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Knowledge, Attitude and Practice Regarding Herbal Medicine Among Medical Students in Saudi Arabia

Syed Faisal Zaidi [1,2,]*, Muhammad Anwar Khan[1], Sheikh Abdul Saeed[3], Khalid Al Zahrani[1] Adel Al Ahmadi[1], Turky Al Yamy[1], Aslam Khan[4], Kanwal Ahmed[5]

[1]College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Jeddah 21423, Saudi Arabia.
[2]Department of Pharmacology, School of Medicine, Batterjee Medical College for Sciences and Technology, Jeddah 21442, Saudi Arabia.
[3]Department of Physiology, Bahria University Medical & Dental College, Karachi, Pakistan.
[4]College of Science and Health Professions, King Saud bin Abdulaziz University for Health Sciences, Jeddah 21423, Saudi Arabia.
[5]Fakeeh College for Medical Sciences, Jeddah 21461, Saudi Arabia.

Authors' Contributions
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***Address of Correspondence Author:** sfaisalhz@gmail.com*

ABSTRACT

Background: Herbal medicine is becoming increasingly popular among the general population. Before consulting a medical practitioner, patients already try home remedies. Therefore, it becomes more pertinent that the medical students as future doctors, must possess some knowledge of the herbal medicine. In Saudi Arabia, no study has yet evaluated this aspect in medical students.

Methods: A cross-sectional study was performed with 240 medical students at a Health Sciences University. The survey questionnaire was validated, and descriptive/inferential statistics analyses were conducted by SPSS.

Results: Data showed 50/240 students (20.8 %) used herbal medicines and majority 36 (72%) used it without consultation with doctors. Moreover, male understanding of the sources of herbal medicine was less compared to females' ($p < 0.05$). In terms of attitude, majority agreed with the benefits of herbal medicines in the maintenance and promotion of health (123, 51.3%) and to treat illness (127, 52.9%). However, medical students did not want to use herbal medicines (122, 50.8%) or recommend it to their families (161, 67.1%). A significant number of the respondents (160, 66.7%) opined that the herbal medicines could be taken with conventional or allopathic medications. Male students were significantly more inclined towards use of herbal medicine than their female counterparts ($p < 0.05$).

Conclusion: Medical students were found to be unaware of some important aspects regarding herbal medicines, like use of herbs with drugs without consultation. Inclusion of proper courses on alternative medicine in medical curriculum can fill this gap and clarify the misconceptions among medical students.

Keywords: Herbal medicine knowledge; attitude; practice; medical student awareness; Jeddah; Saudi Arabia.

INTRODUCTION

Herbal medicine is described as the use of herbs or plants products derived from various parts of the plants like leaves, roots, flowers, fruit, berries, etc. for medicinal purposes. Herbal medicines as dietary supplements are extensively used worldwide for sustaining wellbeing, boosting immunity or to cure diseases [1,2]. Many studies have suggested numerous propitious effects of herbal medicines like gastroprotective, anti-inflammatory, and anti-Helicobacter pylori, etc. [3]. In Africa, 80% of the population uses various types of herbal medicine products, for these reasons many governments, institutes and companies have invested millions of dollars looking for promising medicinal herbs [4].

In Saudi Arabia, there is a lack of data in this field and only few studies have been conducted

to-date. Al-Faris *et al* in 2008 investigated the pattern and prevalence of use of alternative medicine in Riyadh through a household survey [5]. The results revealed a high tendency of public towards alternative medicine which is partly due to perceived failure of modern medical treatment. In 2012, another study in Riyadh region examined the attitude, knowledge and practice of complementary and alternate medicine (CAM) in community, through a household survey which showed that a high level of prevalence and interest of public in the use of CAM in Riyadh region [6]. Another study was done on specific population (pregnant women) regarding attitudes, knowledge and prevalence about using the herbal medicine during pregnancy, labor and the post-partum period. They found that the prevalence of using herbal medicine during these periods was relatively high [7]. As students particularly those related to the health sciences, are an important part of society, it may be appropriate to study medical students knowledge and attitude towards herbal medicines. In this aspect, a cross-sectional survey was conducted in 2015 in Ghana about CAM on 203 medical students [8]. In this study, the overall knowledge score was 19.6%, and the knowledge regarding CAM in students of higher classes was significantly more than in the lower classes. This study revealed that the herbal medicines were used by most of the students and the main source of information regarding the CAM were relatives and friends. Majority of the students' showed a positive attitude towards CAM and favored the addition of CAM into the health science curriculum. Gender, year of study, residential locality of the student didn't significantly affect attitude towards CAM usage. Another questionnaire-based descriptive and cross-sectional study was conducted in Kuwait University in 2012. In this study 250 students were randomly selected from the College of Pharmacy and Medicine [9]. It also indicated that the herbal products were commonly used by students. The knowledge about herbal products was significantly higher among pharmacy students than the medical students. Lack of scientific evidence and trained professionals were the most commonly perceived barriers for implementation of CAM.

The above studies highlighted that use of herbal medicine among general population is becoming increasingly common. As we know that patients normally try home remedies before seeking consulation with a medical practitioner. Knowledge of the herbal medicine will help doctors in treating the patient in a better way. Therefore, it is now more important than before, that the medical students as future doctors, must posess some knowledge of herbal medicine and it is very pertinent that they are also privy of usage of herbal medicine. Since there has been no study among the medical students with respect to herbal medicines in the Kingdom of Saudi Arabia, this study was aimed to assess the knowledge, attitude, and practice regarding herbal medicines among medical students in King Saud bin Abdulaziz University for Health Sciences (KSAU-HS), Jeddah campus.

METHODS

Participants and Setting

A cross-sectional survey was carried out among medical students (2nd to 6th year) of King Abdulaziz University for Health Sciences (KSAU-HS) in February 2018. Self-administered questionnaire was distributed, and the participants filled out the survey directly on site. The researchers were present during the survey to answer any query. The required sample size was estimated using Roasoft® at the 95 percent confidence level with ±5% margin of error. The required minimum sample size was determined to be 202. Non-probability convenience sampling technique was employed. All students above the age of 18 and currently enrolled in the medical college were included.

Development and Validation of Questionnaire

Questionaire for this study was created after survey of available literature [9-11]. The face validity of the questionnaire was done by biostatisticians and health professionals while the content validity was also done by the subject expert. Arabic translation of the questionnaire was also done to remove the language barrier and was checked by a language expert. After getting the approval from King Abdullah International Medical Research Centre (study number SP18/071/J and Memo. Ref. No. IRBC/0911/1), the questionnaire was distributed among the medical students who were requested to complete the questionnaire. Informed consent was taken from each participant before filling the questionnaire.

The questionnaire was designed to assess students in four areas namely knowledge, demographic, attitude and practice of herbal medicine. The first part was gathering of demographic information of the students, the second part was used to get information about student' knowledge of herbal medicine, the third part was for assessing the student' attitude about herbal medicine, and the fourth part was for assessing student' practice or usage of herbal medicine. All questions in the questionnaire were close-ended questions except for the first part because it was related to gathering the demographic data.

Response for the closed-ended questions in the second part was "yes", or"no". The answer "yes" carried three points, and "no" two points. Part three responses for the closed-ended questions were "yes", "no", and "not sure". The answer "yes" carried three points, "no" two and "not sure" one point. Part four responses for five closed-ended questions were "strongly agree", "agree", "neutral", "disagree" and, "strongly disagree". "Strongly agree" carried five points, four points for "agree", three points for "neutral", two points for "disagree", and one point for "strongly disagree".

Statistical Analysis

Data was stored in Microsoft Excel and analyzed by Statistical Package for the Social Sciences (SPSS) IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Qualitative variables, like gender, were presented by frequency, and percentage. Quantitative variables were presented as mean and standard deviation. Chi-square was used for comparison of two cateogorical variables. p-value < 0.05 was defined as significant.

RESULTS

A pilot test was conducted on 24 medical students from 4th and 5th year and Cronbach's alpha was calculated, which yielded a reliability of 0.75 (supplementary Table **1**). A total of 240 students participated in the survey, out of which 146 (60.8%) were males while 94 (39.2%) were females with a mean age of 21.37 + 2.22 years (mean+SD). The 227 (94.6%) were single while 13 (5.4 %) were married. About one-third 71 (29.6%) respondents were 2nd-year students followed by 70 (29.2%) 3rd-year students, however, only 18 (7.5%) were 4th-year students. Few of the respondents had chronic illnesses such as respiratory disease (25, 10.4%), diabetes mellitus (4, 1.7%), hypertension (2, 0.8%), heart disease (2, 0.8%) and joint disease (2, 0.8%). The 191 (79.6%) of the respondents did not visit the herbal medicine store and 190 (79.2%) had not used the herbal medicines before. Majority of the participants (38 out of the 50) who had taken herbal medicine in the last 6 months, used herbal medicine without consulting doctor. Interestingly, abdominal pain (64%) was the main reason to consume herbal medicine among the participants who consumed herbal medicine. The complete demographic profile of the respondents is shown in Table **1**.

Table 1. Descriptive Statistics for Students' Demographic Characteristics.

Demographics (N= 240)	***n***	**%**
Age = 21.37± 2.22 years (mean±SD)		
Gender		
Male	146	60.8
Female	94	39.2
Marital Status		

Single	227	94.6
Married	13	5.4
Academic Year		
2nd year	71	29.6
3rd year	70	29.2
4th year	18	7.5
5th year	53	22.1
6th year	28	11.7
Present chronic illness		
Respiratory disease	25	10.4
Diabetes mellitus	4	1.7
Hypertension	2	0.8
Heart disease	2	0.8
Joint disease	2	0.8
Personal health condition		
Poor	1	0.4
Fair	4	1.7
Good	14	5.8
Very good	22	9.2
Excellent	199	83.0
Number of visits to herbal store before		
10 visits and more	40	16.7
5-10 visits	5	2.1
1-4 visits	4	1.6
No visit	191	79.6
Have taken herbal medicines in the past 6 months		
No	190	79.2
Yes	50	20.8
Total	240	
Source of herbal medicine taken		
Prescribed and given by hospital clinic after consultation	3	6
Purchased from retail pharmacy	3	6
Purchased from herbal store without consultation to doctor	36	72
Use from someone else herbal medicine	6	12
Purchased from retail pharmacy + Purchased from Herbal store without consultation to doctor	1	2
Purchased from herbal store without consultation to doctor + Use from someone else medicine	1	2

Reason for taking herbal medicine		
Abdominal pain	32	64
Dental pain	5	10
Skin disease	11	22
Abdominal + Dental pain	1	2
Abdominal pain + Skin disease	1	2
Total	50	

Majority of respondents 148 (61.7%) showed an adequate knowledge of herbal medicines as shown in Table **2**. Respondents mostly agreed that the use of herbal medicines does not prevent (n=184, 76.7%) and cure (n=196, 81.7%) all diseases and must need consultation with a doctor for its use (179, 74.6%). In addition, majority of the respondents 130 (54.2 %) believed that herbal medicines are not from animal source, however, 31 (12.9 %) of them were certain that herbal medicines can come from the animal source. Eighty four (35.0%) of the respondents agreed that the use of herbal medicines has less side effects and 182 (75.8%) of the respondents were certain that overuse of herbal medicines causes or produces adverse effects.

Table 2. Respondents' Knowledge of Herbal Medicines.

No.	Statements	Not Sure	No	Yes
1	Herbal medicines can be from animal source	79 (32.9%)	130 (54.2%)	31 (12.9%)
2	Herbal medicines can prevent all diseases	44 (18.3%)	184 (76.7%)	12 (5.0%)
3	Herbal medicines can cure all diseases	34 (14.2%)	196 (81.7%)	10 (4.2%)
4	Herbal medicines are preferred because of less side effects	77 (32.1%)	79 (32.9%)	84 (35.0%)
5	Herbal medicines is always safe	42 (17.5%)	177 (73.8%)	21 (8.8%)
6	Overuse of herbal medicines can cause adverse effect	35 (14.6%)	23 (9.6%)	182 (75.8%)
7	Herbal medicines can be taken with conventional or allopathic medications	64 (26.7%)	16 (6.7%)	160 (66.7%)
8	Herbal medicines don’t need consultation with doctors	41 (17.1%)	179 (74.6%)	20 (8.3%)
9	Herbal medicines don’t expire	52 (21.7%)	73.3% (176)	12 (5.0%)

Table **3** summarizes the association between gender and the knowledge of herbal medicine. It can be seen from the results that female gender is associated with more knowledge on the source of herbal medicine ($p > 0.05$). Among the respondents, 25 males while only 6 females thought that the herbal medicine can be from animal source. A significant association ($p > 0.05$) was also found between gender of students and the preference of herbal medicine because of fewer side effects. More male students (53) compared to female students (31) believe that herbal medicines are preferred due to their safety. Similarly, male gender was significantly associated ($p < 0.05$) with the knowledge that overuse of herbal medicines can cause adverse effects. Among the participants 108 males and 74 females considered that adverse effects can be caused by excessive consumption of herbal medicines.

Table 3. The Association of Gender with Knowledge of Herbal Medicine.

Knowledge of Herbal Medicines		Gender		
		Male	Female	p-value
Herbal medicines can be from animal source	Not sure	53(36.3)	26(27.7)	0.006
	No	68(46.6)	62(66)	
	Yes	25(17.1)	6(6.4)	
Herbal medicines can prevent all diseases	Not sure	31(21.2)	13(13.8)	0.287
	No	109(74.7)	75(79.8)	
	Yes	6(4.1)	6(6.4)	
Herbal medicines can cure all diseases	Not sure	19(13)	15(16)	0.388
	No	119(81.5)	77(81.9)	
	Yes	8(5.5)	2(2.1)	
Herbal medicines are preferred because of less side effects	Not sure	55(37.7)	22(23.4)	0.010
	No	38(26)	41(43.6)	
	Yes	53(36.3)	31(33)	
Herbal medicines is always safe	Not sure	30(20.5)	12(12.8)	0.134
	No	101(69.2)	76(80.9)	
	Yes	15(10.3)	6(6.4)	
Overuse of herbal medicines can cause adverse effect	Not sure	29(19.9)	6(6.4)	0.003
	No	9(6.2)	14(14.9)	
	Yes	108(74)	74(78.7)	
Herbal medicines can be taken with conventional or allopathic medicines	Not sure	31(21.2)	33(35.1)	0.057
	No	11(7.5)	5(5.3)	
	Yes	104(71.2)	56(59.6)	
Herbal medicines don't need consultation with doctors	Not sure	25(17.1)	16(17)	0.997
	No	109(74.7)	70(74.5)	
	Yes	12(8.2)	8(8.5)	
Herbal medicines don't expire	Not sure	34(23.3)	18(19.1)	0.746
	No	105(71.9)	71(75.5)	
	Yes	7(4.8)	5(5.3)	
	Total	146	94	

Table **4** shows the attitude of respondents regarding the use of herbal medicines while Table **5** summarizes the association of gender with attitudes towards herbal medicine. One hundred twenty three (51.3%) of the respondents agreed that herbal medicine can be used to help maintain and promote health and 127 (52.9%) of the respondents agreed that it can be used to treat illnesses. No significant difference was found by our results between gender and attitude towards herbal medicine except for the use of herbal medicines to treat illness ($p > 0.05$). Male students (82) were found to be more inclined towards the use of herbal medicine in treating illness compared to female students (45).

Table 4. Respondents' Attitude Towards Herbal Medicines.

No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
1	Herbal medicines can be used to help maintain and promote health	1 (.4%)	15 (6.3%)	67 (27.9%)	123 (51.3%)	34 (14.2%)
2	Herbal medicines can be used to treat illness	3 (1.3%)	26 (10.8%)	54 (22.5%)	127 (52.9%)	30 (12.5%)
3	Herbal medicines are safe because they are made from natural ingredients	24 (10.0%)	93 (38.8%)	76 (31.7%)	38 (15.8%)	9 (3.8%)
4	Herbal medicines are better for me than conventional or allopathic medicines	62 (25.8%)	75 (31.3%)	83 (34.6%)	16 (6.7%)	4 (1.7%)
5	A lot of health claims made by the manufacturers of Herbal medicines are unproven	79 (32.9%)	80 (33.3%)	59 (24.6%)	16 (6.7%)	6 (2.5%)
6	I don't feel that herbal medicines are dangerous for children	68 (28.3%)	78 (32.5%)	67 (27.9%)	22 (9.2%)	5 (2.1%)

Table 5. Association of Gender with Attitude Towards Herbal Medicine.

Attitude towards herbal medicines		Gender		
		Male	Female	p-value
Herbal medicines can be used to help maintain and promote health	Strongly disagree	1(0.7)	0(0.0)	0.591
	Disagree	10(6.8)	5(5.3)	
	Neutral	38(26)	29(30.9)	
	Agree	73(50)	50(53.2)	
	Strongly agree	24(16.4)	10(10.6)	
Herbal medicines can be used to treat illness	Strongly disagree	0(0.0)	3(3.2)	0.002
	Disagree	11(7.5)	15(16)	
	Neutral	28(19.2)	26(27.7)	
	Agree	82(56.2)	45(47.9)	
	Strongly agree	25(17.1)	5(5.3)	
Herbal medicines are safe because they are made from natural ingredients	Strongly disagree	16(11)	8(8.5)	0.105
	Disagree	48(32.9)	45(47.9)	
	Neutral	47(32.2)	29(30.9)	
	Agree	29(19.9)	9(9.6)	
	Strongly agree	6(4.1)	3(3.2)	

Herbal medicines are better for me than Conventional or allopathic medicines	Strongly disagree	36(24.7)	26(27.7)	0.571
	Disagree	47(32.2)	28(29.8)	
	Neutral	53(36.3)	30(31.9)	
	Agree	9(6.2)	7(7.4)	
	Strongly agree	1(0.7)	3(3.2)	
A lot of the health claims made by the manufacturers of Herbal medicines are unproven	Strongly disagree	45(30.8)	34(36.2)	0.859
	Disagree	48(32.9)	32(34)	
	Neutral	39(26.7)	20(21.3)	
	Agree	10(6.8)	6(6.4)	
	Strongly agree	4(2.7)	2(2.1)	
I do not feel that Herbal medicines are dangerous for children	Strongly disagree	42(28.8)	26(27.7)	0.373
	Disagree	45(30.8)	33(35.1)	
	Neutral	46(31.5)	21(22.3)	
	Agree	10(6.8)	12(12.8)	
	Strongly agree	3(2.1)	2(2.1)	
	Total	146	94	

Chi-square test

However, it was surprising that 122 (50.8%) of the participants responded that they will not take herbal medicines when they get sick and 161 (67.1%) of the respondents did not prefer to give the herbal medicines to their family members if they were taken ill. Moreover, 113 (47.1%) of the respondents opined that they will prefer to consult a doctor before taking the herbal medicines. An encouraging finding of the survey was that majority of the participants i.e. 147 (61.3%) look at the expiry date before taking herbal medicines (Table **6**).

Table 6. Respondents' Practices Towards Herbal Medicines Usage.

No	Statements	Not sure	No	Yes
1	When get sick, I first take Herbal medicines to help me get better	27 (11.3%)	122 (50.8%)	91 (37.9%)
2	I consult a doctor before taking Herbal medicines	24 (10.0%)	103 (42.9%)	113 (47.1%)
3	I also give Herbal medicines to my family members if they get sick	35 (14.6%)	161 (67.1%)	44 (18.3%)
4	I take herbal medicines in case of acute conditions like severe pain	26 (10.8%)	180 (75.0%)	34 (14.2%)
5	I give herbal medicines to my children if they suffer from fever or pain	44 (18.3%)	153 (63.8%)	43 (17.9%)
6	I take herbal medicines according to the instruction on the label	51 (21.3%)	74 (30.8%)	115 (47.9%)
7	I always look at the expiry date of Herbal medicines before taking git	37 (15.4%)	56 (23.3%)	147 (61.3%)
8	I advise others to take Herbal medicines whenever they have problems	71 (29.6%)	133 (55.4%)	36 (15.0%

DISCUSSION

Herbal medicines are plant-derived substances. They have gained popularity as complementary medicine, traditional, and alternative modality in the prevention and treatment of illness. The phytochemicals or biologically active functional components of herbal medicines have claimed for its therapeutic effectiveness, however, limited clinical evidence is available for its clinical safety and efficacy [12,13].

The herbal medicines are used in the form of raw plant materials, processed plant materials and medicinal herbal products. In some traditions, inorganic materials or animal tissues may also be present in herbal products [14]. Although, 54% of the respondents of this study believed that the components of herbal medicines are from plant sources but surprisingly, 12.9 % of the respondentswere certain that herbal medicines are from animal sources. The possible explanation of this difference in their perception could be based on their own views or misconceptions about the sources of herbal medicines. For instance, a combination of animal tissues with medical herbs are being recommended and practiced in Traditional Chinese Medicine (TCM) or CAM and still being used as a health remedy in many countries around the world. The clinical use of these preparations is often based on symptomatology (e.g. Yin and Yang), tradition and health belief, but without scientific evidence of efficacy [15].

In Saudi Arabia, the Saudi Food and Drug Authority (SFDA) is the regulatory authority for any material of animal source contained in any herbal products and need to be specified by the manufacturer for product evaluation before it can be authorized for marketing [16]. Nevertheless, no local studies have been done to assess consumer's knowledge concerning the source of the herbal medicine they use. However, dispensing of unregistered herbal medicines through several outlets and community pharmacies is still being practiced and it's use continues to be a public health concern [17,18]. Control of safety and quality assurance of commercial herbal medicine needs to be strengthened by strict scrutiny of these products, regulating practices and practitioners.

On the other hand, herbal medicine use among chronically ill patients is increasing even without consultation with physician before its use. Unfortunately, healthcare professionals do not respond to patients' inquiries concerning use of herbal medicine [19]. This study also showed that majority of the medical students (179, 74.6%) agreed that the herbal medicine use indeed needs consultation with a doctor to prevent any side effects or adverse effects it can cause or to avoid drug-herb interactions that could make health condition becomes worse. This gives importance to educate healthcare practitioners such as community pharmacists and physicians to effectively communicate about these medicines and advise consumers/patients regarding the safe and effective use of these herbal medicines. Availability of the herbal medicinal information for health practitioners, consumers, patients is indeed necessary.

Because of the growing popularity of herbal medicine among the general population, health sciences students are also showing interest in learning about alternative healing modalities, especially herbal and natural products. A study conducted in Egypt among medical students also documented the interest of medical students in CAM and recommended to incorporate CAM education and training to all concerned people including medical students [20]. This suggests the importance and inclusion of CAM courses in the curriculum of health profession education, which will benefit the community in both the use and misuse of CAM. Therefore, the academic curricula and health policies need to be revised and a standardized health care practice of CAM is needed to ensure public protection. In response to this demand, one medical school has developed and implemented a novel electives program for the fourth-year medical students. This natural/herbal medicine course uses classroom presentations, guest lecturers and active learning mechanisms that include case-based learning, experiential rotations and team-based learning to improve knowledge of students towards natural/herbal medicine efficacy and safety [21]. Also, the finding of this study is in agreement with the one done in Riyadh region, in which health professionals with a bachelor's degree and doctorate degree have significantly higher knowledge of CAM than subjects with a master's, diploma or fellowship degree [22]. Similarly, studies on medical students showed that the attitude and knowledge towards CAM significantly improved across some sub items of CAM questionnaire with a positive trend in the rest of its items including their views on CAM practices [21,23]. Our study revealed that majority of the student-respondents believed that the herbal medicines could

treat some illness but still they do not prefer to recommend or use it when they get sick. This might be due to the lack of proper and scientific knowledge provided to the medical students in their curriculum and call for a need to incorporate such courses.

Apart from knowledge, the attitude of health professionals towards herbal or complementary medicines also requires careful consideration in modern-day/conventional medical therapies. Literature highlighted the following factors that are considered to be influencing the use of herbal or complementary therapies: “a desire for greater personal involvement in the maintenance of health, holistic health beliefs”, “dissatisfaction with conventional care”, “lack of access to adequate health care services”, and “ready availability of CAM services” [24,25].

According to a study, majority of the participants reported to have a positive attitude concerning the use of herbal medicines, however, several studies have shown a variety of perceptions of health care providers regarding the use of herbal/Complementary therapies [24,26]. Senior doctors and health professionals discourage the use of CAM practices, which might be due to the limited availability of evidence of safety and lack of scientific validation of the CAM and its practices. Moreover, it may be because our study focused on the medical students and these other studies involved already trained and practicing healthcare professionals. Giannulli found that in Italy, 42% of general practitioners did not suggest the use of CAM to their patients. However, some studies have indicated that general practitioners and specialists accept the use of CAM [27].

Physicians in Russia and Germany encourage the use of herbal/complementary medicine along with modern/conventional medicine, whereas the physicians in USA did not reflect positive opinion about herbal/complementary medicine. Still around 44% of physicians referred patients to CAM practitioners [28,29]. Similarly, in Netherlands and UK, most of the physicians referred their patients to CAM practitioners [30-32]. In addition, pharmacists also suggest the need for the continuous training on the use of herbs/complementary medicine and their interaction with drugs [33]. As far as use of herbal medicines by medicial students is concerned, our study revealved low consumption of herbal medicines by medical students (50 out of 240 i.e. 20.8 %). This is in contrast to a study conducted in Ghana where 54.7 % of medical students used herbal medicine [34]. This might be due to the fact that avaiallitbiy of conventional medicine is comparatively low in Arfican countries like Ghana compared to Saudi Arabia which resulted in more consucmpiton of alternative medicine. Interestingly, another study conducted in Turkey among medical students revealed high consumption of herbal medicines (73.4 %) without having sufficient knowledge about medicinal herbs and hence the researchers recommended to increase the level of awareness among medical students [35]. Drug-herb interaction has gained enormous attention in the past few decades and it may result in harmful events in some cases [36,37]. In our findings, majority of the medical students believed that herbal medicines can be taken with allopathic or conventional drugs which is bit alarming. These misconceptions can be corrected by incorporating drug-herb interaction-related topics in the curriculum. The above discussion concludes that CAM including herbal medicines is very much prevalent in society at a certain level among various healthcare professionals. However, proper knowledge and awareness is lacking across the board. Moreover, with the recent focus of researchers on the evidence-based evaluation of medicinal plants, herbal medicines like psyllium husk are not only prescribed by traditional but also conventional medicine doctors [38,39]. This creates a dire need to increase the awareness regarding herbal medicines across all healthcare professionals including doctors, pharmacists and as well as health science students which will ultimately help in elevating the overall health of the society.

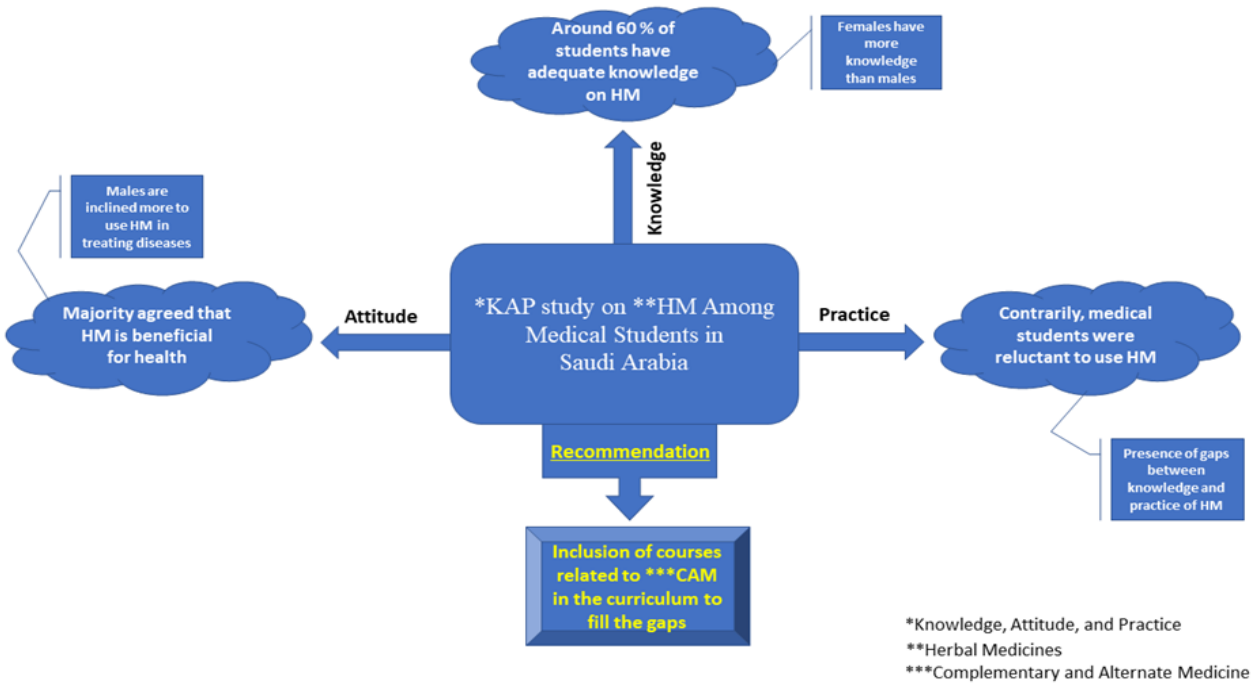

Figure 1. Summary of the Findings of the Study in Graphical Form.

CONCLUSION

The widespread knowledge and varying attitudes towards the use of herbal/complementary medicines among this group of future health care professionals is affected by varied factors. It is recommended that further and in-depth studies on the knowledge and attitude among other health care providers in the use of herbal medicines should be carried out to explore this commonly used entity in the society for the prevention and treatment of diseases. Furthermore, incorporation of appropriate courses in the undergraduate medical curriculum may help in clarifying the misconceptions regarding herbal medicine and bringing up the confidence in proper utilization of CAM entities to alleviate the concerns of patients (Figure **1**). This is the first study among medical students in Jeddah, Saudi Arabia using an elaborated and validated questionnaire. However, a higher sample size and probability sampling technique could further increase the strength of such studies. In our research there can be response bias as the students might be in a hurry and answered in untruthfully or misleadingly. Furthermore, findings of this single-centered study cannot be generalized to students of whole Saudi Arabia.

Declarations

Ethics Approval and Consent to Participate

The study was approved by the Institutional Review Board of Medical Research Center with the study number SP18/071/J and Memo. Ref. No. IRBC/0911/1 while the written informed consent was taken from each participant before the study.

Availability of Data and Materials

The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Supplementary Table 1.

Reliability Statistics

Cronbach's Alpha	N of Items
.758	24

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Herbal medicines are made from plant source	56.69	67.936	.028	.765
Herbal medicines can be from animal source	57.52	69.901	-.129	.772
Herbal medicines can prevent all diseases	57.28	66.207	.172	.757
Herbal medicines can cure all diseases	57.24	65.475	.245	.753
Herbal medicines are preferred because of less side effects	56.97	62.534	.410	.743
Herbal medicine is always safe	57.52	65.116	.260	.753
Overuse of herbal medicine can cause adverse effect	57.21	66.956	.081	.764
Herbal medicine can be taken with conventional or allopathic medicines	56.97	62.463	.443	.742
Herbal medicines don't need consultation with doctors	57.17	63.433	.530	.741
Herbal medicines don't expire	57.45	65.470	.246	.753
Herbal medicines can be used to help maintain and	55.79	58.527	.684	.724
Herbal medicines can be used to treat illness	55.59	58.394	.630	.726
Herbal medicines are safe because they	55.83	56.791	.619	.723
Herbal medicines are better for me than	56.31	60.865	.360	.746
I don't feel that Herbal medicines are dangerous for children	57.03	60.677	.405	.742
I prefer Herbal medicines because they are cheap and easily	55.97	62.249	.350	.747
When get sick, I first take Herbal medicines to help me get better	57.00	64.929	.204	.757
I do not consult doctors before taking Herbal medicines	57.31	64.150	.287	.751
I also give Herbal medicines to my family members if they get	56.97	62.249	.531	.738
I take Herbal medicines in case of acute conditions like severe pain	57.21	69.027	-.071	.776
I give Herbal medicines to my children if they suffer from fever o	57.10	69.167	-.069	.770
I take Herbal medicines according to the instruction on the label	57.03	64.034	.284	.751

I always look at the expiry date of Herbal medicines before taking	56.72	66.207	.164	.758
I advise others to take Herbal medicines whenever they have	57.07	61.352	.419	.742