Comparative Assessment of Knowledge, Attitude, Perceived Effectiveness, and Practice of Complementary and Alternative Medicine among Medical and Non-Medical Students in Bangladesh

Anne Katrine Møller[1]*, Signe Louisa Thomsen[1], Lars Henrik Svensson[2], Erik Johan Lindberg[2]

[1]Department of Management, BI Norwegian Business School, Oslo, Norway.
[2]Department of Management, School of Economics, Lund University, Lund, Sweden.

*E-mail ✉ a.moller.bi@gmail.com

Abstract

In Bangladesh, a large portion of the population relies on Complementary and Alternative Medicine (CAM) for managing health issues. Despite rising interest in CAM, it has largely been absent from mainstream medical education in the country for many years. This study aimed to evaluate and compare the knowledge, attitudes, perceived effectiveness, and self-use of CAM among undergraduate students in Bangladesh. A cross-sectional comparative study was carried out among undergraduate students (medical and non-medical) in Bangladesh from November to December 2021. Data were gathered via a pretested, semi-structured online self-administered questionnaire. The survey included questions on participants' background, CAM knowledge, sources of CAM information, attitudes toward CAM, interest in learning about CAM, perceived efficacy and side effects, self-practice, and willingness to recommend CAM. A total of 576 students responded, allowing analysis of: (1) participant characteristics, (2) overall CAM knowledge and perceptions, and (3) comparisons of CAM knowledge, attitudes, and practices between medical and non-medical students. Data analysis was conducted in STATA (v.16) using descriptive statistics, Pearson's chi-square, and Mann-Whitney U tests. The study included 329 medical and 247 non-medical students, with a mean age of 21.57 ± 1.8 years; 56.2% were male. The most familiar CAM method for medical students was homeopathy (44.6%), while for non-medical students it was herbal medicine (45.7%). Non-medical students demonstrated significantly higher knowledge in nine out of twelve CAM modalities; the remaining three showed no significant difference. Perceived effectiveness was highest for traditional Chinese medicine (81.1%) among medical students and homeopathy (86.2%) among non-medical students. The statement "Incorporating CAM with conventional medicine would result in increased patient satisfaction" showed the most significant difference between groups ($p = 0.0002$). Yoga was most commonly practiced among medical students, whereas homeopathy was most practiced among non-medical students. Although CAM is widely practiced in Bangladesh, medical students exhibit limited knowledge but generally hold positive attitudes toward it. Thus, integrating CAM education into medical curricula should be prioritized.

Keywords: Attitude, Bangladesh, Complementary therapies, Knowledge, Students

Introduction

Complementary and Alternative Medicine (CAM) includes "health practices, approaches, knowledge, and

beliefs that involve plant-, animal-, and mineral-based medicines, spiritual therapies, manual techniques, and exercises, which can be applied alone or in combination to treat, prevent, and diagnose illnesses and promote well-being" [1]. CAM is increasingly popular in Western countries, and its global acceptance is rising [2–4]. In regions such as Africa, Asia, and Latin America, around 80% of people use CAM despite access to modern medical products [5]. Factors contributing to CAM's popularity include convenience, perceived safety,

effectiveness, cost, and personal or spiritual beliefs [6–8].

In Bangladesh, over two-thirds of the population reportedly still rely on traditional and alternative therapies [9]. Common CAM practices include herbal, homeopathic, religious, and magical treatments, delivered by both registered and unregistered practitioners (locally called kabiraj) [10]. The country's rich plant diversity, particularly in the hill tracts, has fostered indigenous herbal systems, which form a key part of local first-aid methods [11]. Ayurveda and Unani medicine also contribute significantly to the herbal CAM framework in Bangladesh.

The demand for CAM is increasing in developing nations. In addition to public interest, undergraduate students' knowledge, attitudes, and self-use of CAM have received research attention [12]. Many studies indicate high rates of CAM use among pharmacy, medical, and nursing students [13–15]. Health behaviors and treatment choices are often shaped during undergraduate years, particularly among medical students, and these habits carry into professional life [12, 16]. In contrast, non-medical students may be more vulnerable to inappropriate CAM use due to lower awareness of healthy practices [17].

Most Bangladeshi physicians have limited exposure to CAM during training, which can contribute to strained doctor-patient interactions, especially when patients do not disclose CAM use, potentially increasing risks such as drug-herb interactions [18]. Despite growing use, CAM remains largely absent from medical education, leaving healthcare professionals underinformed and hesitant to address CAM-related inquiries.

Therefore, this study aimed to assess and compare medical and non-medical undergraduate students' CAM knowledge, perceptions, attitudes, self-reported effectiveness, and barriers to CAM use.

Complementary and Alternative Medicine (CAM) includes "health practices, approaches, knowledge, and beliefs that involve plant-, animal-, and mineral-based medicines, spiritual therapies, manual techniques, and exercises, which can be applied alone or in combination to treat, prevent, and diagnose illnesses and promote well-being" [1]. CAM is increasingly popular in Western countries, and its global acceptance is rising [2–4]. In regions such as Africa, Asia, and Latin America, around 80% of people use CAM despite access to modern medical products [5]. Factors contributing to CAM's popularity include convenience, perceived safety,

Materials and Methods

Study design & participants

This cross-sectional comparative study targeted undergraduate students in Bangladesh, including both medical and non-medical disciplines. Medical students were those enrolled in medicine and dentistry programs, whereas non-medical students pursued studies in fields such as literature, engineering, law, social sciences, economics, and others. To maintain social distancing during the pandemic, an online survey approach was

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utilized. Participants were selected using a quota sampling method to achieve proportional representation from all eight divisions of Bangladesh, supplemented with convenience sampling. Inclusion criteria were: (1) Bangladeshi residency, (2) enrollment in a medical or non-medical undergraduate program, and (3) providing informed consent.

Pilot study

Before the main survey, a pilot study was conducted with 40 students (20 medical + 20 non-medical) randomly chosen from one medical college and one non-medical institution. Recruitment employed a fixed-step sampling method, where every third eligible student was invited to participate until 20 responses per institution were collected. Findings from the pilot study informed revisions of the main survey questionnaire. Questions were adjusted for improved clarity and phrasing to enhance face validity. Content validity was verified by two independent CAM practitioners. The questionnaire's internal consistency and reliability were confirmed using Cronbach's alpha, yielding a coefficient of 0.80.

Instrument and measurement

A semi-structured, self-administered questionnaire consisting of four sections, including informed consent, was used for data collection. Section 1 captured participants' demographic information, while Section 3 assessed attitudes toward CAM. Section 2 focused on 12 CAM modalities and included questions on knowledge, perceived effectiveness, and self-practice. Section 4 contained four additional items concerning interest in recommending CAM, sources of CAM information, barriers to CAM use, and beliefs about adverse effects. The questionnaire was transferred to Google Forms for online distribution without randomizing items and tested for technical functionality and usability. It included 60 questions spread across three pages, with mandatory items marked with a red asterisk and options for non-response. Respondents could navigate back to review or modify their answers, and each participant could submit the survey only once to avoid duplicate responses.

Data collection

Data collection occurred between November and December 2021. Trained research assistants approached participants via convenience and quota sampling (targeting 100 students from each of the eight divisions). The study purpose and procedures were explained, and participants who met the inclusion criteria were provided a link to the Google Forms survey via Facebook message, email, or SMS, ensuring a closed survey environment. The survey was not publicly advertised. Of the 608 eligible participants, 576 completed the survey in full (completion rate: 94.7%), while incomplete responses were excluded from analysis **(Figure 1)**.
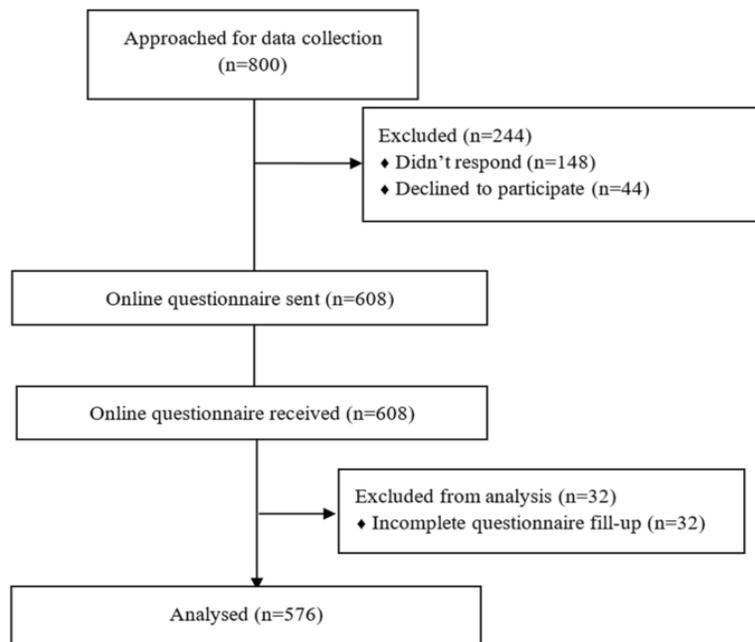
Figure 1. Participant flow through different stages of the study

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Statistical analysis

Data analysis was carried out using Stata (v.16; StataCorp, College Station, TX, USA). To assess the distribution of continuous variables, a histogram, normal Q-Q plot, and Kolmogorov-Smirnov test were applied. Quantitative variables were summarized using mean and standard deviation. Associations between dependent variables (knowledge, perceived effectiveness, and self-practice of CAM) and independent variables (demographics) were examined using Pearson's Chi-square test. For comparing attitude scores on the five-point Likert scale between medical and non-medical students, the non-parametric Mann-Whitney U test was used. All reporting followed the CHERRIES (Checklist for Reporting Results of Internet E-Surveys) recommendations [19].

Results and Discussion

In total, 329 medical students and 247 non-medical students completed the study. Participant demographics are detailed in **Table 1**. The mean age was 21.5 years for medical students and 22.1 years for non-medical students. Among medical students, 56.2% were male, whereas 68.8% of non-medical students were female. Regarding family health history, 53.5% of medical students reported a relative with hypertension, and 51.6% had a relative with diabetes. Among non-medical students, these figures were 63.1% and 57.4%, respectively.

Table 1. Demographic characteristics of study participants (n=576)

Characteristic	Non-medical Students (n = 247)	Medical Students (n = 329)
Age, mean ± SD (years)	22.1 ± 1.5	21.5 ± 1.8
Gender		
Male, n (%)	77 (31.1%)	185 (56.2%)
Female, n (%)	170 (68.8%)	144 (43.7%)
Monthly family income (BDT), mean ± SD	57,249.9 ± 53,608.7	80,842.9 ± 186,702.6
Year of study		
1st year, n (%)	54 (21.8%)	78 (23.7%)
2nd year, n (%)	62 (25.1%)	64 (19.4%)
3rd year, n (%)	53 (21.4%)	59 (17.9%)
4th year, n (%)	44 (17.8%)	66 (20.0%)
5th year, n (%)	34 (13.7%)	62 (18.8%)
Family history of illness		
No family history, n (%)	0 (0.0%)	14 (100.0%)
Diabetes, n (%)	142 (57.4%)	170 (51.6%)
Hypertension, n (%)	156 (63.1%)	176 (53.5%)
Access to conventional healthcare		
Easy, n (%)	208 (84.2%)	297 (58.8%)
Difficult, n (%)	39 (15.7%)	32 (45.0%)
Use of complementary and alternative medicine (CAM) by first-degree relative		
Yes, n (%)	61 (24.7%)	79 (24.0%)
No, n (%)	186 (75.3%)	250 (75.9%)

SD, standard deviation; BDT, Bangladeshi taka

All values expressed as n (%) unless indicated otherwise

Knowledge of CAM

Table 2 summarizes differences in awareness of CAM modalities. Aromatherapy (5.1% medical, 7.2% non-medical), chiropractic (6.0% vs. 10.5%), and traditional Chinese medicine (6.6% vs. 7.6%) were among the least familiar therapies in both groups. Medical students were most knowledgeable about homeopathy (44.6%), massage (35.5%), and yoga (42.8%). Non-medical students demonstrated greater familiarity with herbal medicine (45.7%), homeopathy (60.3%), massage (55.8%), and yoga (59.9%). Knowledge of acupuncture, aromatherapy, and traditional Chinese medicine did not

differ significantly between groups, while non-medical students showed higher awareness of the remaining CAM therapies.

Table 2. Knowledge levels of CAM modalities in medical and non-medical students (% of respondents)

Modality	Non-medical Students (n = 247)			Medical Students (n = 329)			p-value*†
	Good knowledge n (%)	Heard about it, but don't know details n (%)	Never heard of it n (%)	Good knowledge n (%)	Heard about it, but don't know details n (%)	Never heard of it n (%)	
Acupuncture	33 (13.3)	93 (37.6)	121 (48.9)	35 (10.6)	146 (44.3)	148 (44.9)	0.234
Aromatherapy	18 (7.2)	103 (41.7)	126 (51.0)	17 (5.1)	146 (43.1)	170 (51.6)	0.569
Ayurveda	95 (38.4)	123 (49.8)	29 (11.7)	78 (23.7)	207 (62.9)	44 (13.3)	0.001
Chiropractic	26 (10.5)	66 (26.7)	155 (62.7)	20 (6.0)	72 (21.8)	237 (72.0)	0.036
Spiritual Healing	59 (23.8)	121 (48.9)	67 (27.1)	40 (12.1)	150 (45.5)	139 (42.2)	<0.001
Herbal medicine	113 (45.7)	126 (51.0)	8 (3.2)	92 (27.9)	222 (67.4)	15 (4.5)	<0.001
Homeopathy	149 (60.3)	83 (33.6)	15 (6.0)	147 (44.6)	159 (48.3)	23 (6.9)	0.001
Massage	138 (55.8)	102 (41.3)	7 (2.8)	117 (35.5)	188 (57.1)	24 (7.2)	<0.001

Modality							p-value
Hijama / Cupping	68 (27.5)	100 (40.4)	79 (31.9)	62 (18.8)	143 (43.4)	124 (37.6)	0.043
Traditional Chinese Medicine	19 (7.6)	118 (47.7)	110 (44.5)	22 (6.6)	137 (41.6)	170 (51.6)	0.237
Yoga	148 (59.9)	89 (36.0)	10 (4.0)	141 (42.8)	174 (52.8)	14 (4.2)	<0.001
Unani	57 (23.0)	111 (44.9)	79 (31.9)	41 (12.4)	191 (58.0)	97 (29.4)	0.001

*Pearson's chi-square test is used to examine group differences
†Significant p-values are highlighted

Sources of CAM information

The most frequently reported sources of CAM knowledge were friends (30.7% medical, 16.4% non-medical), along with mass media such as leaflets (5.2% vs. 12.1%) and newspapers (12.1% for both). Additional sources included family (10.1% medical, 10.0% non-medical) and personal experience (12.1% vs. 16.4%) **(Figure 2)**.
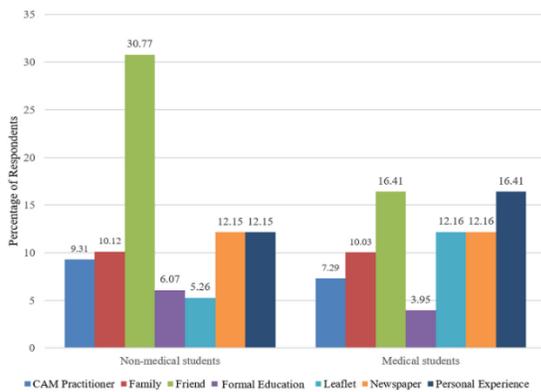

Figure 2. Common sources of CAM information**.**

Perceived effectiveness of CAM

Table 3 presents student perceptions of CAM effectiveness. Among medical students, traditional Chinese medicine (81.1%), homeopathy (72.6%), herbal medicine (72.0%), Ayurveda (67.7%), and hijama/cupping (63.5%) were rated as most effective. For non-medical students, homeopathy (86.2%), traditional Chinese medicine (85.8%), herbal medicine (80.9%), and Ayurveda (78.1%) were considered highly effective. Both groups largely did not regard aromatherapy, spiritual healing, or Unani as effective. Perceptions of acupuncture, chiropractic, spiritual healing, traditional Chinese medicine, and yoga did not differ significantly between groups (p > 0.05). For the remaining seven modalities, non-medical students reported significantly higher perceived effectiveness (p < 0.50).

Table 3. Perceived effectiveness of CAM modalities among medical and non-medical students (% of respondents)

Modality	Non-medical Students (n = 247)		Medical Students (n = 329)		p-value*†
	Perceived as effective n (%)	Perceived as not effective n (%)	Perceived as effective n (%)	Perceived as not effective n (%)	

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	Value 1	Value 2	Value 3	Value 4	p-value
Acupuncture	131 (53.0)	116 (46.9)	172 (52.2)	157 (47.7)	0.857
Aromatherapy	123 (49.8)	124 (50.2)	126 (38.3)	203 (61.7)	0.006
Ayurveda	193 (78.1)	54 (21.8)	223 (67.7)	106 (32.2)	0.006
Chiropractic	137 (55.4)	110 (44.5)	156 (47.4)	173 (52.5)	0.056
Spiritual Healing	110 (44.5)	137 (55.4)	123 (37.3)	206 (62.6)	0.084
Herbal medicine	200 (80.9)	47 (19.0)	237 (72.0)	92 (27.9)	0.013
Homeopathy	213 (86.2)	34 (13.7)	239 (72.6)	90 (27.3)	<0.001
Massage	146 (59.1)	101 (40.8)	154 (46.8)	175 (53.1)	0.003
Hijama / Cupping	194 (78.5)	53 (21.4)	209 (63.5)	120 (36.4)	<0.001
Traditional Chinese Medicine	212 (85.8)	35 (14.1)	267 (81.1)	62 (18.8)	0.138
Yoga	131 (53.0)	116 (46.9)	149 (45.2)	180 (54.7)	0.066

Unani	107 (43.3)	140 (56.6)	106 (32.2)	223 (67.7)	0.006

*Differences determined using Pearson's chi-square test

†Significant p-values in bold

Attitudes toward CAM

Table 4 summarizes participants' perspectives measured on a 5-point Likert scale. Two items revealed statistically meaningful differences between medical and non-medical students: Item #1, "Combining CAM with conventional medicine improves patient satisfaction" ($p < 0.001$), and Item #11, "Physicians should have knowledge of CAM approaches" ($p = 0.004$).

Table 4. Attitudes toward CAM among medical and non-medical students

Sl. No.	Statement	Non-medical Students (n = 247) Mean score	Medical Students (n = 329) Mean score	p-value*†
1	Combining CAM with conventional medicine would lead to higher patient satisfaction.	3.7	3.4	<0.001
2	CAM is unsafe and lacks effectiveness.	2.9	2.9	0.89
3	I am keen to learn about and explore new CAM approaches.	3.8	3.7	0.05
4	CAM is mainly useful for treating minor health issues and conditions.	3.3	3.2	0.41
5	The benefits of CAM are mostly attributable to the placebo effect.	3.2	3.2	0.48
6	CAM represents a risk to public health.	2.8	2.9	0.19

#	Statement			
7	CAM requires further scientific investigation.	3.9	3.9	0.42
8	CAM practices should be regulated by law.	3.5	3.5	0.80
9	Consulting a qualified health professional before using CAM is essential.	3.9	3.9	0.88
10	CAM is generally cost-effective.	3.4	3.3	0.13
11	Physicians should be familiar with CAM methods.	3.9	3.7	0.004
12	Having a basic knowledge of CAM is important before using them.	3.9	3.9	0.44
13	There are many unqualified practitioners ("quacks") in complementary medicine.	3.5	3.5	0.65

Responses were recorded on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree
*Mann-Whitney U test applied to compare groups
†Significant p-values are highlighted

Medical students reported higher agreement on Item #5 ("Most CAM outcomes are due to placebo," M = 3.2, NM = 3.0), Item #6 ("CAM presents a risk to public health," M = 2.9, NM = 2.8), and Item #13 ("There are many unqualified practitioners in CAM," M = 3.5, NM = 3.5), although these differences did not reach statistical significance. Conversely, non-medical students scored higher for Item #4 ("CAM is mainly effective for minor health issues," M = 3.2, NM = 3.3), Item #24 ("CAM requires additional research," M = 3.9, NM = 3.9), and Item #23 ("CAM is cost-efficient and basic understanding is necessary before use," M = 3.3, NM = 3.4).

CAM practices

Among medical students, the most frequently utilized CAM was homeopathy (current users 6.9%, previous users 62.3%), followed by yoga (8.2%, 23.7%), herbal medicine (5.1%, 30.0%), and massage therapy (5.4%, 20.0%) **(Table 5).** For non-medical students, the most common practices were homeopathy (12.5%, 60.7%),

herbal medicine (6.8%, 42.5%), and Ayurveda (8.1%, 32.3%). Statistically significant differences were found between medical and non-medical students in the usage of aromatherapy, Ayurveda, chiropractic, spiritual healing, herbal medicine, massage, and Unani therapy ($p < 0.05$).

Table 5. CAM usage among medical and non-medical students (% of respondents)

Self-practice of CAM modalities	Non-medical Students (n = 247)			Medical Students (n = 329)			p-value*†
	Currently using n (%)	Used in the past n (%)	Never used n (%)	Currently using n (%)	Used in the past n (%)	Never used n (%)	
Acupuncture	17 (6.8)	8 (3.2)	222 (89.8)	10 (3.0)	10 (3.0)	309 (93.9)	0.095
Aromatherapy	17 (6.8)	20 (8.1)	210 (85.0)	11 (3.3)	10 (3.0)	308 (93.6)	0.003
Ayurveda	20 (8.1)	80 (32.3)	147 (59.5)	14 (4.2)	67 (20.3)	248 (75.3)	<0.001
Chiropractic	17 (6.8)	16 (6.4)	214 (86.6)	11 (3.3)	9 (2.7)	309 (93.9)	0.011
Spiritual Healing	23 (9.3)	24 (9.7)	200 (80.9)	16 (4.8)	13 (3.9)	300 (91.1)	0.001
Herbal medicine	17 (6.8)	105 (42.5)	125 (50.6)	17 (5.1)	99 (30.0)	213 (64.7)	0.003
Homeopathy	31 (12.5)	150 (60.7)	66 (26.7)	23 (6.9)	205 (62.3)	101 (30.7)	0.07
Massage	22 (8.9)	79 (31.9)	146 (59.1)	18 (5.4)	66 (20.0)	245 (74.4)	<0.001
Hijama / Cupping	17 (6.8)	15 (6.0)	215 (87.0)	15 (4.5)	9 (2.7)	305 (92.7)	0.06

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Traditional Chinese Medicine	16 (6.4)	16 (6.4)	215 (87.0)	13 (3.9)	11 (3.3)	305 (92.7)	0.07
Yoga	34 (13.7)	64 (25.9)	149 (60.3)	27 (8.2)	78 (23.7)	224 (68.0)	0.058
Unani	18 (7.2)	43 (17.4)	186 (75.3)	10 (3.0)	32 (9.7)	287 (87.2)	0.001
Concerned about possible side effects of CAM	Yes n (%)	No n (%)		Yes n (%)	No n (%)		
	116 (46.9)	131 (53.0)		170 (51.6)	159 (48.3)		0.26
Would recommend CAM to others	Yes n (%)	No n (%)		Yes n (%)	No n (%)		
	114 (46.1)	133 (53.8)		121 (36.7)	208 (63.2)		0.023

*Differences tested with Pearson's chi-square
†Significant p-values highlighted

Regarding side effects, 51.6% of medical students reported adverse reactions after using CAM, compared to 46.9% of non-medical students. About 36.7% of medical students would recommend CAM to others, whereas 46.1% of non-medical students were unwilling to do so—a statistically significant difference (p < 0.05).

Barriers to CAM adoption

Figure 3 illustrates students' perceptions of obstacles to using CAM. The shortage of trained professionals was identified as the most important barrier by 29.5% of non-medical students and 22.4% of medical students. Lack of scientific validation was reported by 26.1% of medical students and 21% of non-medical students. Insufficient knowledge was highlighted by 25.5% of medical and 23.4% of non-medical students. Treatment duration was also noted as a limiting factor (6.3% medical, 9.3% non-medical). Both groups additionally pointed to the absence of governmental support and legal uncertainties as hurdles to CAM practice.
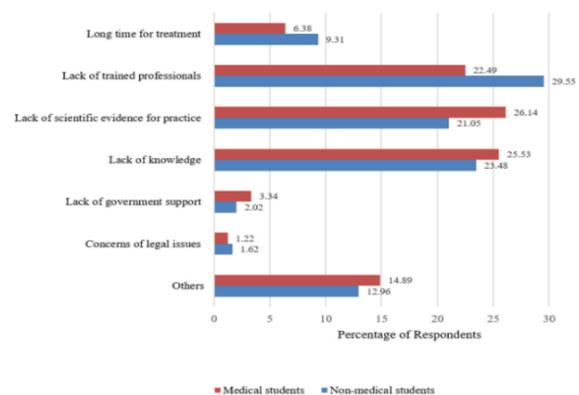
Figure 3. Barriers to CAM utilization among medical and non-medical students

Interest in CAM education

Approximately 80% of both medical and non-medical students expressed interest in receiving education on CAM, with no significant difference between groups **(Figure 4)**. Among medical students, acupuncture generated the most interest (84%), while aromatherapy was the most preferred topic among non-medical students (86%) **(Figure 4).**
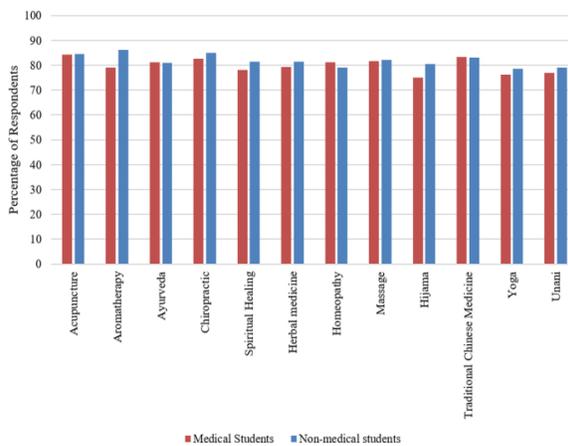
Figure 4. Participants' interest in receiving CAM education

The types and utilization of complementary and alternative medicine (CAM) often vary by region, influenced by cultural and environmental factors. As an Asian nation, Bangladesh has its own perspectives regarding CAM [20], which motivated this study. Findings indicated that non-medical students demonstrated greater knowledge of CAM, perceived its therapies as more effective, and were more inclined to recommend CAM than medical students. Nevertheless, overall attitudes toward CAM were largely similar between both groups.

For nine out of the twelve CAM modalities evaluated—ayurveda, chiropractic, spiritual healing, herbal medicine, homeopathy, massage, and hijama/cupping—non-medical students displayed significantly higher knowledge than medical students **(Table 2)**. This knowledge gap aligns with recent scoping review results [21], likely due to the limited inclusion of CAM topics in conventional medical education, causing medical students to prioritize other areas [22]. Homeopathy was the most familiar modality across both groups, likely due to its widespread availability in clinics and shops across Bangladesh. Students also reported familiarity with ayurveda, spiritual healing, herbal medicine, massage,

and yoga. Conversely, aromatherapy, chiropractic, and traditional Chinese medicine were the least recognized, consistent with data from Pakistan and Singapore [23, 24]. This may be attributed to the Western or Chinese origins of these therapies and the scarcity of local practitioners [24]. Cultural influences, particularly from neighboring India and exposure through media, may explain why yoga is more widely understood among students [25]. These observations underscore the importance of cultural context in shaping CAM knowledge.

Social networks, family influence, and cultural norms are known to affect CAM use, particularly in Asian populations [26]. Our results support this: both medical and non-medical students cited friends, personal experiences, and newspapers as their main sources of CAM information, consistent with reports from Thailand, Pakistan, and Saudi Arabia [24, 27, 28]. Only a small fraction of students (3.9% medical, 5.2% non-medical) reported learning about CAM through formal education **(Figure 2)**, which is unsurprising given that CAM is generally excluded from medical curricula in Bangladesh [29]. However, there is growing recognition of the need to integrate CAM education into academic programs to address patient needs [30, 31].

Non-medical students rated all CAM modalities as more effective than medical students, with significant differences for aromatherapy, ayurveda, herbal medicine, homeopathy, massage, hijama/cupping, and unani **(Table 3)**. This higher perceived effectiveness among non-medical students may reflect cultural and familial influences, where elders' experiences and exposure to practicing professionals shape beliefs in CAM efficacy [24]. Medical students' lower confidence in CAM may be explained by the frequent reporting of "lack of scientific evidence" as a key barrier (Fig. 3), resulting in 51.6% acknowledging potential adverse effects and 63.2% unwilling to recommend CAM to others. In contrast, non-medical students expressed fewer safety concerns and were more likely to suggest CAM therapies. These differences likely stem from medical students' more critical evaluation and limited exposure to CAM concepts [32, 33].

Attitudes toward CAM were generally similar across both groups. The only significant differences were for the statements "Incorporating CAM with conventional medicine enhances patient satisfaction" and "Doctors should be knowledgeable about CAM methods," with medical students expressing slightly less favorable

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attitudes, potentially reflecting the focus of their formal training. Both groups, however, showed strong interest in learning about CAM modalities, with no significant difference in interest levels **(Figure 4)**, consistent with previous studies [24, 34, 35].

Homeopathy was the most widely used CAM modality among both groups (medical: 6.9%, non-medical: 12.5%), comparable to reports from Malaysia [36], though higher than findings from Sierra Leone [8]. Overall, 80% of participants had used at least one type of CAM during their lifetime, with medical students showing lower usage than non-medical students, echoing results from Saudi Arabia [37]. Currently, only 23.61% of students reported using any of the twelve CAM modalities included in this study. Potential risks of CAM use, including immunological reactions, pharmacological interactions, mechanical injuries, organ toxicity, infections, and carcinogenic effects, highlight the need for caution [38].

The main barriers identified for CAM use were a shortage of trained professionals, a lack of scientific evidence, and insufficient knowledge **(Figure 3)**, findings consistent with prior studies both locally and internationally [12, 39].

Limitations

Several limitations should be acknowledged. Responses were self-reported, which may introduce recall bias and subjective interpretation. The cross-sectional, quantitative design does not capture deeper insights or allow assessment of changes in attitudes over time. Convenience sampling, although supplemented with quota sampling to ensure division representation, may introduce selection bias due to time and funding constraints. Future longitudinal studies with larger, randomized samples are recommended to examine how educational exposure and socio-demographic factors affect CAM knowledge, attitudes, and practices.

Conclusion

Overall, non-medical students displayed higher knowledge, more favorable attitudes, greater self-practice, and a higher likelihood of recommending CAM compared to medical students. Limited coverage of CAM in conventional medical training may explain the lower knowledge and less positive attitudes among medical students. These findings underscore the need to incorporate CAM education into both medical and non-medical academic programs to enhance awareness, understanding, and safe practice.

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