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Dental students' knowledge of and attitudes towards complementary and alternative medicine in Australia - An exploratory study

Joon Soo Park^{a#}, Amy Page^{b,c,d}, Emma Turner^{e,f}, Jasmine Li^e, Marc Tennant^a, Estie Kruger^a

^aInternational Research Collaborative - Oral Health and Equity, School of Human Sciences, The University of Western Australia, Crawley, Western Australia

^bAlfred Health, Pharmacy Department, Melbourne, Victoria

^cMonash University, Centre for Medicine Use and Safety, Parkville, Victoria

^dUniversity of Western Australia, School of Allied Health, Crawley, Western Australia

^eUWA Dental School, The University of Western Australia, Crawley, Western Australia

^fAustralian Dental Students Association, Australia

[#]Corresponding Author:

Dr Joon Soo Park

International Research Collaborative - Oral Health and Equity

School of Human Sciences

The University of Western Australia - 35 Stirling Highway, Crawley, WA 6009

Email: alex.park@research.uwa.edu.au

Highlights

- In Australia, gaps in dental Complementary and alternative medicines (CAM) knowledge were observed.
- Dental students showed a positive attitude towards CAM in terms of interest, effectiveness, and the need for it to be incorporated into the current dental curriculum.
- By assessing existing knowledge, findings may identify specific knowledge gaps which could help to redesign and improve current dental curricula.

Abstract

Objectives - While Complementary and alternative medicines (CAM) are used by more than half of Australians, their role in dentistry is rarely covered in the curricula of Australian dental schools. This study aimed to investigate dental students' knowledge of and attitudes towards CAM therapies.

Design - Australian dental students in the final two years of their study were invited to undertake a survey. These questions consisted of five clinically relevant case vignettes, for which there was only one correct answer amongst four possible options and seven self-reported perspective-based questions. Results were analysed using descriptive statistics.

Results - Of the 185 students that participated, the mean correct response rate for the five clinical scenarios was 3.46 ± 0.95 (range: 0 - 5 out of 5). Of 185 students, 157 (85%) answered more than half of the questions correctly. All five questions were answered correctly by 19 (10%) students. Most (74%) students self-reported to have little to no knowledge. More than two-thirds of dental students reported an interest in and belief in the effectiveness of CAM. A

similar proportion expressed a desire for the integration of CAM content into their undergraduate curriculum.

Conclusions - Despite approximately three out of four of dental students in this study having little to no knowledge on CAM, attitudes towards CAM therapies, and the need to integrate them into the dental curriculum, were generally positive. Future research into identifying specific knowledge gaps could help to redesign improved dental curricula.

Keywords: Complementary Alternative Medicines, Dental curriculum, Knowledge, Perception

1. Introduction

Complementary and alternative medicines (CAM) is defined by the Cochrane Collaboration as *“broad domain of healing resources that encompasses all health systems, modalities, and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period”*.¹ Furthermore, CAM therapies are therapies used in treating or preventing disease that was captured by more than 70 different treatment modalities.² Complementary agents can be used on an adjunctive basis in concert with conventional approaches, whereas alternative medicines are used instead of conventional therapies.^{3, 4} It is important to take into consideration that what people consider to be CAM, varies from one country to another. As CAM is readily available, recommended by those interested in holistic health, and perceived to be safer by many lay people, it has gained popularity as an alternative when conventional medicine cannot provide a satisfactory treatment outcome.^{5, 6} Thus, despite its limited evidence, as well as the controversy around the effectiveness of CAM among health professionals, CAM are utilised by more than half of Australians.^{3, 7, 8}

Dentists are one of the health professionals that can prescribe medications, in accordance with Australian legislation.^{2, 3} Popular interventions include vitamins and nutraceuticals, herbalism and homeopathy,^{3, 7} which can also be applied in dentistry. Common dental indications include the relief of symptoms (more commonly gingival inflammation, toothache, jaw pain) experienced in acute oral conditions.^{9, 10} Approximately, 10% of dental patients use topical herbal products (such as tea tree and cloves oils) for pain, as well as mind-body techniques to control anxiety.¹¹ The expectations of CAM users include disease prevention and general well-being promotion, fewer side effects and symptom relief.¹² However, it is important, for both patients as well as health professionals, to adhere to evidence-based practice when utilising CAM.

While the use of some CAM in dentistry is supported by clinical evidence in safety and or efficacy,¹³⁻¹⁶ research is lacking for most, as there are limited randomised controlled trials.¹⁰ Adverse effects, such as potential drug interactions and overdose, are possible for many CAM interventions.⁹ Dental professionals should be aware that some CAM (such as ginger, ginkgo, ginseng, garlic, or fatty acids) can potentiate excessive bleeding during invasive oral surgical procedures, with potentially fatal consequences.^{9, 17, 18} Certain CAM (such as valerian, St John's wort and ginseng) can also interfere with dental sedatives, such as benzodiazepines.¹⁹ Thus, just because CAM is perceived to be natural and non-invasive, it can pose risks to patients undergoing dental treatment.²⁰ Obtaining a comprehensive medical history, including concomitant CAM, is therefore essential for dental professionals to safely manage patients on CAM regimes.²¹

Currently, there are no registered courses available for Australian dental students in CAM. The need for CAM education in Australian dental schools has historically been debated due to the insufficient evidence in support of such medicines,²¹ despite their common usage.⁷ While Australia currently has no consensus guidelines on the role of CAM in dentistry, all prescribers, including dentists, are expected to meet the National Prescribing Service MedicineWise Prescribing Competencies Framework.²² A newly-qualified graduate dentist is expected to possess theoretical and practical medication knowledge, in accordance with this competency standard.^{23, 24} Arguably, this should include CAM, given reports of adverse outcomes. Since dental graduates practice autonomously after registering with the Dental Board of Australia,²⁵ clinical responsibility for medication-related adverse outcomes rests with the prescribers.

While some insight has come from overseas studies,²⁶⁻²⁹ no existing study has assessed whether Australian dentists are graduating with adequate knowledge to manage patients using CAM, nor have attitudes towards CAM, within the student body, been gauged. Therefore, this study aimed to investigate the knowledge and perceptions of dental students about CAM therapies.

2. Methods

2.1. Ethics

This cross-sectional study was approved by the Human Research Ethics Committee at the University of Western Australia (Approval Number - RA/4/20/5215).

2.2. Study sample demographics

Nine Australian dental schools, with around 3,730 registered students, graduate approximately 650 dentists per annum.³⁰⁻³² Six out of nine universities offer a five-year undergraduate qualification, whereas three out of nine offer a four-year graduate entry route.³³ After students are assessed to be pre-clinically competent in performing the basic general dental skills in a simulated scenario, they undertake their supervised clinical practice in the final two years of study.

2.3. Survey design

A survey, consisting of anonymous questionnaires, was carried out among Australian dental students in the final two years of their degree. Survey questions (Supplement 1) were formulated by an interdisciplinary team consisting of registered pharmacists, a registered general dentist, and dental public health academics, using evidence-based sources.^{17, 34} Before the surveys were disseminated, the pilot testing was conducted by five 2018 dental graduates, at the University of Western Australia. Then the surveys were modified accordingly before disseminating to the target students. The questions firstly included demographic details (i.e. dental school location, year level, gender, and previous undergraduate degree (if applicable)).

2.3.1. CAM knowledge

Five short case vignettes, each outlining a clinical scenario (CAM interactions, CAM - nutraceutical interactions, CAM used in dentistry, acupuncture, and CAM adverse reactions), were provided to represent presentations that may be encountered in the dental setting. It was at the participating student's discretion to access appropriate resources to assist in answering these cases. Students were then asked one question about their knowledge of CAM (yes to not at all)

2.3.2. Interest in CAM

Students were asked one question about their interest in CAM (yes to not at all).

2.3.3. Self-reported perspectives of CAM

Five perspective-based questions measured attitudes towards CAM. Self-reported attitudes about CAM consisted concerning treating dental ailments, safety, effectiveness, necessity and integration into the dental curriculum (strongly agree to strongly disagree).

2.4. Participants and recruitment

The survey was carried out among Australian dental students in the final two years of their degree (from survey design section), and 1300 students were invited to participate (from study sample demographics). Each participant provided informed consent after reading the participant information form.

2.5. Survey administration

The surveys were administered via Qualtrics^{®XM} software (Provo, UT, USA) using an anonymous online link available over four months (21/05/2019 - 21/09/2019).

One staff member from each Australian dental school was contacted to disseminate the link to the questionnaire through email. Additionally, student representatives from respective student bodies at each school were also contacted to distribute the link to the survey through social media. After reading the participant information form, each participant was required to provide informed consent before completing the questionnaire. By explicitly agreeing to complete and

submit the questionnaire, the students consented to take part in this study. The information provided to the researchers were non-identifiable as the demographic details collected did not consist of name, age, contact address. As the information provided was anonymous, consent form with name and signature was not required. Completed surveys were sent back directly to researchers. Reminder follow-up emails were sent every month, for four months, to ensure a timely response. In addition, reminders through the social media post and from the assistance of a student representative at their respective universities have routinely been attempted to achieve the desired sample size. For quality assurance, in addition to the 'Prevent Ballot Box Stuffing' in Qualtrics®^{XM} software, IP addresses were manually checked to identify potential duplicate entries from the same user.

2.6. Statistical analysis

Responses to the questions were categorical (Yes, Some, Not Much, Not at All for some questions, and Strongly Agree, Agree, Disagree, Strongly Disagree for others). These responses were dichotomised, by combining the first two categories and the last two, for all questions. To compare outcomes of the dichotomised variables across gender, Chi-square tests were used, and for comparison across year-levels, Fishers exact tests were used. Percentages of students who provided correct answers to the various questions were also presented. SPSS® version 25.0 (IBM Company, Chicago, IL, USA) was used, and the statistical significance was set at $P < 0.05$.

3. Results

3.1. Study sample demographics

The survey was completed by 185 students (male, $n = 83$, 45%), and this included respondents from each Australian dental school (Table 1). Out of the 1300 students invited to participate, the complete response rate was 14%.

Of the five clinical questions provided to each student ($n = 925$), there were a total of 633 correct responses (68%). There was no statistically significant difference in the number of correctly answered questions between the gender and two-year levels ($P > 0.05$). More than half of all students correctly answered four of five scenarios (CAM interaction (141 [76%]), nutraceutical interaction (109 [59%]), CAM used in dentistry (163 [88 %]), and acupuncture (167 [90%]; Table 2)). In contrast, the question of CAM adverse reactions was only answered correctly in 29% of cases (Table 2). Of 185 students that responded to the questionnaire, nineteen students (10%) correctly answered all the questions. Females were more likely to answer correctly the CAM used in dentistry. However, there was no statistical difference between the gender and year levels in the correct responses provided ($P > 0.05$).

3.2. Knowledge of CAM

Of the 185 students, 49 students responded that they were aware of CAM (26%). One hundred and thirty-six students self-reported to have little to no knowledge (74%) (Table 3) There was no statistical difference between the gender and year levels in the responses provided ($P > 0.05$).

3.3. Interest in CAM

Of the 185 students, 115 students expressed an interest in CAM (62%). Females were more likely to have an interest ($P = 0.007$).

3.4. Self-reported perspectives of CAM

Dental students' self-reported perspectives on the role of CAM in dentistry were largely positive (Table 4). Upwards of 60% of students self-reported that CAM could be beneficial in dental ailments and that education is necessary and should be included in the dental curriculum. In addition, approximately two out of three students disagreed that CAM is ineffective and inert. Finally, nine out of ten students were aware that CAM could affect the safety of dental procedures. There was no significant difference between the gender and year levels in these responses ($P > 0.05$).

4. Discussion

This study was the first to analyse CAM knowledge and perceptions among dental students in Australia, which has been investigated by only a handful of authors in the international literature.²⁶⁻²⁹ Understanding the safe use of CAM, like any medication, is necessary to ensure that patients are managed appropriately. Most students were aware that CAM could affect the safety of dental procedures, which is consistent with international reports of dental students' awareness of a possible association between incorrect CAM knowledge and adverse reactions.²⁷ However, one in four Australian dental students believed that they possessed very little, if any, CAM knowledge, as has also been demonstrated in international cohorts.^{28, 29} This was reflected in our findings, with a minority being able to identify CAM-associated adverse reactions correctly. For this reason, students should be made aware of evidence-based CAM databases to ensure safe prescribing to patients on polypharmacy regimes.^{4, 35-37}

In Australia, approximately two-thirds of dental students expressed an interest in learning more about CAM. Furthermore, females were more likely to have an interest. In a previously published study, German female dentists were more likely to endorse CAM to patients.¹⁰ Furthermore, more than half of the students perceived CAM to be useful for common dental ailments. This corroborates findings from Japanese cohorts.²⁸ Only one in three Australian dental students believed that CAM was ineffective and inert. This was consistent with a Malaysian cross-sectional survey.²⁷ While only 30% of students thought that CAM would be viewed as necessary for oral health (a significantly lower figure than the dental students surveyed in Japan²⁸), positive attitudes were expressed about CAM and its presumed effectiveness in dentistry, as well as the need for CAM-based teaching to be incorporated into the dental curriculum given its clinical relevance. Further investigations need to be undertaken to assess why only 30% of students thought that CAM would be viewed as necessary.

Four of five Australian dental students believed that information on CAM is needed in the dental curriculum. This was double the proportion identified in a cross-sectional study conducted in the United States (US), where 40% of surveyed students requested CAM to be taught in their dental programs.²¹ The US results were similar in India as well as Malaysia.^{27, 29}

In responding to the survey, dental students were able to refer to the necessary resources to find the answers required with no restrictions in resources or time. This was to create external validity within the study. However, the results showed that many students answered the questions incorrectly. Few of the possible explanation could be that the resources are limited or too

technical, or because students do not know how to obtain information about CAM. Therefore, further studies assessing their existing knowledge should be conducted.

One of the limitations of this study was that there was a low sample size. Despite not achieving the desired sample size, there was an equal distribution of males and females in the study, making it generalisable as the gender proportion was the same as the true proportion. Due to variable numbers of responses from different university cohorts, comparison between dental schools was not possible. Nevertheless, since Australian dental graduates can register and work anywhere across the country, the purpose of this study was to collectively assess the knowledge and perceptions of all dental students towards CAM.

In different Australian universities, pharmacotherapeutics is taught at various levels of breadth and depth. Modes of content delivery include lectures, workshops, seminars, problem-based learning, and self-directed studies.³⁸⁻⁴⁶ However, little, if any CAM education is provided in dental schools in Australia or internationally.²¹ Drawing on the American Dental Association's policy statement on the role of CAM in dentistry⁴⁷ in the absence of Australian consensus guidelines, it is clear that leading policy-makers are open to the idea of integrating CAM into clinical practice, provided that it is clinically tested to be safe and within evidence-based guidelines. Therefore, as proposed by other authors,^{48, 49} dental curricula may benefit from the incorporation of CAM teaching. The reasoning behind this is that participation in a CAM course improved the knowledge about CAM therapies.⁵⁰ Furthermore, the result of this study could create a basis in terms of policy and practice in the Australia health system and dental education in Australia. The findings of this study could be reported to the Australasian Council of Dental

Schools (ACODS), the peak body representing tertiary education, training and research in dentistry across Australia and New Zealand.⁵¹ In addition, the findings could be incorporated into the competency standards set out by the Australian Dental Council and Australian Dental Association.^{23, 24}

This study creates a foundation for future research to investigate the knowledge and attitudes of dental students towards CAM prescriptions, and the management of patients using CAM. Obtaining insight from students, on a broader level, may be useful for future curriculum design. Specificity and sensitivity analysis should distinguish conscious and unconscious awareness about CAM and its effects, and more rigorously assess the competency of students in a more extensive range of clinical scenarios.

Conclusion

We identified that a significant number of Australian dental students, that participated, could correctly answer clinical questions on CAM. Notwithstanding, students generally displayed positive attitudes towards CAM and its integration into the dental curriculum. Having identified specific knowledge gaps in prescribing, and the management of patients utilising CAM therapies, provides a basis for targeted pharmacotherapeutic teaching and further research.

Ethical approval

This cross-sectional study was approved by the Human Research Ethics Committee at the University of Western Australia (Approval Number - RA/4/20/5215).

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Declaration of competing interest

The authors declare no conflicts of interest.

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Table 1 - Demographics of participating Australian dental students (N = 185)

Gender	Count (%)
Male	83 (45)
Female	102 (55)
Year level	
Final Year	85 (46)
Graduate Entry - 3rd Year	54 (29)
Undergraduate Entry - 4th Year	46 (25)
Dental School	
Charles Sturt University	10 (5)
Griffith University	21 (11)
James Cook University	22 (12)
La Trobe University	6 (3)
The University of Adelaide	12 (7)
The University of Melbourne	30 (16)

The University of Queensland	18 (10)
The University of Sydney	16 (9)
The University of Western Australia	50 (27)

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Table 2 - Clinical knowledge of complementary alternative medicines (CAM) for dental students assessed using multiple-choice questions (N = 185)

Topic	Correct answer count (%)	Gender p-values*	Year level p-values**
CAM interaction	141 (76)	0.532	0.329
CAM - nutraceutical interaction	109 (59)	0.429	0.161
CAM used in dentistry	163 (88)	0.005 [#]	0.956
Acupuncture	167 (90)	0.414	0.133
CAM adverse reaction	53 (29)	0.801	0.480
Total	633 (68)		

* Fisher's exact tests

** Chi-square test

[#] Statistically significant ($P < 0.05$)

Table 3 - Self-reported knowledge and interest of complementary alternative medicines (CAM) for dental students (N = 185)

Questions	Response count (%)			
	Yes / Some	Not much / Not at all	Gender p-values [*]	Year level p-values ^{**}
Knowledge regarding CAM	49 (26)	136 (74)	0.437	0.277
Interest in learning more about CAM	115 (62)	70 (38)	0.007 [#]	0.445

^{*} Fisher's exact tests

^{**} Chi-square test

[#] Statistically significant ($P < 0.05$)

Table 4 - Dental students self-reported perspectives on the role of complementary alternative

Questions	Response count (%)			
	Strongly	Disagree /	Gender p-	Year level p-
	agree /	Strongly	values*	values**
	Agree	disagree		
CAM can be helpful in targeting common dental ailments	107 (58)	78 (42)	0.559	0.856
CAM can affect the safety of dental procedures	163 (88)	22 (12)	0.385	0.407
CAM are ineffective and inert	56 (30)	129 (70)	0.080	0.766
CAM will be viewed as necessary for health care and dentistry	56 (30)	129 (70)	0.222	0.054
Education of CAM in dentistry is needed for the dental curriculum	150 (81)	35 (19)	0.248	0.433

* Fisher's exact tests

** Chi-square test

Statistically significant ($P < 0.05$)

medicines (CAM) for oral health (N = 185)