

Full Length Research Paper

Herbal medicine: a survey on the knowledge and attitude of medical students in Tamale, Ghana

Evans P. K. Ameade*, Anthony Amalba, Gideon K. Helegbe and Baba S. Mohammed

Accepted 14 January, 2015

There is an increasing usage of herbal remedies worldwide. To adequately manage safety issues associated with herbal medicines, the future physician must possess good knowledge of them. Medical students of the 2nd, 3rd and 4th year classes, totaling 284 completed a questionnaire in a cross-sectional study which assessed their knowledge and attitude towards herbal medicines. Data was analyzed using SPSS 18 and GraphPad 5.01. The respondents had good attitude ($3.365 \pm 1.069/5$ or 67.9%) but poor knowledge ($4.697 \pm 3.509/16.5$, or 28.5%). Advancing years of study had a significant effect on the students' overall knowledge of herbal medicine ($p = 0.01$). Majority of the students, 54.7% ever used herbal product with 77.5% of the users getting positive outcome of the treatment. The best known and used herb was the Neem plant (*Azadirachta indica*) used by most students to treat malaria. Although with limited knowledge, the medical students showed a high level of personal use and good attitude towards herbal medicines. Introduction of herbal medicine course in their medical curriculum should increase their knowledge and attitude so they could in the future adequately manage patients who used or intend to use herbal products together with the orthodox medicines.

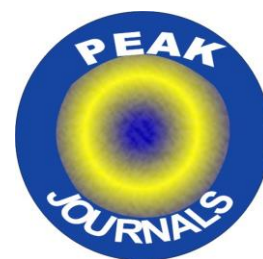
Key words: Complementary, practice, plant, Neem, malaria.

INTRODUCTION

Herbal medicines include herbs, herbal materials, herbal preparations, and finished products that contain parts of plants or other plant materials as active ingredients (Mahomoodally, 2013). According to the World Health Organization (2002), up to 80% of persons living in Africa, use traditional medicines, especially herbal medicine for their primary healthcare needs. Even, in developed countries such as the United States, herbal products have seen an increasing level of use and it is now used by approximately 20% of the population (Bent, 2008). With this high level of use of herbal medicines in both developed and developing countries, the reports of patients combining orthodox medicines with herbal products without the doctors' knowledge being on the ascendancy is not surprising (Molassiotis et al., 2005; Howell et al., 2006). For people in developing countries, high dependence on herbal medicines may be due to the ease of accessibility, affordability, availability and acceptability. With developed countries; however, the

drive for the use of herbal medicines may stem from the notion that as plants, herbs are natural hence safer than orthodox medicines (Ernst, 1998; Tamuno, 2011). Reports have shown that this 'safe' tag on herbal medicines cannot be true since several side effects have been reported following the use of herbal products (Ernst, 1998; De Smet, 2002; Bent, 2008). Neustadt (2006) reported that interaction between herbs and allopathic drugs leads to undesirable pharmacokinetic and pharmacodynamic effects. It is therefore worth noting that the overall quality of healthcare delivery especially relating to possible adverse effects of herbs and herb-drug interactions will depend on the level of knowledge and attitude that the physician will have towards herbal medicines (Clement et al., 2005). Issues of adverse effects and drug-herb interactions should be of important public health concerns because of their overall effect on human health and safety.

Various studies have been conducted on the



Department of Human Biology,
School of Medicine and Health

*Corresponding author. E-mail:
sokpesh@yahoo.com

knowledge and attitude of physicians and medical students with regards to complementary and alternative medicine (Yeo et al., 2005; Loh et al., 2012; Alrashidi et al., 2013). Few studies have however been conducted to measure the medical students' knowledge and attitude towards herbal medicine specifically. For the Ghanaian physician-in-training, greater knowledge on herbal medicine is imperative since before the patients come to the hospital, there is a high probability that they have used herbal products. Currently none of the four medical schools in Ghana have incorporated Complementary and alternative medicine into their curriculum. This study therefore measured the medical students' knowledge of and attitude towards herbal medicines.

METHODOLOGY

A cross-sectional survey was conducted among medical students of the University for Development Studies (UDS), Tamale in June 2014. A questionnaire developed based on previous studies elsewhere, was pretested among six 3rd and 4th year medical students of the university (Clement et al., 2005; Loh et al., 2012; Yeo et al., 2005; Alrashidi et al., 2013). After obtaining the approval of the Ethics committee of the School of Medicine and Health Sciences, UDS, all 2nd, 3rd and 4th year students were invited to complete the final questionnaire (students involved in pretesting were excluded). Whereas, the 2nd year class was administered the questionnaire after a block examination, the 3rd and 4th year students filled the questionnaire before a lecture session. After a free and informed consent was obtained, all respondents were allowed at least 20 min to complete the questionnaire.

The questionnaire had 3 segments which assessed the students' knowledge, attitude and their patronage of herbal medicine. Five of the eight questions which measured knowledge were closed ended questions with a 'yes' or 'no' option while one of the three open ended question requested respondents to identify five African or Ghanaian herbs and diseases or conditions they are most commonly used to treat. The maximum score for knowledge was 16.5. Five closed ended questions also with 'yes' or 'no' options assessed students' attitude (maximum score, 5). Patronage of herbal medicine by the students' was tested with questions asking if the student had ever used a herbal product and whether the outcome was satisfactory. Other information obtained from respondents were on the products used, the ailments which the product was used for, persons who recommended them and when the herb or herbal product was last used. Knowledge and attitude were further categorized as poor when scores were less than 50% or good, when scores were 50% or more.

Data was entered into Microsoft Excel, and analyzed using GraphPad Prism, Version 5.01 (GraphPad

Software Inc., San Diego CA) and Statistical Package for the Social Sciences (SPSS), version 18 (SPSS Inc, IBM, Chicago, IL, USA). Internal consistency of the questionnaire was assessed by the Cronbach's alpha value. Associations between participants' demographic characteristics and both knowledge and attitude scores were assessed using the Chi-square test. The mean scores of knowledge and attitudes were compared using the independent t-test and one-way Analysis of Variance (ANOVA), where appropriate. Relationship between knowledge and attitude scores was determined by calculating the Pearson's correlation coefficient. Statistical significance was assumed at $p < 0.05$ and at a confidence interval of 95%.

RESULTS

Demographic profile

Out of the 284 students who received questionnaires, 203 submitted their completed questionnaire which represented a response rate of 71.5% (2nd year $n = 97/124$, 78%; 3rd year $n = 62/83$, 75%; 4th year $n = 44/77$; 57%). Cronbach's alpha value for the questionnaire was 0.819. The mean age of the respondents was 22.35 ± 2.248 years. Majority of students, 125 (61.6%) were males. Whereas 116 (56.7%) were followers of the Christian religion, 43 (21.2%) were Muslims. Majority of the students grew up in the urban areas of Ghana, 116 (56.7%).

Students' knowledge on Herbal medicine

Out of 16.5 knowledge score, the mean scores for the various years were; 2nd year (4.149 ± 3.282), 3rd year (4.589 ± 3.677) and 4th year (6.057 ± 3.469) as shown in Table 1. The overall mean knowledge score was 4.697 ± 3.509 , equivalent to 28.5% of maximum score. Awareness of herbal medicine represented by ever hearing of herbal medicine had the best scores (88.1%) but a lower score was recorded when students were asked to define herbal medicine (59.5%). The worst scores (less than 1.0%) were in relation to level of awareness of and the naming of the herbal pharmacopoeias. Advancing years of study had a significant effect on the overall knowledge of the medical students about herbal medicine ($p = 0.01$). The association between year of study and knowledge of names and usages of herbs ($p = 0.036$) as well as herbs and their products affecting pharmacokinetics of allopathic medicines ($p < 0.0001$) were significant, with students in higher years recording higher scores. Although, the gender of the students and locality within which they grew up did not significantly affect their knowledge on herbal medicine, females (4.954 vs 4.547 ,

Table 1. Mean knowledge scores of medical students on herbal medicine categorized by year of study, gender, and locality of early stage of life.

Statements (Score)	Year of study				p-value	Gender		Locality	
	2 nd	3 rd	4 th	% of average		Male	Female	Urban	Rural
Heard of Herbal medicine (0.5)	0.418	0.460	0.443	88.1	0.288	0.432	0.442	0.435	0.38
Correct definition of herbal medicine (1)	0.505	0.645	0.636	59.5	0.146	0.554	0.628	0.609	0.534
Listing five Ghanaian or African herbs and correct usage (10)	2.381	2.691	3.773	29.5	0.036*	2.64	3.00	2.609	3.000
More than 60% of Ghanaians use herbs or products for ailments (1)	0.392	0.323	0.372	36.2	0.678	0.345	0.397	0.330	0.414
Herbs and products may affect pharmacokinetics of OD when used together (1)	0.443	0.419	0.841	56.8	<0.0001	0.552	0.474	0.461	0.602 ^a
Are you aware of any International herbal pharmacopoeia? (1)	0.000	0.016	0.000	0.5	-	0.008	0.000	0.011	0.000
Aware of a Ghanaian herbal pharmacopoeia? (1)	0.010	0.016	0.000	0.9	-	0.008	0.013	0.011	0.009
Name of the Ghanaian pharmacopoeia (1)	0.000	0.016	0.000	0.5	-	0.008	0.000	0.000	0.011
Total knowledge score (16.5)	4.149	4.586	6.065	28.5		4.547	4.954	4.466	4.95
Percentage of total p-values	25.1	27.8	36.8	0.01		27.6	30.0	27.1	30.0
						0.409		0.257	

^a p-value = 0.0459; OD – Orthodox drugs

p = 0.409) and rural dwellers (4.95 vs 4.466, p = 0.257) recorded higher mean knowledge scores.

Majority of the students, 120 (59.1%) were able to give common English names of at least one African herb with 40 (33.3%) naming only two herbs. A total of 35 plants were listed by the students. Table 2 shows the first fifteen most listed herbs which included *Azadirachta indica*, 102 (85.0%), *Carica papaya*, 49 (39.2%), *Moringa oleifera*, 40 (33.3%), and *Chromolaena odorata*, 18 (15.0%). For most of these plants (66.8%; n = 10/15), malaria was cited as one of the conditions for which they would be used to treat.

Attitude of students towards Herbal Medicine

Table 3 shows the mean attitude scores of the students categorized according to their year of study, gender and locality of early life. The overall average attitude score of the students in this study was 3.365 ± 1.069 (67.9%). The

3rd year class had the highest score of 3.548 ± 1.066 , followed by the 4th year, 3.409 ± 1.127 with the 2nd year class scoring the lowest of 3.227 ± 1.066 but these differences were not significant (p = 0.173). Although majority, 195 (96.1%) of students believed they will ask patients of their previous usage of herbal medicines when they qualify as physicians, only 22 (10.8%) of the students as shown in Table 4 were ever asked by their physicians of their previous use of herbal medicines. A minority of students, 50(25.8%) was ready to personally partake in clinical trials involving herbal products. Females (3.462 vs. 3.304; p = 0.309) and students who grew up in rural communities (3.367 vs. 3.346; p = 0.422) had better attitude than their male and urban dwelling counterparts, but the differences were not significant.

Personal experiences with Herbal medicines

The level of personal usage of and satisfaction derived

Table 2. Common medicinal plants and their uses as cited by the students.

Common name	Botanical name (Family)	Uses cited	No. (%) of students citing it. (n = 120)
Pawpaw	<i>Carica papaya</i> (Caricaceae)	Intestinal worm infestation, malaria, fever, epilepsy, stomach pain, hepatitis, catarrh, typhoid	47 (39.2)
Neem	<i>Azadirachta indica</i> (Meliaceae)	Malaria, fever, headache, catarrh	102 (85.0)
Moringa	<i>Moringa oleifera</i> (Anacardiaceae)	Constipation, headache, immune booster, liver diseases, malaria, hypertension, pains, stomach upset, typhoid	40 (33.3)
Acheampong plant *	<i>Chromolaena odorata</i> (Asteraceae)	Bruises, wounds, stop bleedings, boils	18 (15.0)
Mango	<i>Mangifera indica</i> (Anacardiaceae)	Fever, malaria, typhoid, cough	11 (9.2)
Guava	<i>Psidium guajava</i> (Myrtaceae)	Malaria, constipation, chicken pox	4 (3.3)
Mahogany	<i>Khaya senegalensis</i> (Meliaceae)	Waist pains, fever, malaria, boils, stomach upset	11 (9.2)
Pineapple	<i>Ananas comosus</i> (Bromeliaceae)	Malaria, Jaundice	5 (4.2)
Ginger	<i>Zingiber officinale</i> (Zingiberaceae)	Cold, Sore throat, cough, stomach ache, 'anal ulcer'	7 (5.8)
Teak	<i>Tectona grandis</i> (Lamiaceae)	Typhoid, malaria, fever	3 (2.5)
Aloe vera	<i>Aloe vera</i> (Xanthorrhoeaceae)	Skin conditions	6 (5.0)
Baobab	<i>Adansonia digitata</i> (Malvaceae)	Wound healing	5 (4.2)
Dawadawa*	<i>Parkia biglobosa</i> (Fabaceae)	General wellbeing, emesis	3 (2.5)
Bitter leaf	<i>Vernonia amygdalina</i> (Asteraceae)	Malaria, fever	4 (3.3)
Acacia	<i>Acacia nilotica</i> (Fabaceae)	Typhoid, malaria	4 (3.3)

* These are the local names of these plants.

from Herbal medicine is as shown in Table 4. Majority of the students, 111 (54.7%) had ever used herbal medicine for various health concerns with 86 (77.5%) of the users satisfied with the outcome of the treatment. Up to 77(69.4%) of these users of herbal medicines did so based on recommendation by relatives. Most of the students, 52 (46.9%) last used the herbal medicine three or more years ago. Although up to 48 (43.2%) remembered the name of the herb or herbal product

used, the majority could not do so.

DISCUSSION

This study showed that the medical students in this study were deficient in knowledge on herbal medicine but possessed a rather high attitude; a result found in similar studies elsewhere (Clement et al., 2005; Yeo et al., 2005;

Table 3. Mean attitude scores towards Herbal medicine categorized by year of study, gender and locality of early stage of life.

Statement (score)	Year of Study			Average (%)	Gender		Location	
	2 nd	3 rd	4 th		Male	Female	Urban	Rural
Believe CAM including herbal medicine is beneficial to healthcare?(1)	0.80	0.952	0.886	87.9	0.832	0.923	0.887	0.841
Will recommend herbal product to a patient (1)	0.64	0.726	0.750	70.5	0.664	0.731	0.687	0.693
Are you willing to participate in clinical trials (1)	0.206	0.274	0.295	25.8	0.280	0.192	0.239	0.252
Will ask patient of previous herbal product use when I qualify as a doctor (1)	0.959	0.968	0.955	96.1	0.968	0.949	0.965	0.955
There should be separate consulting rooms for herbal medicine practitioner and orthodox doctor in same hospital for patients to have options. (1)	0.619	0.629	0.523	60.1	0.560	0.667	0.568	0.626
Total attitude score (5)	3.224	3.549	3.409		3.304	3.462	3.346	3.367
Total Attitude score (%)	64.5	70.1	68.2	67.9	66.1	69.2	66.9	67.3
p-values		0.173			0.309		0.422	

Table 4. The level of personal usage of and satisfaction with Herbal medicine.

Statement	Subgroup	Number of students	Percentage
Ever used herbs or herbal product?	Yes	111	54.7
	No	92	45.3
Satisfied with outcome after the use of the herbal medicine?	Yes	86	77.5
	No	25	22.5
Type of herbal medicine (n = 111)	Raw herbs	22	19.8
	Herbal preparation	26	23.4
	No recollection	63	56.8
Last time herbal product was used	< 1 year	24	21.6
	1 -3 years	25	22.5
	> 3 years	52	46.9
	No recollection	10	9.0
Person who recommended the herbal medicine	Health worker	9	8.1
	Relative	77	69.4
	Friends	7	6.3
	Herbalist	13	11.7
	Others (personal, media, etc)	3	2.7
Doctor ever asked of your previous usage of herbal medicine (n = 203)	No recollection	2	1.8
	Yes	22	10.8
	No	181	89.2

Xu and Levine, 2008; Loh et al., 2012; Alrashidi et al., 2013). Several factors such as the environment, having a family member using a complementary and alternative medicine (CAM) modality, personal interest, religious beliefs, and cultural background have been shown to influence a person's knowledge and attitude towards a CAM modality (Akan et al., 2012). Since up to 80% of Africans used traditional medicine which mainly involves the use of herbs, it is not surprising that up to 88.1% of these students were aware of herbal medicine and 59.1% ever using it (Mahomoodally, 2013). The high level of use of herbal medicine in this study is similar to levels in previous studies that reported 58 – 85% (Johnson and Blanchard, 2006; Sekhri et al., 2013; Strgar et al., 2013). The effect of familial relations on the usage and attitude towards herbal medicine has been confirmed in this study where 69.4% of users had recommendation on herbal medicine from relatives, which is similar to results from other studies (Sekhri et al., 2013; Strgar et al., 2013). This study, like others, showed a highly significant association between advancing year of medical education and increasing knowledge of students on CAM (Khimani et al., 2007; Akan et al., 2012). The difference observed in this study could be attributed to 3rd and 4th year students having more years of a Community Based Education and Services (COBES). COBES which is part of the curriculum of the University for Development Studies ensures medical students spend at least 4 weeks in a rural health facility and interact with the prevailing health systems. There was a positive and significant relationship between the age of the student and their level of knowledge, with the older ones being more knowledgeable ($r = 0.18$, $p = 0.009$). The older students were mostly graduate students who had ever practiced in health facilities, exposing them to more information about herbal medicines.

Knowledge of the herbal pharmacopoeia, which is an invaluable source of information on herbal medicines in this study, was abysmal. Considering the fact that the participants in this study had no formal training of herbal medicine and their abysmal knowledge on herbal pharmacopoeia, any knowledge they possessed was possibly acquired from the environment or personal use of herbal medicines. Knowledge on the names of the African herbal plants by the students was also poor. Just half of the students were able to list one of five herbs, and half of those who had ever used herbal medicine were unable to name the herbs or products used. This poor knowledge can be attributed to various factors. Firstly, only a fifth of the herbal medicine users used the crude herbs while the rest used pre-packaged preparations or forgot the names of the herbal material used. Secondly, more than half of the student users last used the herbal medicine more than 3 years ago or could not remember when they last used a herbal product. Deficiency in the naming of the herbs could also be possibly due to some students not being familiar with the

English or botanical names of the plants. The diseases that students used herbal medicine to treat differ among countries. In a Canadian study, it was musculoskeletal conditions; in the USA, it was cough and cold but in this study, malaria was the most common disease for which the students used herbal medicines to treat (Sekhri et al., 2013; Strgar et al., 2013). The high malaria prevalence rate of up to 70% in certain parts of Ghana makes it one of the most common diseases; hence, several herbs are more likely to be used for its management (Mba and Aboh, 2007). Studies have reported the antiplasmodial effect of the Neem (*A. indica*), and the possible reason for it being the best known in this study is that it provides a cure and also, it is widely distributed across all the vegetation zones in Ghana (Farahna et al., 2010; Awofesi, 2011).

There was a high overall attitude of the students towards the use of herbal medicine in this study (67.9%). The year of study of the student, gender and locality of early life did not significantly influence the attitude of the students, as supported by a similar study (Newberry et al., 2001). The authors reported that students who will volunteer to be part of clinical trials involving herbal products were in the minority, with the most prominent reason for this attitude among the majority ($n = 96$; 62.5%) being the fear of possible adverse effects of the herbal products. For about 60% of the students to have agreed to the suggestion of having separate consulting rooms for both orthodox and herbal medical practitioners in the same hospital was a positive attitude which will facilitate the integration of trained herbal medicine practitioners and the orthodox medical practitioners in Ghanaian hospitals. Currently, a university in Ghana trains first degree herbal medical practitioners and it is the policy of the Ministry of Health in Ghana to have them practice in hospitals. It would have been expected that with the high use of traditional medicines by Ghanaians, physicians could take interest in previous herbal product usage by patients. This study has revealed that physicians rarely ask patients of their usage of herbal medicines and this rather low interest in physicians knowing the herbal drug history of patients is quite revealing because of possible herb-orthodox drug interactions which may have fatal consequences. This poor patient-doctor communication about herbal medicines reported in several studies could be due to various factors including the limited knowledge on herbal medicines by physicians which makes them less confident on issues related to products of herbal origin (Clement et al., 2005; Neustadt, 2006; Fakeye and Onyemadu, 2008; Ghia and Jha, 2013). Although almost all the students said they will ask their patients of their herbal products usage during history taking, their current attitude may deteriorate to the level of the currently practicing physicians if there are no educational interventions before they also qualify to practice.

Structured herbal medicine educational interventions

have been reported in several studies to significantly improve the knowledge, confidence and hence effective communication of physicians about herbal medicines with their patients (Kemper et al., 2002; Mikail et al., 2003). Currently, the four Ghanaian medical schools do not provide any formal training on complementary and alternative medicines including herbal medicines hence physicians in Ghana possess no formal knowledge of herbal medicine. To prepare future physicians adequately to address questions of herbal medicines from patients and to prevent dangers associated with the herb-drug interactions in Ghana, there will be the need for the incorporation of herbal medicine into the medical training curriculum. This would also make the intended formal integration of herbal medicine and orthodox medicines in Ghanaian hospitals progress smoothly.

This study is limited because, it was conducted in one medical school and only at preclinical level and so cannot be generalized to cover all medical students and at all levels of study in Ghana. The challenge of retrospectively accounting for knowledge and usage also introduced bias which could influence the results obtained in this study. At the preclinical level of a Problem Based Learning (PBL) curriculum which is followed in this university, there is no substantial appreciation of disease and treatment mechanisms with their associated benefits and potential untoward effects, which could affect participants' attitude towards the use of herbal medicines.

Conclusion

Medical students in this study possessed good attitude but poor knowledge of herbal medicines. This deficit of knowledge in herbal medicine if not changed will limit physicians' ability to elicit information on the use of herbs and their products which may influence their decisions in the safe and efficient management of ailments. The good attitude exhibited by the students is, however, encouraging since they would possibly accept the introduction of herbal medicine courses into their medical curriculum and thereby minimize their resistance to the integration of herbal medicine into the current conventional health delivery system in Ghana.

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