

Complementary and alternative medicine use among hypertensive patients receiving biomedical treatment: a cross-sectional survey at the LEKMA General Hospital in Accra, Ghana

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Abstract

Background: Complementary and alternative medicine (CAM) use is on the increase globally and there is an increased rate of usage among hypertensive patients.

Objective: This study was designed to describe CAM use among hypertensive patients at a municipal hospital.

Methods: A cross-sectional survey of hypertensive patients at a Municipal Assembly Hospital was conducted. Respondents were made up of 209 (99 CAM users and 110 non-CAM users) selected randomly from patients attending the hypertension clinic. The pattern of CAM use, clinical profiles of respondents, and their attitudes toward CAM were examined. Descriptive statistics and the Chi Square test were used for data analysis.

Results: Out of the 209 patients interviewed, 99 (47.36%) had used at least one type of CAM mostly herbal products (72.72%, n = 72). The CAM users demonstrated poorer adherence to antihypertensive medications (30.30%, n = 30) as compared to non-CAM users (8.08%, n = 80). We observed a positive association between non-CAM use and medication adherence ($p = 0.001$). The majority (72.72%, n = 72) of the CAM users claimed to have obtained the expected effect, however, 89.89% (n = 89) did not disclose their CAM use to their physician. They cited lack of inquiry by physicians as the main reason for non-disclosure.

Conclusion: A considerable proportion of hypertensive patients receiving conventional treatment at a municipal hospital also use CAM therapies. Physicians should be encouraged to inquire about the history of CAM use among their patients to be able to advise patients concerning the possible adverse reactions and drug interactions.

Keywords: Complementary and alternative medicine, hypertensive, biomedical treatment

INTRODUCTION

Hypertension is a non-communicable disease affecting one billion of the world's population. It is one of the leading risk factors of cardiovascular disease and a major independent risk factor for heart failure, stroke, and kidney failure in Africa [1, 2]. Notwithstanding national and international guidelines and measures for hypertension control, population-based studies revealed that two-thirds of hypertensive patients were either untreated or inadequately controlled with a considerable number remaining undiagnosed [3]. According to the

World Health Organization, low adherence to treatment among patients with hypertension is a major factor impeding control [3]. Multiple factors have been identified to be responsible for a patient's low adherence to prescribed pharmacologic therapies. One of them is the use of complementary and alternative medicine (CAM) [4]. The National Centre for Complementary and Alternative Medicine in the United States of America defines complementary and alternative medicine as a group of diverse medical and healthcare systems, practices and products that are not presently considered to be part of conventional medicine. However, the exact definition of what comprises CAM is culturally dependent [5]. Before the introduction of western medicine, what is being referred to as CAM in modern medicine was the mainstream therapeutic product in West Africa. Currently, it is

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estimated that about 70% of Ghanaians rely on traditional medicine for their health care [6]. It has been suggested that CAM use may be high among people with chronic conditions or life-threatening diseases that did not receive satisfactory treatment outcome from conventional medicine [6]. A study conducted in Palestine reported a high percentage of CAM use among hypertensive patients to manage their condition. This high level of CAM use suggests patients' preference for an integrative approach to hypertension management [7]. However, it has been noted that some CAM products are likely to interfere with the intended action of prescribed antihypertensive drugs [8]. A common use of CAM was reported among cardiovascular disease patients most of whom believed that CAM has remedial benefits and was perceived as being safe or safer than the prescribed medications, though, many of them were not willing to disclose their CAM use to their Physicians [9]. This study was designed to describe the use of complementary and alternative medicine among persons with hypertension who were seeking care from a municipal hospital in Accra, Ghana.

MATERIALS AND METHODS

Study design

The study was conducted at Ledzokuku Krowor Municipal Assembly (LEKMA) hospital. The hospital is a public health facility built by the Chinese government as a China-Ghana friendship hospital. It is a 100-bed capacity hospital, located at Teshie in Accra and can boast of all the departments of a general hospital, such as CT scan, Dental clinic, Ear, Nose and throat clinic, Eye clinic, Laboratory, radiology. Also, LEKMA hospital has a Malaria control program as well as Herbal Medicine unit. This hospital was chosen for the study because it runs a hypertensive clinic twice every week (Tuesdays and Thursdays).

Data collection materials

The target population for this study was patients aged ≥ 18 yr. who were clinically diagnosed as hypertensive and were seeking health care at LEKMA hospital. A simple random sampling without replacement technique was used to select participants for the study. The minimum sample size of 188 was determined with the assumption that at least 15% of patients seeking care at the LEKMA Hospital will be hypertensives, and at 95% confidence interval [10]. On a clinic day, available outpatient folders were located, and the number of each folder written on a piece of paper, folded and put together in a bowl and then randomly picked out till the required number of at least 40 interviews was reached. Data were collected by two persons (the first author and a trained research assistant) with each person expected to interview at least 20 respondents in a day for five clinic days. However, a total of 209 hypertensive outpatients were interviewed. Selected folders were scrutinized to ensure patient met the inclusion criteria. Folders selected each day were marked to avoid double selection. Using Ga, a dominant local language as an example, the questionnaire

was translated into Ga and back translated to English to ensure consistency of the tool when translated into a local language. The tool for data collection was validated through pre-testing. The questionnaire had closed, and open-ended questions structured into four sections. Data collection was done through interviewer-administered interviews with patients to ensure consistency in the interpretation of questions and probing for clarifications. None of the patients approached to participate in the study declined. Participation in the study was entirely voluntary and participants had the option not to participate or to discontinue their participation without any adverse consequence. Written informed consent forms were given to participants to sign or thumbprint. All informed consent was in English. However, the consent form was read out to patients who could not read and write, and they were made to thumbprint in place of a signature. Verbal consent was also sought from participants at the point of the interview. Confidentiality of information collected was assured and no personal identifiers were used in presenting findings. Data was password protected and handled only by the research team.

Statistical analysis

The completed questionnaires were cross-checked for completeness and consistency, coded and entered into the computer using Statistical Package for Social Sciences (SPSS) version 20 for analysis. Descriptive statistics were used to determine frequency counts and percentages of participant characteristics. Chi square test was used to establish the relationship between CAM usage and variables such as sex, age, and educational level. Statistical significance was set at a $p < 0.05$.

RESULTS

Demographic characteristics of participants

The results show that both men and women were represented in the study with females constituting 51.20% ($n = 107$) of respondents. Over a third (38.76%, $n = 81$) of the respondents had attained secondary school education. Respondents were mostly 40 - 69 yr. with the age group of 50 - 59 yr. accounting for 33.97% ($n = 71$) (Table 1). Association between CAM use and respondents' demographic data is shown in Table 2. A positive association was identified between CAM use and educational level ($p = 0.001$). Most CAM users, 40 (40.40%), had attained a primary level of education compared to 21 (19.09%) non-CAM users. On the other hand, most non-CAM users 56 (50.91%) had attained a secondary level of education. There was no association between CAM usage and sex as well as CAM usage and age groups.

Clinical profile of responders

It was observed that 208 (99.52%) respondents were on antihypertensive drugs and CAM usage was reported by 99 (47.37%) respondents. Over a third (36.36%, $n = 36$) of the respondents reportedly experienced negative side effects of

Table 1: Demographic characteristics of respondents

Variables	Frequency (n= 209)	Percentage
Sex		
Male	102	48.88
Female	107	51.19
Age		
30 - 39 yr.	7	3.34
40 - 49 yr.	63	30.14
50 - 59 yr.	71	33.97
60 - 69 yr.	45	21.53
≥ 70 yr.	23	11
Educational level		
No formal education	27	12.92
Primary	61	29.19
Secondary	81	38.76
Tertiary	40	19.14

antihypertensive medications. It was also observed that 170 (81.34%) of the respondents were adhering to their antihypertensive medications. It came to light that 71 (34.0%) respondents declared having other chronic diseases like diabetes. Most respondents (71.77%, n = 150) reported having lived with the disease between 1 - 10 yr. with about a third (36.36%, n = 76) of them having the disease for between 6 - 10 years. Few respondents (14.35%, n = 30) lived with the disease for ≥ 16 years. Family history of hypertension was reported by 50.72% (n = 106) of respondents. The majority (58.85%, n = 123) of the respondents were registered with the national health insurance scheme and maintain that without it, it would have been difficult for them to cope with the high cost of their medications. The 86 respondents who did not have health insurance reported various levels of affordability; 55 (63.95%) found their medication affordable, 11 (12.79%) found their medication somehow affordable and 20 (23.25%) found their medication unaffordable.

Table 2 summarizes the significant association between CAM use and some clinical profiles of respondents. The analysis showed clearly that CAM users demonstrated poorer adherence to their antihypertensive medications (30.30%, n = 30) as compared to non-CAM users (8.18%, n = 9). A positive association was identified between non-CAM usage and medication adherence ($p = 0.001$). Also, more CAM users (57.58%, n = 57) reported experiencing negative adverse effects of the antihypertensive medications compared to non-CAM users (17.27%, n = 19), showing a positive association between CAM use and adverse effects ($p < 0.001$). More, (57.58%, n = 57) CAM users reported adverse side effects of anti-hypertensive medication than non-CAM users (17.27%, n = 19). Also, more (20.20%, n = 20) CAM users reported that they have lived with the condition for ≥ 16 yr. compared to non-CAM

Table 2: Summary of demographic and clinical profile of respondents and association with CAM use

Statements	Using CAM		p value
	Yes n (%)	No n (%)	
Sex			0.852
Male	49 (49.49)	53 (48.18)	
Female	50 (50.51)	57 (51.82)	
Age			0.128
30 - 39 yr.	1 (1.01)	6 (5.45)	
40 - 49 yr.	36 (36.36)	27 (24.55)	
50 - 59 yr.	34 (34.34)	37 (33.64)	
60 - 69 yr.	17 (17.17)	28 (25.45)	
≥ 70 yr.		12 (10.91)	
Educational level			< 0.001
No formal education	12 (12.12)	15 (13.64)	
Primary	40 (40.40)	21 (19.09)	
Secondary	25 (25.25)	56 (50.91)	
Tertiary	22 (22.22)	18 (16.36)	
Ability to stick to the prescribed dosage of antihypertensive medications			< 0.001
Yes	69 (69.70)	101 (91.82)	
No	30 (30.30)	9 (8.18)	
Affordability of medication			< 0.001
Affordable	18 (18.18)	37 (33.64)	
Use Health Insurance			
Somehow affordable	11 (11.11)	0	
Expensive	14 (14.14)	6 (5.45)	
Experience negative side effects of Medications			< 0.001
Yes	57 (57.58)	19 (17.27)	
No	42 (42.42)	91 (82.73)	
Duration of illness			0.013
1 - 5 yr.	35 (35.35)	40 (36.36)	
6 - 10 yr.	27 (27.27)	49 (44.55)	
11 - 15 yr.	17 (17.17)	11 (10.00)	
≥ 16 yr.	20 (20.20)	10 (9.09)	
Having other chronic illnesses			0.485
Yes	33 (33.33)	38 (34.55)	
No	66 (66.67)	72 (65.45)	
Family history of hypertension			0.002
Yes	61 (61.7)	45 (40.91)	
No	38 (38.38)	65 (59.09)	
Total	99	11	

* CAM, complementary and alternative medicine

users (9.09%, n = 10). Having other chronic diseases was similar among CAM users (33.33%, n = 33) and non-CAM users (34.55%, n = 38). Also, more CAM users (61.62%, n = 61) reported family history of hypertension compared to non-CAM users (40.91%, n = 45). Determinants of CAM use are presented in Table 2. Affordability of antihypertensive medication, medication adherence, and side effects of the medication was significantly associated with CAM usage ($p = 0.001$). Family history of hypertension as well as the duration of hypertension were

also associated with CAM usage ($p = 0.002$ and $p = 0.013$, respectively).

The attitude of respondents toward CAM

Respondents' attitude to CAM is summarized in Table 3. The majority, (74.75%, $n = 74$) out of the 99 CAM users and 8 (7.27%) out of 110 non-CAM users believed that CAM products are more natural and effective medication than biomedicine. Out of 110 non-CAM users, 24 (21.82%) and 5 (5.05%) CAM users believed there was a lack of regulation to guide its use in Ghana. Also, 27 (24.55%) non-CAM users reported a lack of evidence on the safety and efficacy of most CAM products in the market, which affects their decision not to use it.

Table 3: Summary of respondents' beliefs and evaluation about CAM

Responses	CAM users	
	Yes	No
	n (%)	n (%)
CAM is effective and more natural form of healing	74 (74.75)	8 (7.27)
CAM enables you to be more active in your own health care	14 (14.14)	3 (2.73)
Lack of regulatory oversight to regulate CAM	5 (5.05)	24 (21.82)
Contamination and adulterations of CAM products	3 (3.03)	-
Adverse effects of CAM treatment not known or documented	2 (2.02)	27 (24.55)
Personal dislike for CAM	1 (1.01)	21 (19.09)
Lack of evidence on safety and efficacy of CAM	-	27 (24.55)
Total	99	110

*CAM, complementary and alternative medicine

users, 72 (72.72%) said their expectations regarding the effectiveness of the therapy were achieved. Also, 79 (79.79%) said they have experienced an improvement in their health status after going on CAM therapy. Majority of CAM users, 71 (71.71%) said they found it effective. However, it was instructive to note that 17 (17.17%) of them were emphatic that the CAM therapy was not effective or did not work for them. It was, however, reassuring that only 5 (5.05%) CAM users reported having had some side effects after using it, which was mostly diarrhoea. The CAM users' sources of recommendation for usage were friends (42.42%; $n = 42$), the media (30.30%, $n = 30$) and family members (22.21%, $n = 22$). One respondent said he was introduced to CAM by another hypertensive patient, while CAM was recommended to two patients by herbalists. Out of 99 CAM users, only 10 (10.1%) said they have informed their physician about their CAM usage, thus the majority of them 89 (89.89%) did not disclose their CAM usage to their physician. Reasons for not informing their physician about CAM use were "the physician had never asked them about it (60.6%, $n = 60$)", "they did not think it was necessary (16.16%, $n = 12$)", "the fear that physician will not approve of it (12.1%, $n = 8$)", and "the fear that physician will be angry (6.60%, $n = 6$)". Few respondents (5 out of 99 CAM users and 8 out of 110 non-CAM users) mentioned four antihypertensive medicines drugs that are commonly given to patients in Ghana. All the 13 respondents mentioned Amlodipine®, 9 mentioned Nifedipine®, 5 mentioned Exforge® and 3 mentioned Co-diovan®. Majority of the respondents could not readily remember the names of their medications, largely due to lack of local names.

DISCUSSION

Complementary and alternative medicine is used by a significant proportion of the general population all over the world. Our findings reveal that over 47% of hypertensive patients interviewed were using or have used CAM therapy in the 12 months preceding the study. This finding is in line with the trend of CAM use throughout the world as reported in various studies: Palestine [7], China [12], Nigeria [13], United Kingdom [14], and Ghana [15,16]. This study revealed a comparatively lower (47.4%) rate of CAM usage among participants than what was reported in China (74.2%) [12], this must, however, be put into perspective, while the CAM industry in China has evolved and developed over the years, that could not be said about Ghana, where it is still rudimentary, relying heavily on folk practices. On the other hand, the 47.5% reported CAM use in our study was more than what was reported among urban Nigerian hypertensive patients (29%) [13]. The finding that herbal-based products and dietary supplements were the most used CAM is similar to findings from; Nigeria [16], Jordan [17] and Ghana [15]. A review conducted by Tashjian et al. in 2010 reported high consumption of herbal remedies among millions of people in the USA [8], although, a systematic search of works of literature using

Patterns of CAM use

Most of the CAM products used within the 12 months preceding the study was mainly herbal preparations (72.72%, $n = 72$), others were dietary supplements, (46.46%, $n = 46$) and acupuncture (3.03%, $n = 3$). Various reasons were given by CAM users for its usage and among them were: "it slows down the progression of the disease (52.52%, $n = 52$)", "it is natural and safe (38.38%, $n = 38$)", "it will cure the disease (29.29%, $n = 29$)", and "it relieves the symptoms of the disease (24.24%, $n = 24$)". Other reasons were "it is cheaper (cost-effective) compared to biomedicine (11.11%, $n = 11$)"; "dissatisfaction with biomedicine/conventional therapy (11.11%, $n = 11$)"; and "easy accessibility (10.10%, $n = 10$)". Out of the 99 CAM

different databases reported that homoeopathy and acupuncture were the most utilized CAM products in the USA [18]. A study of cancer patients in Ghana revealed that a significant proportion (59.2%) of them were using herbal products to treat their conditions [6]. Generally, Ghanaians use herbal products to treat all forms of ill health and our finding of high herbal-based therapy among respondents only go to confirm the belief in the healing potentials of herbs among Ghanaians [19]. The position of CAM users in our study that CAM is natural, safe and has helped to slow down the progression of their disease was similar to reports from other studies [13, 20]. This finding implies that a good proportion of hypertensive patients will continue to use CAM and most probably in combination with allopathic medicine, and this calls for the examination of the safety of CAM products, especially the herbal-based ones, which are predominantly used in Ghana. It is also important to determine the safety of using biomedical antihypertensives drugs with CAM products to forestall any health implication of drug interactions. Overall, CAM users in this study reported perceived improvements in their health status and therefore confidence in the effectiveness of CAM, and this is similar to what was reported in other findings [5, 10, 12]. It was reported from Italy that people with chronic diseases used CAM more frequently with high satisfaction [10]. It was also reported from China that more than 70% of a study respondent perceived CAM product to be effective [12]. A study conducted in Japan also reported that the majority of respondents found their CAM treatment to be effective [5]. Most CAM users in our study perceived it to be medically beneficial to them and this requires that the public health system fully appraise the relative merits of CAM therapy, its use and effectiveness as suggested by Jon et al. in 2014 [22].

As part of an evidence-based approach to treating hypertension, various CAM therapies should be evaluated to determine their full benefits and efficacy [23]. Similar to what was reported from Nigeria [24], only a few respondents said they had experienced some adverse reactions after using CAM with diarrhoea being the most reported. As CAM usage is growing and gaining acceptance, there is a need for more research into adverse effects associated with its use to ensure the safety of the products. Respondents' decision to use CAM was influenced largely by friends and the media, and this confirmed what was reported from Palestine by AliShtayeh et al. in 2013 [7]. The media is a powerful tool for disseminating information about products, with the current influx of radio and television stations in Ghana, coupled with increased advertisements and discussions on CAM products, the role of the media cannot be overemphasized in promoting CAM use in Ghana. An important finding of this study is the high (89.9%) nondisclosure of CAM usage to physicians by hypertensive patients. This finding agreed with other studies where few patients disclosed their CAM use to their health professionals. For instance, Hori et al. in 2008, reported from Japan that only a small proportion of

patients reported their CAM use to their physician [5]. An earlier study in Ghana revealed that a significant number of participants did not disclose their CAM use to their healthcare providers [15]. The fact that some did not do so for fear that the physician will be angry or disapprove of its usage, called into question the kind of relationship that exists between the patient and the care provider. This finding shows the enormous power that the physician wields over the patients, which could pose a threat to quality healthcare delivery, it may affect the quality of doctor-patient interactions, with the patient holding back vital information needed for clinical decision making. Physicians may therefore not be able to address some of the gaps in patients knowledge regarding the dangers that may come with unsupervised use of biomedicine simultaneously with herbal products and this can result in serious herb-drug interactions [8]. It also raises the issue of whether health professionals adequately investigate their patients self-use of other forms of treatments before coming to them as part of quality care provision.

Understanding the demographic characteristics of CAM users provide insight into some factors that may influence the choice to use CAM. In this study CAM users and non-CAM users were fairly represented in terms of age and sex. Results obtained showed no association between CAM use and age as well as CAM use and sex. These findings are consistent with a study by Hu et al. in 2013 [12], but inconsistent with other studies [10, 17]. The finding that non-CAM users have attained higher education compared to CAM users was consistent with what was reported in another study where CAM usage was higher among those with a low level of education [7]. On the other hand, it is inconsistent with a study that revealed a higher rate of CAM utilization among highly educated individuals [10]. Thus, in our study, there was a significant relationship between the educational level of respondents and CAM use, and this contradicts findings of a study which reported no relationship between CAM use and educational level [12]. The positive relationship between CAM use and poor adherence to antihypertensive therapy is an indication that CAM users were less likely to adhere to their antihypertensive medications. This is consistent with a study from the UK, which reported poor adherence to antihypertensive medication among CAM users [26]. In our study, most respondents had registered with the national health insurance scheme; and they indicated that the scheme subsidized the cost of medication. This must be encouraged and promoted since those who were not on the national health insurance scheme reported that the biomedical antihypertensive medications were not affordable. It was not surprising that there was an association between CAM use and medication affordability, suggesting that CAM users were less able to afford their medications and this compares well with an earlier report from Ghana by Kretchy in 2014 [15]. This calls for efforts to get more hypertensive patients on the health insurance scheme to lessen their burden of buying

medicine directly from their pockets as this may improve treatment adherence among patients. Other factors that were significantly associated with CAM use in this study include having a family history of hypertension and duration of hypertension. These results are comparable to a study by Ali-Shtayeh et al. in 2013 from Palestine, which also reported an association between CAM use and family history of hypertension [7]. Our findings revealed a significant association between CAM use and the experience of antihypertensive medication side effects, confirming the finding reported by Lee et al., 2014, that majority of their respondents had negative perceptions of western medicine due to its side effects, hence adjusting their prescribed antihypertensive drugs with CAM [27].

Conclusion

The use of CAM, particularly herbal therapies for managing hypertension, is prevalent among hypertensive patients seeking healthcare at a municipal hospital in Ghana. We found that CAM use among respondents influenced educational level, duration of hypertension and family history of hypertension. Adherence to medication and side effects of the medication were also identified to have influenced CAM use. The CAM users showed a more positive attitude toward CAM than non-CAM users. Herbal products are the most used CAM reported. CAM users in our study reported satisfaction with its effectiveness. The study revealed that most patients did not disclose their CAM use status to their physicians, and we recommend that physicians must inquire from hypertensive their patients any history of CAM use during consultations to provide appropriate and quality healthcare as well as to advice patients concerning possible adverse drug interactions. Like all cross-sectional surveys, findings cannot be generalized to represent the views of hypertension patients in Ghana because the study was conducted among hypertensive patients attending a typical busy physician specialist clinic in a hospital setting. This notwithstanding, findings reported in this paper adds to the existing knowledge of CAM usage among hypertensive patients in Ghana and emphasized the importance of clinicians asking about it during clinical history taking.

DECLARATIONS

Ethical considerations

Ethical clearance was obtained from the Ghana Health Services Ethical Review Committee with a clearance number GHSERC:16/02/15.

Consent to publish

All authors consented to the publication of the manuscript.

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None

Competing Interests

No conflict of interest was reported by the authors.

Author contributions

MFD and CSKA conceptualized and designed the study, data analysis, interpretation of results. MFD drafted the manuscript and CSKA revised it for intellectual content. Both authors approved the manuscript for submission.

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Availability of data

Data is available upon request to the corresponding author.

REFERENCES

1. Kayima J, Wanyenze RK, Katamba A, Leontsini E, Nuwaha F (2013) Hypertension awareness, treatment and control in Africa: A systematic review. *BMC Cardiovasc Disord* 13:54. <https://doi.org/10.1186/1471-2261-13-54>
2. World Health Organization (WHO) (2013) World Health Day 2013: A global brief on Hypertension: Silent killer, global public health crisis. *World Heal Organ* 1–40
3. Marshall IJ, Wolfe CDA, McKevitt C (2012) Lay perspectives on hypertension and drug adherence: Systematic review of qualitative research. *BMJ* 345: e3953. <https://doi.org/10.1136/bmj.e3953>
4. Krousel-Wood MA, Muntner P, Joyce CJ, Islam T, Stanley E, Holt EW, Morisky DE, He J, Webber LS (2010) Adverse effects of complementary and alternative medicine on Antihypertensive medication adherence: FINDINGS from the cohort study of medication adherence among older adults. *J Am Geriatr Soc* 58:54–61. <https://doi.org/10.1111/j.1532-5415.2009.02639.x>
5. Hori S, Mihaylov I, Vasconcelos JC, McCoubrie M (2008) Patterns of complementary and alternative medicine use amongst outpatients in Tokyo, Japan. *BMC Complement Altern Med* 8:14. <https://doi.org/10.1186/1472-6882-8-14>
6. Yarney J, Donkor A, Opoku SY, Yarney L, Agyeman-Duah I, Abakah AC, Asampong E (2013) Characteristics of users and implications for the use of complementary and alternative medicine in Ghanaian cancer patients undergoing radiotherapy and chemotherapy: A cross-sectional study. *BMC Complement Altern Med* 13:16. <https://doi.org/10.1186/1472-6882-13-16>
7. Ali-Shtayeh MS, Jamous RM, Jamous RM, Salameh NMY (2013) Complementary and alternative medicine (CAM) use among hypertensive patients in Palestine. *Complement Ther Clin Pract* 19:256–263. <https://doi.org/10.1016/j.ctcp.2013.09.001>
8. Tachjian A, Maria V, Jahangir A (2010) Use of herbal products and potential interactions in patients with cardiovascular diseases. *J. Am. Coll. Cardiol.* 55:515–525
9. Grant SJ, Bin YS, Kiat H, Chang DHT (2012) The use of complementary and alternative medicine by people with cardiovascular disease: A systematic review. *BMC Public Health* 12:299
10. Barbadoro P, Chiatti C, D'Errico MM, Minelli A, Pennacchietti L, Ponzio E, Prospero E (2011) Complementary and Alternative Medicine (CAM) among adults in Italy: Use and related satisfaction. *Eur J Integr Med* 3:e325–e332. <https://doi.org/10.1016/j.eujim.2011.09.001>

11. Harris PE, Cooper KL, Relton C, Thomas KJ (2012) Prevalence of complementary and alternative medicine (CAM) use by the general population: a systematic review and update. *Int J Clin Pract* 66:924–939. <https://doi.org/10.1111/j.1742-1241.2012.02945.x>
12. Hu H, Li G, Duan J, Arai T (2013) Prevalence, Purposes, and Perceived Effectiveness of Complementary and Alternative Medicine Use in a Hypertension Population: A Questionnaire Survey. *ISRN Public Health* 2013:1–7. <https://doi.org/10.1155/2013/137472>
13. Osamor PE, Owumi BE (2010) Complementary and alternative medicine in the management of hypertension in an urban Nigerian community. *BMC Complement Altern Med* 10:36. <https://doi.org/10.1186/1472-6882-10-36>
14. Bishop FL, Lewith GT (2010) Who uses CAM a narrative review of demographic characteristics and health factors associated with CAM use. *Evidence-based Complement. Altern. Med.* 7:11–28
15. Kretchy IA, Owusu-Daaku F, Danquah S (2014) Patterns and determinants of the use of complementary and alternative medicine: A cross-sectional study of hypertensive patients in Ghana. *BMC Complement Altern Med* 14:44. <https://doi.org/10.1186/1472-6882-14-44>
16. Amira OC, Okubadejo NU (2007) Frequency of complementary and alternative medicine utilization in hypertensive patients attending an urban tertiary care centre in Nigeria. *BMC Complement Altern Med* 7:30. <https://doi.org/10.1186/1472-6882-7-30>
17. Wazaify M, Alawwa I, Yasein N, Al-Saleh A, Afifi FU (2013) Complementary and alternative medicine (CAM) use among Jordanian patients with chronic diseases. *Complement Ther Clin Pract* 19:153–157. <https://doi.org/10.1016/j.ctcp.2013.03.001>
18. Frass M, Strassl RP, Friehs H, Müllner M, Kundi M, Kaye AD (2012) Use and acceptance of complementary and alternative medicine among the general population and medical personnel: A systematic review. *Ochsner J.* 12:45–56
19. Van Andel T, Myren B, Van Onselen S (2012) Ghana's herbal market. *J Ethnopharmacol* 140:368–378. <https://doi.org/10.1016/j.jep.2012.01.028>
20. Sawalha AF (2007) Complementary and alternative medicine (CAM) in Palestine: Use and safety implications. *J Altern Complement Med* 13:263–269. <https://doi.org/10.1089/acm.2006.6280>
21. Mitha S, Nagarajan V, Babar MG, Siddiqui MJA, Jamshed SQ (2013) Reasons of using complementary and alternative medicines (CAM) among elderly Malaysians of Kuala Lumpur and Selangor states: An exploratory study. *J Young Pharm* 5:50–53. <https://doi.org/10.1016/j.jyp.2013.05.002>
22. Wardle J (Jon) L, Adams J (2014) Indirect and non-health risks associated with complementary and alternative medicine use: An integrative review. *Eur. J. Integr. Med.* 6:409–422
23. Nahas R (2008) Complementary and alternative medicine approaches to blood pressure reduction: An evidence-based review. *Can Fam Physician* 54:1529–1533
24. Okoronkwo I, Onyia-Pat JL, Okpala P, Agbo MA, Ndu A (2014) Patterns of complementary and alternative medicine use, perceived benefits, and adverse effects among adult users in Enugu Urban, Southeast Nigeria. *Evidence-based Complement Altern Med* 2014: . <https://doi.org/10.1155/2014/239372>
25. Chua SA, Furnham A (2008) Attitudes and beliefs towards complementary and alternative medicine (CAM): A cross-cultural approach comparing Singapore and the United Kingdom. *Complement Ther Med* 16:247–253. <https://doi.org/10.1016/j.ctim.2008.02.009>
26. Gohar F, Greenfield SM, Gareth Beevers D, Lip GYH, Jolly K (2008) Self-care and adherence to medication: A survey in the hypertension outpatient clinic. *BMC Complement. Altern. Med.* 8
27. Lee K, Mokhtar HH, Krauss SE, Ong BK (2014) Hypertensive patients' preferences for complementary and alternative medicine and the influence of these preferences on the adherence to prescribed medication. *Complement Ther Clin Pract.* <https://doi.org/10.1016/j.ctcp.2014.03.001>

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