Complementary and Alternative Medicine: Are Medical Students in AlKhobar, Saudi Arabia Interested?

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Abstract
This study aimed to assess the knowledge and attitude of medical students toward complementary and alternative medicine. A cross-sectional design was used, in which a total of 319 fourth- to sixth-year medical students at a local university hospital participated in self-administered questionnaires during the academic year of 2018-2019. The questionnaire assessed levels of perceived knowledge, attitude, and willingness to recommend complementary and alternative therapies. It showed that most students (95.6%) have heard of complementary and alternative medicine previously, and 74.6% of students held a positive attitude toward it. The majority had perceived knowledge about nutritional supplements (63.2%), prayer (60.9%), and yoga/meditation (60.9%), but less than 50% had perceived knowledge about other common therapies. Only 8.7% of the participants thought that their current knowledge about complementary and alternative medicine is adequate. Students were willing to recommend therapies that they were most familiar with, namely prayer (82%), massage (74%), and yoga/meditation (72.6%). Most students (60.5%) got their information about complementary and alternative medicine from the university curriculum. Yet, they did not believe that it provided them with adequate information. In conclusion, medical students showed a positive attitude toward complementary and alternative medicine despite their limited perceived knowledge. We recommend incorporating a complementary and alternative medicine course in the medical curricula that focuses on common therapies in Saudi Arabia.

Introduction
Complementary and alternative medicine (CAM) refers to a group of medical practices and therapies that lie outside the scope of conventional medicine, either in conjunction with conventional medicine (complementary), or used on their own (alternative) [1,2].

Health practitioners and medical students should be aware of the common modalities to advise patients on the proper use and warn them about their risks [3].

The scarcity of data regarding CAM and its modalities in the region prompted this study to assess the knowledge and attitude of medical students toward CAM, identify sources of information and assess their willingness to recommend CAM treatment(s).

Materials and Methods

Study design and setting
A quantitative cross-sectional study was performed among fourth- to sixth-year medical students at a local university hospital, during the 2018-2019 academic year. A total of 730 students were enrolled. The sample size was calculated to be 252 using EpiInfoTM version 3.1.3, at a 95% confidence level. However, 319 students completed the questionnaire, which exceeded the minimum required sample size and corresponded to a response rate of 96.6%. Students were allocated using stratified sampling with proportional allocation according to gender and academic year. The study comprised 146 males (45.8%) and 173 females (54.2%) in their clinical years: fourth year (n = 122 [38.2%]); fifth year (n = 107 [33.5%]) and sixth year (n = 90 [28.2%]).

Tools
A modified self-administered anonymous questionnaire was designed, with some questions being adapted from questionnaires used by other studies [4-7]. The questionnaire included sociodemographic factors (age, gender, academic year, nationality, marital status, parents’ level of education and their occupations, and monthly household income). The knowledge section was an assessment of the participants’ perceived knowledge about CAM; more specifically, whether they believed their information regarding CAM was sufficient, and their sources of information. This comprised 12 different CAM modalities: herbal therapy, massage, prayer, music, acupuncture, cupping, chiropractic, cauterization, yoga/meditation, homeopathy, aromatherapy, and nutritional supplements. The attitude section assessed students’ attitude using seven three-point Likert scale statements. Points for positive statements were allocated as follows: three for agreement,
two for neutral, and one for disagreement. Negative statements were scored in reverse, as follows: three points for disagreement, two points for neutral, and one point for agreement. Finally, participant willingness to recommend different CAM modalities to patients in future practice was also assessed.

Data were collected by five data collectors, one or two collectors for each batch, one male and the other female, starting from November 2018.

A pilot study was conducted among 24 fourth- to sixth-year male and female students. Feedback from the students was taken into consideration for refinement before wider distribution. The validity of the questionnaire was assessed with the help of four academic members of the Faculty of Family and Community Medicine. Reliability measured using Cronbach’s alpha was found to be 0.83.

Statistical analysis
The data were entered and analyzed using SPSS version 22.0 (IBM Corporation, Armonk, NY, USA); statistical significance was set at p-value of ≤ 0.05. Continuous data are expressed as mean and standard deviation, while categorical data are expressed as frequencies and percentages. Association(s) between different variables was measured using the t-test and chi-squared test. Missing data were very minimal, and analyses were performed using only valid data while reporting the denominator of each percentage calculated. In addition, mean scores and mean percent scores were calculated for the attitude section. A mean percent score ≥ 75% was defined as positive, 50% to < 75% as neutral, and < 50% as negative.

Results

Demographics
The mean (± SD) age of the students was 22.14 ± 0.93 years (range, 20 to 25 years). Sociodemographic characteristics of the study sample are summarized in Table 1.

Table 1: Sociodemographic characteristics of medical students in their clinical years.

| Sociodemographic factors       | No. (n=319) | Percent |
|-------------------------------|------------|---------|
| Gender                        |            |         |
| Male                          | 146        | 45.8    |
| Female                        | 173        | 54.2    |
| Nationality                   |            |         |
| Saudi                         | 317        | 99.4    |
| Non-Saudi                     | 2          | 0.6     |
| Marital status (n=317)        |            |         |
| Single                        | 275        | 86.8    |
| Married                       | 39         | 12.3    |
| Divorced                      | 3          | 0.9     |
| Father's education (n=318)    |            |         |
| Less education (Illiterate, can read and write, elementary, high school or diploma) | 140 | 44 |
| Higher education (Bachelor, master or Ph.D.) | 178 | 56 |
| Father's occupation (n=301)   |            |         |
| Freelance (business man, tradesman) | 55 | 18.3 |
| Physician, engineer, or university professor | 86 | 28.6 |
| Soldier                       | 26         | 8.6     |
| Salesman, government employee, teacher, nurse, admin officer (secretary, writer) | 97 | 32.2 |
| Other                         | 37         | 12.3    |
| Mother’s education (n=318)    |            |         |
| Less education (Illiterate, can read and write, elementary or intermediate, high school or diploma) | 166 | 52.2 |
| Higher education (Bachelor, master or Ph.D.) | 152 | 47.8 |
| Mother’s occupation (n=306)   |            |         |
| House wife                    | 185        | 60.5    |
| Working                       | 121        | 39.5    |
| Income (n=315)                |            |         |
| <5,000 SAR                    | 12         | 3.8     |
| 5,000 – 10,000 SAR            | 51         | 16.2    |
| >10,000 SAR                   | 252        | 80.0    |

Knowledge of CAM
The majority (95.6% [n=306]) of students previously heard of CAM. Of these students, 91.3% believed that their current knowledge about CAM was insufficient. A statistically significant difference was observed between males and females, in which male students had higher self-perceived knowledge about cupping (odds ratio [OR] = 1.89 [95% CI: 1.2–2.96]), aromatherapy (OR = 1.87 [95% CI: 1.02–3.43]), chiropractic (OR = 2.32 [95% CI: 1.2–4.5]), and homeopathy (OR= 2.01 [95% CI: 0.98–4.18]) than females. In contrast, females had higher self-perceived knowledge about yoga/meditation than males (OR = 1.55 [95% CI: 1.042–2.3]).

Table 2: Self-perceived knowledge among medical students in their clinical years regarding CAM modalities, by gender.

| CAM modality         | Gender     | No. (n=306) | Percent | X² (p-value) |
|----------------------|------------|-------------|---------|--------------|
|                      | Gender     | Male        | Female  | Total        |              |
| Nutritional supplements |            | 84          | 107     | 191          | 63.2         | .233 (.629) |
| Prayer               |            | 87          | 98      | 185          | 60.9         | 1.003 (.317) |
| Therapy           | Males | Females | Total | Males | Females | Total | p Value |
|------------------|-------|---------|-------|-------|---------|-------|---------|
| Yoga/meditation  | 72    | 53.3    | 112   | 67.1  | 184     | 60.9  | 5.914 (0.015) |
| Cupping          | 75    | 55.1    | 62    | 37.6  | 137     | 45.5  | 9.282 (0.002) |
| Massage          | 59    | 43.4    | 59    | 35.1  | 118     | 38.8  | 2.161 (0.142) |
| Music            | 54    | 39.7    | 53    | 31.9  | 107     | 35.4  | 1.977 (0.160) |
| Acupuncture      | 32    | 38.2    | 53    | 31.9  | 105     | 34.8  | 1.311 (0.252) |
| Herbal therapy   | 47    | 34.6    | 55    | 32.9  | 102     | 33.7  | .089 (.766)   |
| Aromatherapy     | 30    | 22.1    | 21    | 12.7  | 51      | 16.9  | 4.613 (0.032) |
| Chiropractic     | 28    | 20.6    | 16    | 9.8   | 44      | 14.7  | 6.855 (0.009) |
| Homeopathy       | 22    | 16.2    | 14    | 8.5   | 36      | 12.0  | 4.109 (0.043) |
| Cauterization    | 17    | 12.6    | 17    | 10.3  | 34      | 11.3  | .387 (.534)   |

*Association is significant at 0.05 level of significance*

The university curriculum was the most reported source of CAM information for students (60.5%), followed by family and friends (51%) and journal articles (50.6%), while herbal stores were the least reported (16.9%) (see Figure 1). However, 66.6% of students believed that the university curriculum did not provide them with adequate information regarding CAM.

Females reported the following as sources information regarding CAM more than males: university curriculum (65.7% versus [vs.] 54.2%), journal articles (55.8% vs. 44.4%), and personal experience (39% vs. 22.5%); the differences were statistically significant. Websites were the only source reported by males more than females (45.8% vs. 39%), although the difference was not statistically significant.

Attitude toward CAM

The mean attitude score of medical students was 16.9 ± 2.3 (range, 7 to 21). Female students had a higher mean attitude score (17.4 ± 2) than the male students (16.3 ± 2.6). As illustrated in Figure 2, 74.6% of students exhibited a positive attitude toward CAM, while 24.8% had a neutral attitude, and 0.6% had a negative attitude.

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**Figure 1: Sources of CAM information of medical students in their clinical years.**

**Figure 2: Attitude toward CAM among medical students in their clinical years.**
Medical students’ attitude toward CAM is summarized in Table 3. The data revealed that 77.7% agreed that CAM practices should be approved by the ministry of health, 67.1% believed that hospitals should hire special CAM practitioners, and 65.2% agreed that CAM practices that are not scientifically proven should be discouraged. Agreement regarding the importance of encompassing CAM practices within the medical curricula was reported by 64% of students.

**Table 3: Attitudes toward CAM among medical students in their clinical years, by gender.**

| Attitude statement                                                                 | Gender | Total | X² (p-value) |
|-----------------------------------------------------------------------------------|--------|-------|--------------|
|                                                                                  | Male   | Female |               |
|                                                                                  | No. (n=146) | Percent | No. (n=173) | Percent | No. (n=319) | Percent |
| 1. The effects of CAM treatments are placebo effects. *                            | Agree | 35 | 24.6 | 35 | 20.3 | 70 | 22.3 | 1.922 (.383) |
|                                                                                  | Neutral | 49 | 34.5 | 72 | 41.9 | 121 | 38.5 |
|                                                                                  | Disagree | 58 | 40.8 | 65 | 37.8 | 123 | 39.2 |
| 2. CAM practices should be approved by the ministry of health.                    | Agree | 103 | 72.5 | 141 | 82.0 | 244 | 77.7 | 4.003 (.135) |
|                                                                                  | Neutral | 29 | 20.4 | 23 | 13.4 | 52 | 16.6 |
|                                                                                  | Disagree | 10 | 7.0 | 8 | 4.7 | 18 | 5.7 |
| 3. Effectiveness of conventional medicine alone is less than that of conventional medicine combined with CAM. | Agree | 61 | 43.0 | 79 | 45.9 | 140 | 44.6 | .955 (.620) |
|                                                                                  | Neutral | 57 | 40.1 | 60 | 34.9 | 117 | 37.3 |
|                                                                                  | Disagree | 24 | 16.9 | 33 | 19.2 | 57 | 18.2 |
| 4. Hospitals should hire special CAM practitioners.                               | Agree | 73 | 51.8 | 137 | 79.7 | 210 | 67.1 | 31.844 (.000†) |
|                                                                                  | Neutral | 44 | 31.2 | 30 | 17.4 | 74 | 23.6 |
|                                                                                  | Disagree | 24 | 17.0 | 5 | 2.9 | 29 | 9.3 |
| 5. CAM practices that are not scientifically proven should be discouraged.        | Agree | 77 | 54.6 | 127 | 73.8 | 204 | 65.2 | 12.622 (.002†) |
|                                                                                  | Neutral | 41 | 29.1 | 29 | 16.9 | 70 | 22.4 |
|                                                                                  | Disagree | 23 | 16.3 | 16 | 9.3 | 39 | 12.5 |
| 6. CAM practices play no role in the treatment of serious diseases, such as cancer. * | Agree | 45 | 31.7 | 50 | 29.2 | 95 | 30.4 | 3.374 (.185) |
|                                                                                  | Neutral | 51 | 35.9 | 49 | 28.7 | 100 | 31.9 |
|                                                                                  | Disagree | 46 | 32.4 | 72 | 42.1 | 118 | 37.7 |
| 7. Medical curricula should encompass CAM practices.                               | Agree | 81 | 57.0 | 120 | 69.8 | 201 | 64.0 | 5.564 (.062) |
|                                                                                  | Neutral | 45 | 31.7 | 37 | 21.5 | 82 | 26.1 |
|                                                                                  | Disagree | 16 | 11.3 | 15 | 8.7 | 31 | 9.9 |

CAM, complementary and alternative medicine

*Negative statements
†Association is significant at 0.05 level of significance

There were significant differences in the attitude of male and female students: 79.7% of females believed that dedicated CAM practitioners should be hired in hospitals versus 51.8% of males. Similarly, 73.8% of females agreed that CAM practices that are not scientifically proven should be discouraged, versus 54.6% of their male counterparts (see Table 3).

**Willingness to recommend CAM**

Almost two-thirds (61.7%) of the participants would personally consider using CAM. As shown in Figure 3, the highest percentage of students were willing to recommend prayer (82%), followed by massage (74%), and yoga/meditation (72.6%) to their relatives and patients in the future. On the other hand, willingness to recommend chiropractic (14.3%) and cauterization (4.5%) was the least.

**Figure 3: Willingness to recommend different CAM modalities among medical students in their clinical years.**
Females reported willingness to recommend massage more than males (78.5% vs. 68.3%), as well as yoga/meditation (82.7% vs. 60.3%), with differences that were statistically significant. Conversely, males exhibited more willingness than females to recommend cupping (48.6% vs. 26%) and chiropractic (21.8% vs. 8.1%).

Discussion

Medicine has witnessed significant recent advances, and healthcare costs are rising; thus, more attention is being devoted to CAM by the population, which explains why its use has been increasing recently [9]. CAM is an important topic in the Saudi population and, accordingly, this study aimed to assess the knowledge and attitude toward CAM among clinical students at a local university hospital.

The response rate in our study was the highest (96.6%) among other similar studies conducted in Saudi Arabia (SA) (88.6%) [8] and several international studies [49]. This high response rate may reflect the positive attitude and willingness to learn more about CAM.

Most students in our study, however, believed that their knowledge about CAM was insufficient (91.3%). Sadeghi et al reported that 61% of Iranian students had insufficient information about CAM [7]. Furthermore, in a study from Ireland, Loh et al reported that approximately 65% of medical students did not retain sufficient knowledge about CAM [4].

The most common type of CAM used in the United States is nonvitamin, nonmineral dietary supplements, followed by deep breathing exercises and other meditation techniques, including yoga, tai chi, and qi gong. Chiropractic or osteopathic manipulation and massage therapy are also used [10]. The most commonly used CAM modality among adults in SA is spiritual practices such as prayer and reciting Quran. Other commonly used modalities include dietary supplements, herbs, and honey, while cupping was the least used [11].

In our study, nutritional supplements (63.2%), prayer (60.9%), and yoga/meditation (60.9%) were the most well-known CAM modalities among the students. In another study from SA, it was also reported that prayer is one of the five most known CAM modalities (32%) among students [8]. Yoga was also found to be one of the most well-known modalities in a study from Ghana (66.1%) [9]. Females in our study reported statistically higher knowledge regarding yoga/meditation than males (67.1% vs. 53.3%). This was in accordance with the findings reported in Ghana (70.6% vs. 60%). Conversely, our study revealed that males had higher self-perceived knowledge regarding aromatherapy (22.1%) than females (12.7%); however, the contrary was found in Ghana: more females (20.6%) were aware of aromatherapy than males (10.4%). All results were statistically significant [9].

The high level of awareness about prayer in the present study was not surprising because it was conducted in an Islamic country whose population believes in prayer and the Divine will according to God’s response to supplication and faith healing. Meanwhile, awareness of nutritional supplements and yoga/meditation may be acquired from gyms and spas where they are mostly practiced.

Among 90 health colleges in SA, there are no education programs or specialized degrees in CAM. CAM courses are included in the curricula of 12.2% of colleges, while 16.7% of colleges only allude to CAM-related topics in different courses [12].

The university curriculum was found to be the main source of information regarding CAM (60.5%) in our study. This was followed by relatives and friends (51%), which was the main source of information for many students in two Saudi-based studies conducted by Ahmad et al (32.1%) [13] and Al Mansour et al (20%) [14]. This could be attributed to the fact that they trust their peers’ and relatives’ personal experiences and perspectives.

In the present study, a positive attitude toward CAM was exhibited by 74.6% of medical students. This percentage was higher than that of the study from Iran (49%) [7], yet comparable with the study from Ghana (75.1%). [9] Most students were in favor of integrating CAM into the medical curricula (64%). This agreement toward encompassing CAM in the curricula was also reported in several studies: 55% in Iran; 60% in Saudi; and 71.5% in Ghana [5,7,4]. However, it was found to be lower in another study performed in SA (34.3%) and in Turkey (37.9%) [6,35]. These discrepancies may be attributed to students’ perception of the importance of CAM in medical practice.

Most medical students in our study (82%) were willing to recommend prayer to their patients and relatives, likely owing to the strong religious background of the Saudi population. Students were also willing to recommend massage (74%), yoga/meditation (72.6%), and nutritional supplements (67.6%), which were also among the most recommended modalities in two other studies conducted in Turkey and the United States [15,16]. This is speculated to be due to the students’ personal experiences and the widespread belief among students about their clinical utility [15,17]. It is worth noting that, in the present study, the higher percentage of females recommending yoga/meditation compared with males, was congruent with their high perceived knowledge about yoga/meditation. Similarly, males reported having sufficient knowledge about cupping and chiropractic more than females and were also more likely to recommend these modalities than females. The hesitancy in recommending cauterization and chiropractic in general could be a result of students’ lack of knowledge regarding these modalities. This was also observed in another study involving medical and nursing students conducted in Turkey in 2010 [15].

Our study was limited by the fact that data were self-reported and collected only from medical students in Al Khobar, SA. As such, larger-scale studies are required for the results to be more generalizable.

Conclusions

Despite having inadequate perceived knowledge about CAM, medical students exhibited a positive attitude toward it and encouraged integrating CAM into medical curricula. They also encouraged safe practices, meaning that it should be approved by the ministry of health to ensure that patients obtain accurate and unified medical advice. We recommend adding a CAM course to the curricula that focuses on common CAM therapies in SA, and their uses and possible risks.

Ethics approval and consent to participate

Ethical approval was obtained from the Office of Vice President for Research and Higher Studies of Imam Abdulrahman bin Faisal University on September 27, 2018 (IRB No. IRB- PCS- 2018-03-181). Written informed consent was obtained from all participants.

List of abbreviations

- CAM: Complementary and Alternative Medicine
- SA: Saudi Arabia

Data Availability
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Conflicts of Interest**

The authors declare that there is no conflict of interest regarding the publication of this paper.

**Funding Statement**

Not applicable.

**Authors’ contributions**

NA and SI have analysed, interpreted, and written the manuscript. MS have supervised the authors throughout their project. MA have assisted in the data analysis and interpretation. Both MS and MA have revised and edited the manuscript. All authors read, provided revisions, and approved the final manuscript.

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**Supplementary Materials**

See the questionnaire provided in the Supplementary Material that was distributed amongst the study population.

**References**

[1] Kasper DL, Hauser SL, Jameson JL, Fauci AS, Longo DL, Loscalzo J. Harrison's Principles of Internal Medicine. 19 ed: McGraw-Hill Education; 2015.

[2] NCCIH. Complementary, Alternative, or Integrative Health: What’s In a Name? 2018 [updated 2018]. Available from: https://nccih.nih.gov/health/integrative-health.

[3] Kessler RC, Davis RB, Foster DF, Van Rompay MI, Walters EE, Wilkey SA, et al. Long-term trends in the use of complementary and alternative medical therapies in the United States. Annals of internal medicine. 2001;135(4):262-8.

[4] Loh KP, Ghorab H, Clarke E, Conroy R, Barlow J. Medical students’ knowledge, perceptions, and interest in complementary and alternative medicine. Journal of alternative and complementary medicine (New York, NY). 2013;19(4):360-6.

[5] Al Mansour MA, Al-Bedah AM, AlRukban MO, Elsubai IS, Mohamed EY, El Olemy AT, et al. Medical students' knowledge, attitude, and practice of complementary and alternative medicine: a pre-and post-exposure survey in Majmaah University, Saudi Arabia. Advances in medical education and practice. 2015;6:407-20.

[6] Alzahrani SH, Bashawri J, Salawati EM, Bakarman MA. Knowledge and Attitudes towards Complementary and Alternative Medicine among Senior Medical Students in King Abdulaziz University, Saudi Arabia. Evidence-Based Complementary and Alternative Medicine. 2016;2016:7.

[7] Sadeghi M, Rabiepour S, Forough AS, Jabbari S, Shalahi S. A Survey of Medical Students’ Knowledge and Attitudes Toward Complementary and Alternative Medicine in Urmia, Iran. Journal of Evidence-Based Complementary & Alternative Medicine. 2016;21(4):306-10.

[8] Canizares M, Hogg-Johnson S, Gignac MAM, Glazier RH, Badley EM. Changes in the use practitioner-based complementary and alternative medicine over time in Canada: Cohort and period effects. PLoS One. 2017;12(5):e0177307-e.

[9] Ameade EP, Alnabla A, Helegbe GK, Mohammed BS. Medical students’ knowledge and attitude towards complementary and alternative medicine - A survey in Ghana. Journal of traditional and complementary medicine. 2016;6(3):230-6.

[10] Prevention CDCa. Trends in the Use of Complementary Health Approaches Among Adults: United States, 2002–2012. National Health Statistics Reports. 2015;79.

[11] Alrowais NA, Alyousefi NA. The prevalence extent of Complementary and Alternative Medicine (CAM) use among Saudis. Saudi Pharmaceutical Journal. 2017;25(3):306-18.

[12] Al-Rukban MO, AlBedah AMN, Khalil MKM, El-Olemy AT, Khalil AAH, Alrasheid MHS. Status of complementary and alternative medicine in the curricula of health colleges in Saudi Arabia. Complementary Therapies in Medicine. 2012;20(5):334-9.

[13] Ahmad R, Naqui A, Ahmad N, Baraka M, Mastour M, Al Shardeh S, et al. Awareness, perception, attitude, and knowledge regarding complementary and alternative medicines (cams) among the pharmacy and medical students of a public university in Saudi Arabia. Archives of Pharmacy Practice. 2017;8(2):51-63.

[14] Al Mansour MA, Mohamed EY, Abdalla SM, Medani KA, Mahmoud WS, Meraj SA. Satisfaction, self-use and perception of medical students in Majmaah University, Kingdom of Saudi Arabia, towards Complementary and Alternative Medicine. Journal of Taibah University Medical Sciences. 2015;10(1):74-8.

[15] Yildirim Y, Parlar S, Eyigor S, Sertoz OO, Eyigor C, Fadiloglu C, et al. An analysis of nursing and medical students’ attitudes towards and knowledge of complementary and alternative medicine (CAM). Journal of clinical nursing. 2010;19(7-8):1157-66.

[16] Desylvia D, Stubber M, Fung CC, Bazargan-Hejazi S, Cooper E. The knowledge, attitudes and usage of complementary and alternative medicine of medical students. Evidence-based complementary and alternative medicine : eCAM. 2011;2011:728902.

[17] James PB, Bah AJ. Awareness, use, attitude and perceived need for Complementary and Alternative Medicine (CAM) education among undergraduate pharmacy students in Sierra Leone: a descriptive cross-sectional survey. BMC Complementary and Alternative Medicine. 2014;14(1):438.