo cleanser bitters® (101; 98.5%), ginseng (97; 98.5%), Jobelyn® (91; 88.3%), Ciklavit® (68; 66.6%), gingko (66; 64.1%), herbal tea (66; 64.1%), and Aloe vera (57; 55.3%). The pharmacists self-rated their knowledge of herbal medicines mostly as fair (39%) and good (42%), but they exhibited poor knowledge with regards to the indications, contraindications and safety profiles. Seventy participants consulted reference materials such as leaflet insert in the herbal medicines (56%) and internet (20%) before supplying herbal medicines. The information most frequently sought was herb-drug interactions (85%), contraindications (75%) and adverse effects (70%).

Conclusions: Community pharmacists need to be informed about the indications and safety profiles of herbal medicines.

Keywords: Phytotherapy; Herbal Medicine; Herb-Drug Interactions; Pharmacies; Pharmacists; Health Knowledge, Attitudes, Practice; Nigeria

PLANTAS MEDICINALES SUMINISTRADAS POR FARMACIAS COMUNITARIAS EN LAGOS, NIGERIA: CONOCIMIENTO DE LOS FARMACÉUTICOS

RESUMEN

Antecedentes: El uso de plantas medicinales está en aumento en todo el mundo y son vendidas en farmacias comunitarias como medicamentos sin receta. Los farmacéuticos son, por tanto, responsables de educar e informar a los consumidores sobre el uso racional de las plantas medicinales.

Objetivos: Evaluar el conocimiento de los farmacéuticos de Lagos, Nigeria sobre las plantas medicinales suministradas en sus farmacias.

Métodos: Se pidió a los farmacéuticos encargados de 140 farmacias comunitarias aleatoriamente seleccionadas en las 20 áreas de Gobiernos locales de Lagos que rellenasen un cuestionario auto-administrado. Recogimos información sobre su conocimiento de las indicaciones, efectos adversos, potenciales interacciones planta-medicamento y contraindicaciones de las plantas medicinales que suministraban en sus farmacias.

Resultados: De los 140 cuestionarios distribuidos, 103 participantes (72,9%) lo completaron adecuadamente. La mayoría (74; 71,8%) de los participantes eran hombres y tenían entre 36-50 años (56; 54,4%). Las farmacias suministraban en su mayoría Yoyo cleanser bitters® (101; 98,5%), ginseng (97; 98,5%), Jobelyn® (91; 88,3%), Ciklavit® (68; 66,6%), gingko (66; 64,1%), herbal tea (66; 64,1%), and Aloe vera (57; 55,3%). Los farmacéuticos auto-calificaron su conocimiento sobre plantas medicinales mayoritariamente como escaso (39%) y bueno (42%), pero demostraron poco conocimiento en relación a las indicaciones, contraindicaciones y perfiles de seguridad. 70 participantes consultaban materiales de referencia como los prospectos (56%) e Internet (20%) antes de suministrar una planta medicinal. La información vista más frecuentemente fueron las interacciones planta-medicamento (85%), contraindicaciones (75%) y efectos adversos (70%).

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Conclusiones: Los farmacéuticos comunitarios necesitan más información sobre indicaciones y perfiles de seguridad de las plantas medicinales.

Palabras clave: Fitoterapia; Plantas medicinales; Interacciones de Planta-Medicamento; Farmacias; Farmacéuticos; Conocimientos, Actitudes y Práctica en Salud; Nigeria

INTRODUCTION

Herbal medicines have emerged as a common choice therapy for self-care among individuals who are now taking a more active role in their health care.[1] In addition, irrational claims or advertisements by manufacturers, through different mass media, have enhanced the widespread use of herbal medicines among the general population in developing countries.[2] According to the World Health Organization (WHO), herbal medicines are medications prepared from one or more herbs or plant parts (roots, stem bark, seeds and/or fruits).[3] Many patients use a wide range of herbal medicines in addition to their conventional medicines.[2,4] In Africa, herbal medicines are often used primarily to treat HIV/AIDs[5], and sickle cell anaemia, asthma and epilepsy.[2] Quite a number of the herbal medicines are not well researched and their formulation and sales are poorly regulated. They may be adulterated and potentially at risk for producing adverse effects and toxicity.[2] Concomitant use of herbal and conventional medicines has resulted in a coagulation problem manifesting as postoperative bleeding.[6] Adulteration of an herbal medicine with diazepam was responsible for sedation of a pre-operative patient in India.[7] It also has been documented in the literature that pre-operative use of herbal medicines was responsible for a prolonged or inadequate anaesthesia in surgical patients.[7]

Globally, community pharmacists are a major supplier of complementary herbal medicines. They, therefore, have an important role to play in the use of herbal medicines procured by their customers since the products are sold mostly as over-the-counter (OTC) medicines in many countries.[8] In addition, patients often seek advice and information on medicines, including herbal medicines, from pharmacists.

Previous studies from Nigeria, Kuwait, United Arab Emirates, Oman, and Australia have shown that most community pharmacists did not possess adequate knowledge of potential interaction profiles and side effects of the herbal medicines they supplied.[9-13] There is also evidence to suggest that the knowledge of community pharmacists is inadequate with regards to counselling patients on herbal medicines.[14] Herbal medicines are integral part of complementary medicines (CMs).[15] Studies in Australia, the United Kingdom, the United States of America and Singapore have all indicated that pharmacists rate their knowledge and ability to counsel consumers on CMs as inadequate.[13,16-19] Many factors are responsible for this lack of knowledge. Among the factors is non- mandatory implementation of CM teaching into pharmacy courses and variation in the extent to which it is thought.[20,21] A high positive correlation between educational exposure and perceived usefulness of CMs has been documented in the literature.[22] Despite varied teaching, there is a strong interest in learning more about CMs by both undergraduate pharmacy and medical students.[22-24] Other compounding factors include lack of accurate and easily accessible information, including good patient resources.[14] Pharmacists are interested in integrated non-biased and evidence-based information about herbal medicines[14,25], but available resources may not be accurate to provide this information. Studies have indicated leaflet or package insert of herbal medicines, undergraduate pharmacognosy lecture notes, textbooks, magazine, drug sales representatives, and internet as the likely sources of information about herbal medicines for community pharmacists.[9-13]

The National Agency for Food and Drug Administration and Control (NAFDAC) Act 1993, as amended in 2005, prohibits the manufacture, importation, exportation, distribution, advertisement or sale of any herbal medicine or related product unless it is appropriately labelled and registered as required by the agency.[26] The regulation stipulates that herbal medicines and related products labelling should be informative and accurate, not promotional in tone, not misleading or provide a false claim. The agency requires that adequate information about an herbal medicine should appear on its package insert. These include description of the product; description of its clinical pharmacology, indications and usage, contraindications, warnings against misuse, precautions, dosage and administration, adverse reactions, abuse and dependence, symptoms of over dosage and antidote; description of how it is supplied. The labelling should also describe the animal pharmacology, toxicology, clinical studies, storage conditions, and references of the herbal medicines.

Despite the detailed information required by NAFDAC on herbal medicine package inserts, most pharmacists in Nigeria remained inadequately prepared academically to meet the information needs of patients on herbal medicines since they were not formally taught this topic in schools of pharmacy.[9] In order to give advice to patients, pharmacists must be knowledgeable about the indications, dosing, adverse effects, toxicity, and potential interactions of herbal medicines with conventional medicines. The present study, therefore, aimed to evaluate the knowledge of community pharmacists in Lagos, Nigeria, about the herbal medicines they supply in their pharmacies.

METHODS

The study was conducted between 1st January and 31st March, 2012. Community pharmacies were selected from a list of Association of Community Pharmacists of Nigeria (ACPN) in Lagos State available as at 31st December, 2011. Of the 540 community pharmacies with valid ACPN licence in 2011, only 220 had renewed their licence for the

year 2012. All the licensed community pharmacies are operated by pharmacists who were registered and licensed by the Pharmacists Council of Nigeria (PCN).

Inclusion criteria include registered community pharmacies with a valid 2012 ACPN licence, and community pharmacies with a pharmacist in attendance for at least 8 hours daily. Rural community pharmacies were excluded because they were often run by a pharmacy technician.

Among the community pharmacies with a valid 2012 ACPN licence, 140 were randomly selected from 20 Local Government Areas (LGAs). Firstly, the location of the pharmacies was stratified into 20 LGAs in order to cover the whole of Lagos State. Secondly, because the pharmacies were not evenly distributed across the LGAs, we randomly selected a total of 7 pharmacies from each LGA. Pharmacies with branches or other outlets were counted as one and only one of its outlets was selected for the study. In cases where more than one pharmacist was available in the pharmacy only one was allowed to participate in the study.

Sample size determination

Raosoft® sample size calculator was used to determine the sample size.[27] A sample size of 140 was calculated from the 220 community pharmacies with valid 2012 ACPN licence during the study period using 5% error margin at 95% confidence interval, assuming 50% of the participants responded.

Study design and data collection

Data collection was carried out using a structured self-administered questionnaire, purposely designed for this study (See: online supplementary material). The questionnaire was developed from the previous studies that explored herbal medicine knowledge of community pharmacists in Nigeria and other developing as well as developed countries.[9-19] The questions were mainly close-ended or multiple-choice with some open-ended.

The questionnaire was designed to obtain demographic data including age, gender, year of qualification, and years of practice of the community pharmacist. It also sought the relevant information on the types of herbal medicine they supply in the pharmacy and their indications. Participants were required to select the herbal medicines from a pre-determined list, and also to suggest others that were not included on the list. They also were required to list the indications for the herbal medicines. Other sections of the questionnaire sought the knowledge base of the community pharmacists on the uses, contraindications and potential drug–herb interaction; and relevant training received on the use of herbal medicines. They also were required to rate their knowledge on a 5-point Likert scale (always, regularly, occasionally, rarely, or never). Information was also sought about the participants' perceived professional responsibilities towards herbal medicines use by their customers.

In this study, we differentiated herbal medicines from mega-dose vitamins and minerals by defining herbal medicines as a refined or raw extract from a plant origin. Based on this definition, multivitamin and mineral supplements were excluded as herbal medicines. Included in the herbal medicine lists are multivitamin or mineral supplements containing herbs (Gingko biloba and ginseng of any origin), and any medicinal products containing refined or raw plant parts (leaf, stem, root, fruit, or seed).

The questionnaires were given (person-to-person) to the selected participants to be filled in their respective pharmacies without consulting any reference material. The name of the pharmacy or pharmacist was not requested on the questionnaire to ensure anonymity of the participants. The pharmacists were informed that their responses would help in determining whether there was an adequate training or there was a need for an additional training for pharmacists in the area of herbal medicines. The pharmacists were also informed that willingness to participate in the study was taken as consent.

The questionnaires were pre-tested among five experienced registered community pharmacists in the LGAs that were not included in the study. Responses obtained were used to modify the pre-determined list of herbal medicines and knowledge of the pharmacists.

Ethical considerations

The study was approved by the ethics committee of the Pharmacist Council of Nigeria.

Data analysis

Statistical analysis of the results was performed using the Statistical Package for the Social Sciences (SPSS), version 16. The data on demographics, the types of herbal medicines supplied by the community pharmacies as well as the pharmacists' knowledge of herbal medicines, were analysed using simple descriptive statistics. Comparisons between the gender (male or female), age (≤40 or >40 years), duration of qualification (≤10 or >10 years) or duration of practice (≤10 or >10 years) of the pharmacists and their self-rated general knowledge of herbal medicines or self-rated knowledge of specific herbal medicines was made using the Pearson Chi-squared test at 5% level of significance.

Table 1. Demographics of the community pharmacists in Lagos, Nigeria

Parameters	Frequency
Gender	
Male	74 (71.8%)
Female	29 (28.2%)
Age (years)	
20-35	24 (23.3%)
36-50	56 (54.4%)
51-65	18 (17.5%)
Over 65	5 (4.8%)
Median year of qualification (range)	13 (2-42)
Median duration of practice in years (range)	10 (1-35)
Additional qualification	
None	87 (84.5%)
Fellowship	8 (7.8%)
Master degree	5 (4.8%)
Diploma	2 (1.9%)
Doctorate degree	1 (1.0%)

Table 2: Types of herbal medicines supplied by the community pharmacies in Lagos, Nigeria, and number of pharmacies supplying.

Herbal remedy* (*Latin names of the components*)	Main indication(s)**	Number of pharmacies (%)
Yoyo Cleanser bitters® *(Aloe vera, Acinus avensis, Chenopodium murale, Citrus aurantofolia, Cinamomum aromaticum)*	Improves digestion, boosts immune system, prevents chronic fatigue	101 (98.5)
Ginseng *(Panax ginseng)*	Provides energy and prevents fatigue, improves cognitive function, for treating inflammation, cancer prevention, and for treating erectile dysfunction	97 (93.2)
Jobelyn® *(Sorghum bicolour* Moench leaves, *Parquetina nigrescens, Harungana madagascariensis, Anacardium occidentale, Waltheria indica)*	Treatment and prevention of stroke, increases CD4 count in HIV infected patients, boosts blood cells, improves the general well-being of a patient, and for treating arthritis	91 (88.3)
Ciklavit® *(Cajanus cajan)*	Use in the effective management of pain crisis in sickle cell disease	68 (66.6)
Ginkgo *(Ginkgo biloba)*	For treating memory disorders (Alzheimer's disease), disorders related to reduced blood flow in the brain, especially in older people, difficulty in concentrating, mood disturbances, and hearing disorders. Also use for treating problems related to poor blood flow in the body, including leg pain when walking (claudication), and Raynaud's syndrome (a painful response to cold, especially in the fingers and toes).	66 (64.1)
Herbal tea *(Cassia senna*, *Cassia angustifolia*, *Sennae folium)*	Use to calm and relax the mind, prevention of heart diseases, promotes digestion, promotes wellness, boosts the immune system, and prevents cold.	66 (64.1)
Aloe vera *(Aloe barbadensis)*	Oral Aloe gel is used for treating osteoarthritis, bowel diseases including ulcerative colitis, fever, itching and inflammation, and to increase blood level. It is also used for gastric ulcers, diabetes, asthma, and for treating some side effects of radiation treatment. Topical aloe gel for skin conditions including burns, sunburn, frostbite, psoriasis, and cold sores. Others uses include surgical wounds and bedsores.	57 (55.3)
Yemkem ® products (FJK flusher) *(Cassia alata, Citrus medica var. acida, Aloe barbaris, Aloe vera, Cassia augustifolia vahl, Cassia siamea, Khaya senegalensis, Xylopia aethiopica, Gongronema latifolium, Khaya grandifolia, Moringa lucida, Anthocleista djalonensis, Citrullus var. lanatus)*	Supports virtually every function in the body including; vision, liver, kidney, heart, cardiovascular and healthy hair and nails. Use for energizing the body metabolism, boosts the immune system.	31 (30.1)
GNLD® products (herbal rest and relax) *(Hypericum perforatum, Passiflora incarnata, Verbena officinalis, Matricaria recutita, Schisandra chinensis, Scutellaria lateriflora Melissa officinalis, Turnera diffusa)*	Relaxes the body system and/or a promotes good night sleep	23 (22.3)
Forever living products® (Forever lite) Soybean oils, brewer's yeast, guar gum, beta carotene, tocopherol, soy lecithin, chromium yeast, spirulina *(Arthrospira platensis* and *Arthrospira maxima*)	Promotes healthy living and age re-new	21 (20.4)
Alomo bitter® African breadfruit (*Treculia africana* Decne. Ex Trécul), stem bark of African mahogany (*Khaya ivorensis* A. Chev.)	Prevents high blood sugar level, cleanses the body systems, and increases libido	18 (17.5)
Tianshi® product (Capsilite) Capsaicin extract, anhydrous caffeine, black pepper extract, nicotinamide (vitamin B_3)	helps burn fat and inhibits the growth of fat cells, accelerates calorie burning stimulates the oxidation of fats and carbohydrates, reduces appetite, and improves performance and endurance	16 (15.5)
Echinacea *(Echinacea angustifolia)*	Used primarily to treat or prevent cold. It is also used against many other infections including urinary tract infections, vaginal candidiasis, genital herpes, sepsis, and tonsillitis.	10 (9.7)
Oroki herbal mixture® Stem bark of African mahogany (*Khaya ivorensis* A.Chev.) tree, pattern wood (Alstonia congensis Engl.), mango (*Mangifera indica* L.) leaves, Sorghum (*Sorghum bicolour* Moench)	It is traditionally used for pile, dysentery, constipation, fibroid, diarrhoea, bloody stool, abdominal and waist pain, and haemorrhoid.	9 (8.7)
St John's wort *(Hypericum perforatum* L.)	Improves mood, and decreases anxiety and insomnia related to depression.	6 (5.8)
Valerian *(Valeriana officinalis* L.)	Valerian seems to improve the sleep quality of people who are withdrawing from the use of sleeping pills	6 (5.8)

Table 2: Types of herbal medicines supplied by the community pharmacies in Lagos, Nigeria, and number of pharmacies supplying.		
Ajase poki-poki® Tobacco (*Nicotiana* L.) leaves, stem bark of coconut (*Cocos nucifera* L.), seeds and coat of alligator pepper (*Aframomum melegueta* K.Schum.)	Used to treat diarrhoea, abdominal upset, dysentery, pile, constipation, decreased libido and weak erection.	4 (3.9)
*Only one brand of each of the products is manufactured and available at all the pharmacies surveyed **Indications were obtained from the package insert of the herbal medicines		

RESULTS

All the 140 questionnaires distributed were responded to but only 103 (73.6%) were completed appropriately. The 103 questionnaires were those analysed in this study. The demographics of the respondents are presented in Table 1. More males than females appropriately responded to the questionnaires. Majority of the pharmacist had no additional qualification.

Table 2 shows the types, composition, indications, and frequency distribution of the pharmacies that supplied the herbal medicines. The pharmacies supplied mostly Yoyo cleanser bitters® (101; 98.5%), ginseng (97; 98.5%), Jobelyn® (91; 88.3%), Ciklavit® (68; 66.6%), gingko (66; 64.1%), herbal tea (66; 64.1%), and Aloe vera (57; 55.3%).

It was self-reported by the pharmacists that more males (57; 53.3%) than females (46; 44.7%) purchased the herbal medicines. The herbal medicines were purchased for the use of middle-aged adults (61; 59.2%), elderly (29; 28.8%) and children (13; 10.0%).

The pharmacists rated their knowledge of herbal medicines as excellent (4%), very good (9%), fair (39%), and good (42%). They also were of the opinion that herbal medicines may be effective (39; 37.9%), fairly effective (19; 18.4%), or very effective (14; 13.6%). Although, all the herbal medicines supplied by the pharmacies were approved by the NAFDAC, yet the majority of the pharmacists (71; 68.9%) were uncertain about their safety. However, 19 (18.4%) considered them to be harmless, while 13 (12.4%) believed that they may be harmful.

The self-rated knowledge of the community pharmacists with regards to the uses and potential adverse effects of some of the herbal medicines is presented in Table 3. Most of the respondents were in agreement with the general questions on herbal medicines. However, the respondents either generally disagree or uncertain about the answers to the questions on specific herbal medicines.

There was no significant association between the gender of the pharmacists and their self-rated general knowledge of herbal medicines (P=0.182) or self-rated knowledge of specific herbal medicines (P=0.091) they supplied. Pharmacists older than 40 years appeared to self-rate their general knowledge of herbal medicines higher than those who were 40 years and below (P=0.021). However, there was no significant difference in their self-rated knowledge of the specific herbal medicines (P=0.262). In contrast, pharmacists who qualified over 10 years self-rated their general knowledge of herbal medicines (P=0.012) and knowledge of specific herbal medicines (P<0.01) higher than those who qualified 10 years and below. Similarly, pharmacists who have practiced for 10 years and above self-rated their general knowledge of herbal medicines (P<0.01) and knowledge of specific herbal medicines (P<0.01) higher than those who have practiced for 10 years and below.

Table 4 shows the information sought by the community pharmacists from the buyers of herbal medicines. Although herbal medicines are sold at the pharmacies as over the counter medicine (OTC), yet over half of the pharmacists always or regularly enquired about who prescribed the herbal medicines before they were supplied. Similarly, over half of the respondents always or regularly counselled the users about the administration and potential adverse effects of the herbal medicines supplied. Many of the pharmacists occasionally, rarely or never took the medical or medication history of the potential herbal medicine users. Similar trend was observed with consulting

Table 3: Self-rated knowledge of indications and potential adverse effects associated with herbal medicines supplied by community pharmacists in Lagos, Nigeria					
Question	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
Herb-herb interaction may occur with herbal medicine use	43 (41.7%)	43 (41.7%)	15 (14.6%)	2 (1.9%)	-
Herb-drug interaction may occur when herbal medicine is used with a conventional medicine	55 (53.4%)	38 (36.9%)	9 (8.7%)	1 (1.0%)	-
Herbal medicine may be contraindicated in pregnancy	60 (58.3%)	31 (30.1%)	10 (9.7%)	1 (1.0%)	1(1.0%)
Yoyo cleanser bitters® is an immune booster	7 (6.8%)	12 (11.6%)	52 (50.5%)	27 (26.2%)	5 (4.9%)
Ginseng may increase blood pressure at normal dose	9 (8.7%)	22 (21.4%)	50 (48.5%)	18 (17.5%)	4 (3.9%)
Ginseng is contraindicated in diabetes mellitus	3 (2.9%)	12 (11.6%)	59 (57.3%)	23 (22.3%)	6 (5.8%)
St John's wort is used for controlling mild to moderate hypertension	6 (5.8%)	10 (9.7%)	81(78.6%)	3 (2.9%)	3 (2.9%)
St John's wort may increase digoxin blood level	4 (3.9%)	9 (8.7%)	85 (82.5%)	3 (2.9%)	2 (1.9%)
Ginkgo may delay onset of dementia	-	1 (1.0%)	62 (60.2%)	22 (21.4%)	18 (17.5%)
Ginkgo may increase the risk of bleeding when used concurrently with warfarin	13 (12.6%)	22 (21.4%)	61 (59.2%)	5 (4.9%)	2 (1.9%)
Valerian should be used with caution in a patient on benzodiazepines	-	9 (8.7%)	84 (81.6%)	8 (7.8%)	2 (1.9%)

Table 4: Information sought by the community pharmacists before supplying herbal medicines

Question	Always	Regularly	Occasionally	Rarely	Never
Pharmacists enquired about herbal medicine prescriber	22 (21.4%)	31 (30.1%)	28 (27.2%)	19 (18.4%)	3 (2.9%)
Medical history taken from the buyers	18 (17.5%)	29 (28.2%)	36 (35.0%)	15 (14.6%)	5 (4.9%)
Medication history taken from the buyers	17 (16.5%)	27 (26.2%)	38 (36.9%)	16 (15.5%)	5(4.9%)
Consult referenced materials before supplying herbal medicines	13 (12.6%)	16 (15.5%)	41 (39.8%)	22 (21.4%)	11 (10.7%)
Counsel buyers about administration of the herbal medicine supplied	36 (35.5%)	31 (30.1%)	21 (20.4%)	8 (7.8%)	7 (6.8%)
Counsel buyers about the potential adverse effects of herbal medicines	25 (24.3%)	33 (32.0%)	26 (25.2%)	13 (12.6%)	6 (5.8%)
Pharmacists have ever recommended herbal medicines to buyers	4 (3.8%)	14 (13.6%)	27 (26.2%)	20 (19.4%)	37 (35.9%)
Pharmacists ever received complaints of adverse reaction to herbal medicines from the users	14 (13.6%)	9 (8.7%)	21 (20.4%)	26 (25.2%)	32 (31.0%)

reference materials before supplying herbal medicines, recommending herbal medicines to buyers, and receiving adverse reaction reporting to herbal medicines from the buyers.

Among the 70 pharmacists who had consulted a reference material before supplying herbal medicines, leaflet insert in the herbal medicines pack (56%), followed by internet (20%), were the two major sources of information (Figure 1). The most frequently sought after information is related to the safety of the herbal medicines, which included drug interactions (85%), contraindications (75%) and adverse effects (70%).

DISCUSSION

A wide range of herbal medicines were supplied by the community pharmacies in this study. They included the locally produced (Yoyo cleanser bitters®, Jobelyn®, Ciklavit®, herbal tea, Yemkem® products, Alomo bitter®, Oroki herbal mixture®, and Ajase poki-poki®) and the imported (ginseng, gingko, Aloe vera, GNLD® products, Forever Living products®, Tianshi® products, Echinacea, St. John's wort and valerian) herbal medicines. While efficacy and safety data for some of the imported herbal medicines are available in the literature to guide their use[28-31], such data are lacking for the locally produced herbal medicines. The efficacy and safety of the locally produced herbal medicines supplied by the community pharmacies need to be ascertained by the NAFDAC. Such certification would need to be disseminated to the general populace, through mass media and public enlighten programmes. Although, animal studies were undertaken on the safety of Jobelyn® and Yoyo cleanser bitters® when used at recommended doses[32,33], a randomised clinical trial is required in human to corroborate this claim.

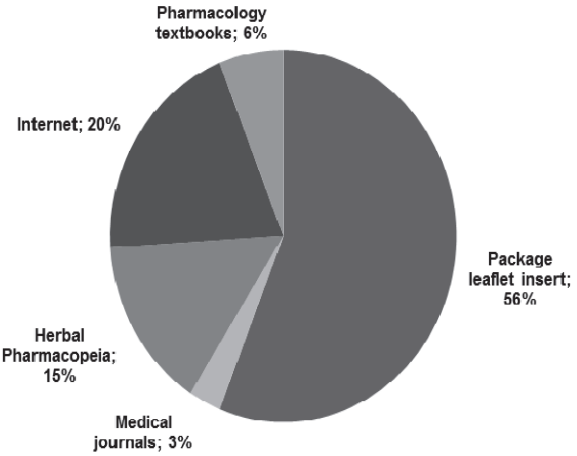

Figure 1. Major sources of herbal medicines information for pharmacists.

Yoyo cleanser bitters®, ginseng and Jobelyn® were the three most commonly supplied herbal medicines, followed by Ciklavit®, ginkgo, herbal tea, and Aloe vera. This was in contrast to the ivy leaves extract and ginseng that were commonly supplied by the community pharmacies in Oman.[12] Findings from our study also were different from the ginseng, gingko, valerian and St. John's wort that were commonly supplied by the community pharmacies in Saudi Arabia.[34] Herbal medicines were procured for use by middle-aged adults and the elderly. This trend was similar to the report in Oman.[12] There is an increasing burden of chronic illnesses such as hypertension, diabetes and HIV/AIDs among the middle-aged adults which defy permanent cure.[35] Aging is associated with an increased risk of pathological changes that may culminate into cancer, cardiovascular disease, dementia, diabetes, and osteoporosis.[36] These chronic diseases are currently incurable. The desire of the middle-aged adults and the elderly for a permanent cure of the chronic diseases may have accounted for their increased use of the herbal medicines. Schoenberg et al reported that about 50% of African Americans, Hispanics, Native Americans, and rural whites with diabetes in the USA were using herbal medicines.[37] Among this group of patients, long reliance on herbal medicines was sometimes responsible for the delayed diagnosis of their chronic illness.

The pharmacists rated their knowledge of herbal medicines as good (42%) and fair (39%). This was similar to the findings among the community pharmacists in Kuwait[10] and Estonia[38] but contrasting to the findings in the previous studies in Australia[13], the United Kingdom[16], the United States[17] and Singapore[18] where the pharmacists self-rated their knowledge and ability to appropriately counsel patients on herbal medicines as inadequate. This may reflect cultural differences

in the perception of herbal medicines by the pharmacists. In contrast to our findings, Adisa and Fakeye[9] assessed the knowledge of community pharmacists about the commonly supplied herbal medicines in south-western Nigeria and reported that only 26% of their surveyed participants had a good knowledge of the indications, adverse effects and potential interactions of their supplied herbal medicines. This suggests that, even within a country, knowledge of herbal medicines may vary among community pharmacists in different states or provinces.

Five herbal medicines (Yoyo cleanser bitters®, ginseng, St. John's wort, gingko, and valerian) were selected to objectively assess the knowledge of the pharmacists about the safety of herbal medicines (Table 2). Over 80% of the respondents either strongly agreed or agreed to herb-herb interaction occurring with herbal medicines, and herb-drug interaction occurring when an herbal medicine was used with conventional medicines. These were in agreement with the various studies that have documented adverse interactions of herbal medicines with other herbal products or conventional medicines.[29,30] Despite the safety concerns for herbal medicines documented in the literature[36], only about 40% of the participants in our study always or regularly take the medical or medication history of the potential users. This was lower than the 93.8% of the community pharmacists in rural Australia who agreed to regularly taking medication history before supplying complementary and alternative medicines including herbal medicines.[13] Failure to take medication history may put the potential herbal medicine users at risk of an adverse herb-herb or herb-drug interactions.

Despite the numerous data that are available on the indications and adverse effects of the five herbal medicines in this study[20-25,38], a very low percentage of the participants correctly agreed that Yoyo cleanser bitters® was an immune booster. An equally low percentage correctly disagreed that St. John's wort was a mild to moderate antihypertensive, and correctly agreed to ginkgo preventing dementia. Less than 30% of the participants correctly agreed to ginseng as a potential blood pressure elevator when used at normal dose. A much lower percentage of the participants correctly agreed to the contraindication of ginseng in diabetes mellitus, correctly disagreed to the increased digoxin blood level by St. John's wort, and correctly agreed to using valerian with caution in a patient on benzodiazepines. In contrast, about 40% of the participants correctly agreed to the increased risk of bleeding when ginkgo was used concomitantly with warfarin. A similar study among the community pharmacists in Oman has demonstrated a good knowledge of the indications, adverse effects and contraindications of ginseng and St. John's wort among 80% of the participants.[12] However, similar to our findings, community pharmacists in Kuwait[10] and Saudi Arabia[34] had demonstrated a poor knowledge of the indications, contraindications, interactions and adverse effects of herbal medicines which included ginseng, gingko, and St. John's wort. These findings would suggest that the practical knowledge of our respondents was not in agreement with their self-rated knowledge of the herbal medicines. Such disparity in self-rated knowledge and objectively assessed knowledge of herbal medicine has been reported among the community pharmacists in Kuwait[10] and Estonia.[39] As a means of changing the present situation, continuous education that is focused on evidence-based use of local and imported herbal medicines, should be a requisite for renewal of the annual practising licence of community pharmacists in Nigeria.

The participants relied mostly on the leaflet or package insert of the herbal medicines. This is an inappropriate practice as the safety information provided may be inadequate or inaccurate. Raynor *et al*. evaluated the information provided with herbal medicines (garlic, ginkgo and Asian ginseng, St. John's wort, and Echinacea) available over the counter in the United Kingdom to know if they can enable safe use.[40] They found that 75% of the 68 herbal medicines contained none of the important safety information needed by consumers for safe use. Internet and the herbal pharmacopoeias were the other sources of information used by the participants in this study. This was in contrast to the many pharmacists in Oman[12] and Kuwait[10] who relied mostly on their undergraduate pharmacognosy lecture notes, followed by textbooks and magazines for herbal medicine information. Our findings also were in contrast to the pharmacists in the United Arab Emirates who mostly sourced herbal medicine information from drug sales representatives.[11] Fewer participants (20%) in the current study than in the Omani study (30%) made use of the internet as a source of herbal medicine information. This may have resulted from inadequate access to the internet in Nigeria. Internet and Monthly Index of Medical Specialties[13]; Physicians' Desk Reference for Herbal Medicines and The Review of Natural Products[41]; and internet, package inserts, pamphlets or brochures, and pharmacology textbooks[42] were the sources of herbal medicine information utilised by the pharmacists in the previous studies. Some of these information resources were less utilised in the current study. The herbal medicine safety information most frequently sought in this study included drug interactions, contraindications and adverse effects. These were similar to the safety information sought by the community pharmacists in Australia[13], south-western Nigeria[9], and the United States.[17]

Self-reporting surveys are characterised by limitations as tools for investigating knowledge, attitude and practice. Participants were self-selected and response bias may have occurred from the participants who displayed greater self-rated knowledge of herbal medicine. Imported herbal medicines, except Yoyo cleanser bitters®, were used to objectively assess the participants' knowledge of the safety profiles of herbal medicines because of their available safety information documented in the literature. The knowledge of the safety profiles may differ if local herbal medicines were used for illustration. The generalisability of the

results to the entire pharmacists in Lagos State is limited as rural pharmacies were excluded from the survey. This study also was limited to the community pharmacists in Lagos, Nigeria and the results may not represent the entire community pharmacists in the country. A prospective multicentre study that will involve community pharmacists in the six geo-political zones is necessary to ascertain their true knowledge with regards to herbal medicines in Nigeria. A mixed method study incorporating qualitative methods such as focus groups or interviews would have enabled further data to be gathered from the participants.

CONCLUSIONS

Locally produced and imported herbal medicines are frequently supplied by most of the community pharmacies surveyed in Lagos, Nigeria. Most of the community pharmacists in charge of the pharmacies rated their knowledge of herbal medicines to be fair or good. This was in contrast with the poor knowledge they exhibited about the indications and safety profiles of the herbal medicines. Leaflet insert was the most common source of herbal medicine information utilised by the pharmacists in this study. This information resource is unreliable and may be inadequate or inaccurate in this regard. There is a need for professional development and training of the community pharmacists with regards to the indication, rational use, and safety of herbal medicines.

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CONFLICT OF INTEREST

None declared.

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