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KNOWLEDGE, ATTITUDE AND PRACTICE ON COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) ASSOCIATED WITH COVID-19

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Abstract: People are more likely to seek information on Complementary and Alternative Medicine (CAM) for self-treatment to reduce COVID-19 symptoms or for prevention. The present study aims to assess the Knowledge, Attitude, and Practices (KAP) of CAM-associated with COVID-19 among adults in Malaysia. A cross-sectional study was carried out on 503 respondents using an online questionnaire. The data was analysed using SPSS version 20 and descriptive statistics were applied. A Chi-squared test was used to determine the association between KAP status and socio-demographic factors. The findings indicated that the majority of respondents had moderate knowledge score (60%) and practice (55.9%), but a high attitude (80%) towards CAM related to COVID-19. There is a significant association between age, ethnicity, employment status and knowledge level on CAM ($p < 0.05$) and also between educational level and attitude level on CAM associated with COVID-19 ($p < 0.05$). Furthermore, there is a significant association between practice level and age, race, educational level, and employment status on CAM associated with COVID-19. The present findings indicated that 73.4% of the respondents used CAM in the past 6 months to reduce or prevent symptoms of COVID-19, with most of them (51.3%) taking more than two types. In conclusion, adults in Malaysia have moderate knowledge and practice, but a high attitude towards CAM associated with COVID-19. We also postulate that respondents are more open to evidence regarding the CAM associated with COVID-19 and ready to adopt the modalities as part of integrated medicine.

Keywords: Complementary and Alternative Medicine (CAM), COVID-19, Knowledge, Attitude and Practices (KAP).

Introduction

The use of non-medical practices has increased in recent years (Konakci *et al.,* 2020). Complementary and Alternative Medicine (CAM) is defined as a group of various medical and healthcare symptoms, practices, and products that are not usually thought of as part of typical medication (Stub *et al.,* 2020). CAM can be categorised into five main groups, which are alternative medical systems, mind-body therapies, biologically based therapies, manipulated and body-based methods, and energy therapies (Konakci *et al.,* 2020). The majority of commonly used CAM among the public are biologically based therapies and alternative medical systems.

Examples of alternative medicine include Ayurvedic medicine, classical homoeopathy, and indigenous healing systems. Traditional Chinese Medicine (TCM), which encompasses acupuncture, Chinese herbs, tui na massage, tai chi, and qi gong, is a major system of complementary and alternative medicine that has gained significant recognition. Mind-body therapies include a variety of practices such as meditation, guided imagery, relaxation techniques, hypnosis, prayer, breathwork, and expressive therapies like dance, art, and music. These therapies acknowledge the fundamental connections between mental processes and physiological functions, harnessing the power

of thoughts and emotions to significantly impact health and well-being. Biologically based approaches often utilise spices, vitamins, and other therapeutic treatments as popular methods for promoting health. Knecht *et al.* (2020) indicate that cancer patients utilise biologically based CAM approaches for various purposes, including chemoprevention, cancer treatment, immune system enhancement, well-being improvement, and relief from side effects of medical interventions such as abdominal discomfort, drowsiness, and physical pain. It has been reported that body-based methods accounted for more than half of all visits to CAM providers. These therapies, such as osteopathic manipulation, chiropractic, massage, and reflexology, involve the movement of one or more body parts and focus on body structures and systems like the skeletal system, connective tissue, and circulatory and lymphatic systems (Koithan, 2009). Energy therapies aim to promote health and healing by utilizing or manipulating energy fields and are classified into two categories: biofield therapies and bioelectromagnetic-based therapies. Biofield therapies involve direct or indirect pressure to influence the energy fields surrounding and penetrating the human body, with examples including Qi gong, Reiki, Healing Touch, and Therapeutic Touch. On the other hand, bioelectromagnetic-based therapies involve the unconventional use of electromagnetic fields in healing interventions, employing pulsed, magnetic, and alternating-current or direct-current fields in treatments (Koithan, 2009).

It has been reported that those taking probiotics, omega-3 fatty acids, and multivitamin supplements had a 14%, 12%, and 13% reduction in risk of testing positive for COVID-19 in the overall UK cohort (Louca *et al.,* 2021). According to Nilashi *et al.* (2020), some plant products and spices used in Ayurvedic remedies have antiviral, antibacterial, and antimicrobial characteristics, as well as the ability to stimulate the immune system and protect against infectious disease (Charan *et al.,* 2021). This is based on a study that looks at pepper, ginger, turmeric, cumin, and coriander seeds.

In this study, knowledge is defined as adults' information about CAM uses towards COVID-19. This includes understanding the types of CAM therapies available, their potential benefits and risks, and their effectiveness in relation to COVID-19. Assessing knowledge can help identify gaps in public awareness and inform targeted educational interventions. Attitude refers to the way adults' attitudes, decisions, beliefs, and self-awareness on CAM use are associated with COVID-19. This may include individuals' openness to trying CAM therapies, their trust in the effectiveness of these treatments, and their perception of the risks and benefits associated with CAM use. Evaluating attitudes can shed light on the factors that influence individuals' decision-making processes and may help identify barriers to the adoption of evidence-based practices. The term "practices" refers to adults' habitual patterns and frequency of CAM practices associated with COVID-19. This can involve the types of CAM therapies used, the consistency of use, and the integration of CAM with conventional medical treatments. Investigating practice can help identify the prevalence of CAM use and the extent to which it is incorporated into individuals' healthcare routines. As shown in Figure 1, the present study aims to investigate the knowledge, attitudes, and practices (KAP) of CAM use among adults in relation to COVID-19. Understanding the public's KAP of CAM can contribute to controlling the spread of infection and reducing mortality rates. By examining the KAP of CAM use in relation to COVID-19, this study aims to provide a comprehensive understanding of the role of CAM in the public's response to the pandemic. The findings can inform future public health initiatives, guide educational campaigns, and support evidence-based decision-making in relation to CAM use for COVID-19 prevention and treatment.

It has been reported that gender, age, and educational level are the factors that can affect their KAP on CAM. Females have more knowledge than men because females are more educated while younger age groups are more active than adults (Ahmed *et al*., 2020). Ferdous

et al. (2020) looked at attitudes and knowledge about COVID-19 in Bangladesh and reported that the way people felt about COVID-19 was strongly linked to the level of knowledge needed to stop the epidemic. They also found that having more information and education was linked to having a positive attitude toward COVID-19 prevention practices.

During the COVID-19 lockdown, people were more likely to seek information on CAM for self-treatment in order to reduce COVID-19 symptoms or to prevent it (Ahmed *et al.,* 2020). Many studies have found that drug candidates are ineffective against the disease (Nugraha *et al.,* 2020). To this date, there has still not been any research has been done in Malaysia. Therefore, assessing KAP related to CAM in the context of COVID-19 is crucial. This evaluation can help identify adults' understanding, beliefs, self-awareness, behavioural patterns, and frequency of CAM use for COVID-19 treatment. By doing so, we can not only work towards reducing the symptoms of COVID-19 but also contribute to controlling the spread of infections.

Materials and Methods

A cross-sectional study was conducted among adults in Malaysia through a convenience sampling. The benefits of using cross-sectional studies are that there is no follow-up time in these studies, and they are comparatively simple to conduct (Munnangi, 2021). The present study was approved by the Human Ethics Committees of the Universiti Malaysia Terengganu (UMT/JKEPM/2022/110).

The minimum sample size was 384 using the formula suggested by Belachew *et al.* (2017) and Mohamed *et al*. (2021), but a total of 503 was received and included in the study. The question for the KAP section was constructed by referring to several published article reviews (Belachew *et al*., 2017; Xie *et al*., 2020; Ahmed *et al*., 2020; Ilori *et al*., 2021; Louca *et al*., 2021) and changes were made accordingly following a pilot test. The questionnaire had 55 questions, of which 8 items on socio-demographics, 12 items on knowledge, 15 items on attitude, and 20 items on practice. The levels for knowledge, attitude and practice were categorised into three levels: Low (0-49%), moderate (50-69%), and high (70-100%) (Peng *et al*., 2020). Figure 2 summarises the research framework of the present study.

A pilot test was conducted by distributing the questionnaire among 36 respondents, through Google Forms. Cronbach's alpha was used to assess the internal consistency of the attitude section. The alpha value should be more than 0.7, which means the results are reliable. The results indicated that the attitude section was 0.952, which is considered good and reliable. Moreover, the difficulty index and discrimination index were used to analyse knowledge questions. The questions were

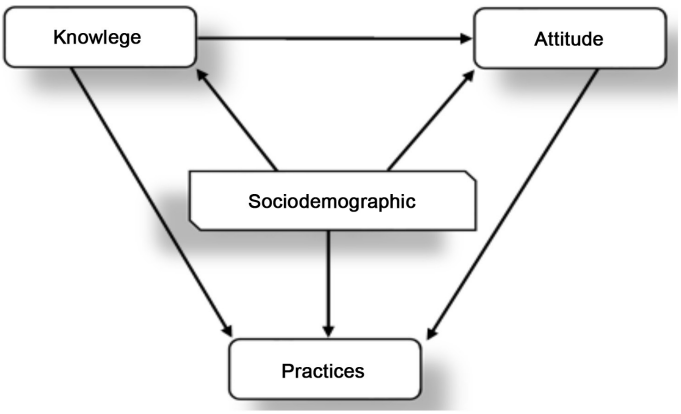

Figure 1: Theoretical framework of KAP

difficult if the difficulty index was less than 0.3, acceptable when the difficulty index was between 0.3 and 0.7, and easy when the difficulty index was more than 0.7 (Rao *et al*., 2016).

The data was analysed using the Statistical Package for Social Science (SPSS) version 20 with a significance level of $p < 0.05$ and a 95% confidence interval. Apart from the descriptive test, a Chi-square test was used to determine the bivariate relationship between KAP status and socio-demographic factors.

Results and Discussion

A total of 503 respondents completed the survey. The sociodemographic profiles of the adult participants in this study are presented in Table 1, which includes age, gender, race, educational level, employment status, monthly household income, history of COVID-19 infection, and stage of COVID-19 infection.

Socio-demographic Characteristics of Respondents

Table 1 shows the socio-demographic profiles of the respondents.

Most of the respondents who participated in this study were aged 18 to 45 years (73.6%), rather than 45 years and above. As per the Department of Statistics Malaysia Official Portal (DOSM, 2021), 88.7% of the population were internet users in 2020, which highlights the broad reach and accessibility of online surveys in the country. Females were more willing to respond to surveys, more reactive and easier to respond to online surveys (Curtin *et al*., 2000; Singer *et al*., 2000; Moore & Tarnai, 2002). This

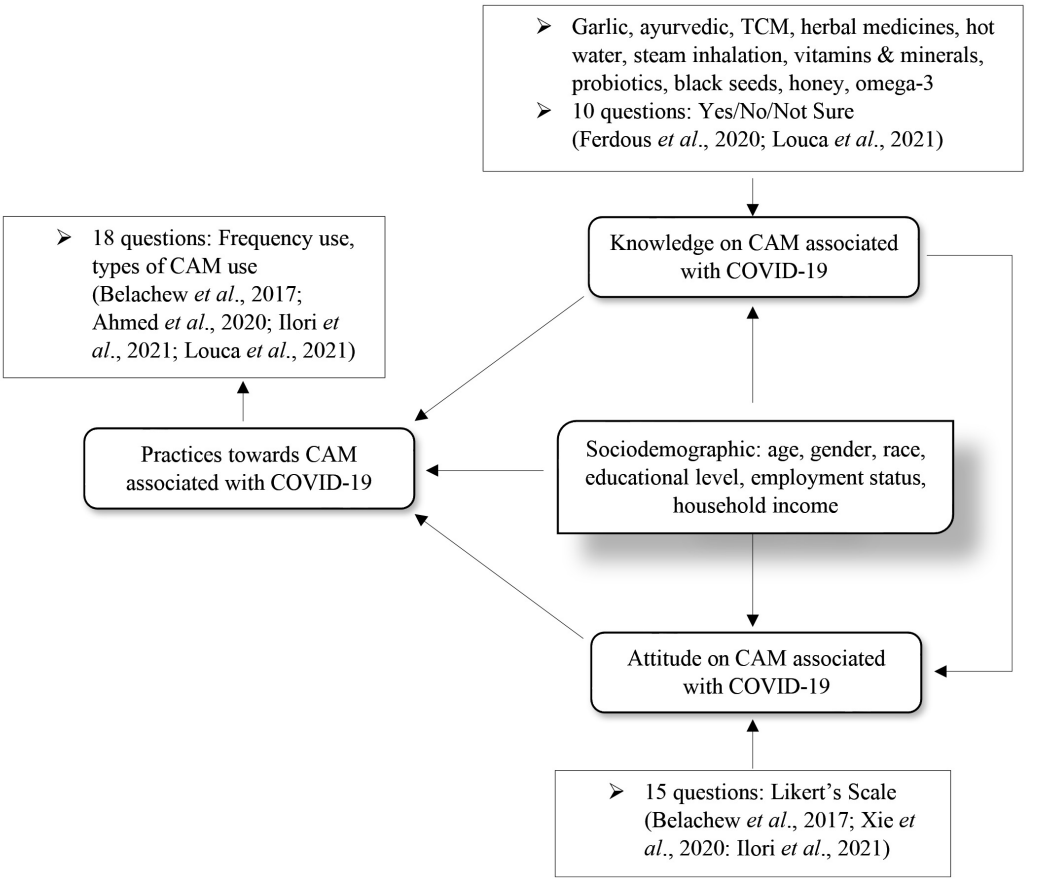

Figure 2: Research framework

Table 1: Socio-demographic profile of respondents (n = 503)

Variables	Frequency (n)	Percentage (%)	Median (IQR)
Age (years)			
18-25	193	38.4	29 (23)
26-35	116	23.1	
36-45	61	12.1	
45 and above	133	26.4	
Gender			
Female	366	72.8	
Male	137	27.2	
Race			
Malay	412	81.9	
Chinese	69	13.7	
Indian	18	3.6	
Others	4	0.8	
Educational level			
SPM or below	48	9.5	
Diploma or equivalent	99	19.7	
Degree	296	58.8	
Master and above	60	11.9	
Employment status			
Employed	271	53.9	
Unemployed/Housewife	51	10.1	
Student	151	30.0	
Pensioner	30	6.0	
Monthly household income			
No income	133	26.4	
< RM2,500	105	20.9	
RM2,500-RM3,969	55	10.9	
RM3,970-RM4,849	27	5.4	
RM4,850- RM7,099	58	11.5	
RM7,100- RM10,959	56	11.1	
RM10,960-RM15,039	36	7.2	
> RM15,039	33	6.6	
History of COVID-19			
Yes	54	10.7	
No	449	89.3	
Stage 1	21	38.8	
Stage 2	27	50.0	
Stage 3	4	7.4	
Stage 4	1	1.9	
Stage 5	1	1.9	

is consistent with our findings, where 72.8% of the respondents were female.

In addition, a total of 449 (89.3%) respondents who participated in the survey did not have a history of COVID-19 patients, and only 54 (10.7%) were former COVID-19 patients. Most of the respondents infected with COVID-19 were at stages 1 and 2 (88.8%, n = 48), which is in the early stages because most of the respondents were fully vaccinated, which did not contribute to severe stages, and followed by 7.4% (n = 4) at stage 3 and above.

Knowledge, Attitude and Practices (KAP) on CAM

Table 2 shows the respondents' levels of knowledge, attitude, and practices regarding CAM in relation to COVID-19. The majority of respondents (52.1%) had a moderate level of knowledge.

This study contradicted the previous study that found 75.3% to have good knowledge of CAM use in COVID-19 (Ilori *et al*., 2021). The overall score of knowledge was 60%, so many respondents still lack knowledge about CAM. For example, most respondents did not know that CAM was scientifically proven or just a myth that could help ease mild COVID-19 symptoms like cough, stuffy nose, and flu and boost immune systems. The majority (93%, n = 468) of the respondents correctly answered that vitamin C, vitamin D, and zinc can boost the immune system against viruses like COVID-19. This high level of awareness may be attributed to the fact that the public is commonly knowledgeable about the role of vitamins and minerals in supporting immune system function (Nilashi *et al*., 2020; Nugraha *et al*., 2020). It has been reported that taking vitamins can boost the immune system and lower the risk and severity of infection. The study also suggests giving high-dose vitamin C intravenously as a safe and effective way to treat COVID-19 in its early stages (Nilashi *et al*., 2020).

In terms of attitude, our present study revealed that the majority (65.5%) had a moderate level of attitude towards CAM associated with COVID-19. However, the overall score of attitudes was 80%, which is considered a high attitude towards CAM associated with COVID-19. Another study reported that 74.7% of their respondents had a good attitude towards CAM (Ilori *et al*., 2021). According to the findings of the present study, 83% agreed with the statement that they would ensure the CAM they consumed was safe based on their knowledge. Furthermore, 79.1% of the respondents were concerned with the impact of CAM on health. The present study further

Table 2: Respondents' knowledge, attitude and practices on CAM

Level	Frequency (n)	Percentage (%)	Overall Score (percentage) Median (IQR)	Level Score
Knowledge				
Low	146	29.0	60.0 (50.0)	Moderate knowledge
Moderate	262	52.1		
High	95	18.9		
Attitude				
Low	10	2.0	80.0 (20.0)	High attitude
Moderate	330	65.6		
High	163	32.4		
Practices				
Low	104	20.7	55.9 (47.1)	Moderate practices
Moderate	262	52.1		
High	137	27.2		

Scoring classification: Low (0-49%); Moderate (50-69%); High (70-100%)

found that 67% of the respondents agreed that CAM would enhance their health care. As in the previous study, CAM was more likely to be used if patients held strong beliefs about traditional theories of health, illness, and remedies, or if family members encouraged them to use it (Bahall & Legall, 2017). Thus, it shows that adults in Malaysia are aware of CAM. The majority of the respondents (69.2%) in the present study agreed that they are willing to learn more about CAM and its use in preventing and treating COVID-19. Comparatively, a higher percentage (81.3%) was reported by Ilori *et al*. (2021).

In addition, slightly more than half of the respondents had a moderate level of practice in CAM associated with COVID-19. The study found that most adults in Malaysia use CAM as a treatment to prevent disease. This finding seems in agreement with a previous study in which the majority of respondents (74.2%) practiced CAM at least once in the past 2 years. The overall score of practice was 55.9%, which is considered a moderate level. The present study also found that olive oil is the highest (19%) of the CAM associated with COVID-19 that most respondents used to prevent and reduce the symptoms of COVID-19. *In silico* studies indicated that phytochemicals present in olive oil are a potential candidate to act against COVID-19 (Majumder *et al*., 2021), supporting its benefits for human health and particularly for the prevention of inflammation.

Our findings indicated that 73.4% of the respondents have taken CAM for the past 6 months to reduce or prevent symptoms of COVID-19, with most of them (51.3%) taking more than two types. Previous studies reported that 23.2% of respondents used more than two types of CAM (Bahall & Legall, 2017) during non-COVID pandemic. It has been reported that respondents take CAM to help calm their emotions, relieve anxiety, and increase their general sense of health and well-being because positive emotions can improve their health (Gawade & Bale, 2020). The majority (79.1%) of the respondents eat fruits and vegetables in their daily life as a way to prevent COVID-19. Fruits and vegetables are beneficial to the immune system and have been studied for potential benefits in association with respiratory and inflammatory conditions due to their antioxidants, vitamins, minerals, and phytochemicals (Zabetakis *et al*., 2020). There was also a heightened awareness of fruits and vegetables as an important immune booster (Louca *et al*., 2020; Ilori *et al*., 2021). The result is supported by WHO (2022), with a recommendation to eat healthy foods, including vegetables and fruits, to maintain health and no guidance on the use of micronutrient supplements as a treatment for COVID-19.

The source of information on CAM for most respondents was the Internet (61.3%), as the Internet has become the first place that people in Malaysia go to believe rather than official websites. In a previous study by Ahmed *et al*. (2020), most of the participants relied on the advice of family, friends, or relatives (40.2%). Another study by Belachew *et al*. (2017) reported that most participants received information on CAM from informal sources such as family members and friends (98.6%). COVID-19 causes pandemic lockdown, which influences respondents to use the internet as their main source of information about CAM towards COVID-19.

Interestingly, the majority (60.2%) of the respondents reported that they did not practice or have a neutral attitude on the use of hot water, hot food, herbal decoctions, gargling with medicated water, steam inhalation, and local applications to help symptomatic relief in mild cases of COVID-19. This finding suggests that the majority of adults in Malaysia may not fully trust or believe the information disseminated through social media, and therefore do not readily adopt these practices as part of their COVID-19 management strategies. Despite this, a majority of the respondents (72.2%, n = 363) reported consuming vitamin C to boost their immune systems against viruses, even though there are limited recommendations for vitamin C intake due to a lack of evidence supporting its effectiveness against COVID-19 infection (Zabetakie *et al*., 2020).

Association between Knowledge, Attitude and Practices with Socio-demographic Profile

Table 3 shows that the use of CAM was higher in younger groups than in older groups. These results are in line with the previous study that reported a strong association between CAM knowledge and age, especially in the age categories of 18-28 (p = 0.02) (Wassie *et al*., 2015).

Table 3: Association between knowledge, attitude and practices with socio-demographic

	Knowledge				
	Low	**Moderate**	**High**	**Chi-square (c)**	**P-value**
	n (%)	**n (%)**	**n (%)**		
Age				23.551	0.001
18-25	65 (12.9)	106 (21.1)	22 (4.4)		
26-35	34 (6.8)	67 (13.3)	15 (3.0)		
36-45	19 (3.8)	26 (5.2)	16 (3.2)		
45 and above	28 (5.6)	63 (12.5)	42 (8.3)		
Race				10.753	0.029
Malay	116 (23.1)	209 (41.6)	87 (17.3)		
Chinese	26 (5.2)	37 (7.4)	6 (1.2)		
Indians	4 (0.80)	16 (3.2)	2 (0.4)		
Employment				14.462	0.006
Status	74 (14.7)	134 (26.6)	63 (12.5)		
Employed	19 (3.8)	44 (8.7)	18 (3.6)		
Unemployed	53 (10.5)	84 (16.7)	14 (2.8)		
Student					
	Attitude				
	Low	**Moderate**	**High**	**Chi-square (c)**	**P-value**
	n (%)	**n (%)**	**n (%)**		
Educational				18.159	0.006
level	2 (0.4)	19 (3.8)	27 (5.4)		
SPM or below	3 (0.6)	63 (12.5)	33 (6.6)		
Diploma or	4 (0.8)	205 (40.8)	87 (17.3)		
equivalent	1 (0.2)	43 (8.5)	16 (3.2)		
Degree					
Master and					
above					

	Practices				
	Low	Moderate	High	Chi-square (c)	P-value
	n (%)	n (%)	n (%)		
Age				23.551	0.001
18-25	48 (9.5)	107 (21.3)	38 (7.6)		
26-35	28 (5.6)	64 (12.7)	24 (4.8)		
36-45	11 (2.2)	28 (5.6)	22 (4.4)		
45 and above	17 (3.4)	63 (12.5)	53 (10.5)		
Ethnics				13.973	0.007
Malay	83 (16.5)	208 (41.4)	121 (24.1)		
Chinese	16 (3.2)	46 (9.1)	7 (1.4)		
Indians	5 (1.0)	8 (1.6)	9 (1.8)		
Educational level				23.744	0.001
SPM or below	5 (1.0)	18 (3.6)	25 (5.0)		
STPM/Matriculation/ Diploma	20 (4.0)	46 (9.1)	33 (6.6)		
Degree	65 (12.9)	161 (32.0)	70 (13.9)		
Master and above	14 (2.8)	37 (7.4)	9 (1.8)		
Employment Status				14.525	0.006
Employed	51 (10.1)	138 (27.4)	82 (16.3)		
Unemployed	14 (2.8)	37 (7.4)	30 (6.0)		
Student	39 (7.80	87 (17.3)	87 (17.3)		

Moreover, there is a significant association between ethnicity and knowledge level, whereby Malays (41.6%) have a moderate knowledge of CAM associated with COVID-19 than non-Malays (10.6%). Our results further showed a significant association between employment status and knowledge level; employed respondents (26.6%) have more moderate knowledge than the unemployed (8.7%). The result is in line with a previous study that reported a significant association between knowledge age and employment status (Wassie *et al*., 2015). There is also a significant association between educational attainment and attitude ($p = 0.006$), with the degree level (40.8%) demonstrating more moderate CAM practice than the other levels (24.8%). Previous studies also demonstrated that educational level has a significant association with attitude level ($p < 0.001$) (Wassie *et al*., 2015; Mohiuddin *et al*., 2021).

We found a significant association between age and practice level, such that people aged under 45 years (39.6%) have a moderate practice of CAM associated with COVID-19 than those aged 45 years and above (12.5%). Besides, there is a significant association between ethnicity and practice, whereby Malays (41.4%) have more moderate practice than their non-Malay counterparts (10.7%). The findings of this study were in accordance with a previous study in Kedah (Mohiuddin *et al*., 2021). A significant association between education and practice was found, such that the degree level (32.0%) demonstrated more moderate practice than the other levels (30.1%). These results are similar to previous study ($p < 0.001$) (Wassie

et al., 2015). In addition, there is a statistically significant association between employment status and practice level, in which employed people reveal more practice on CAM than unemployed people. The findings are consistent with the previous studies as there is a significant association between age, educational status, and employment status with the practice score (Wassie *et al*., 2015).

Conclusion

In conclusion, this study reveals that most respondents demonstrate moderate knowledge and practice but possess a high attitude towards CAM in relation to COVID-19. These findings emphasise the importance of understanding the factors influencing the implementation of CAM, particularly in the context of the ongoing pandemic. As the world strives to achieve the Sustainable Development Goals (SDGs) by 2030, particularly SDG 3, which focuses on ensuring healthy lives and promoting well-being for all ages, exploring the potential benefits and risks of CAM becomes crucial.

The significant associations identified between various demographic factors and knowledge, attitude, and practice levels of CAM in this study could help guide healthcare professionals, policymakers, and researchers in customizing interventions and educational efforts for specific groups. This local insight can contribute to a broader understanding of CAM use in the global community, fostering collaboration and informed decision-making across different healthcare systems.

Lastly, the receptiveness of respondents to further evidence regarding CAM and COVID-19 treatment highlights the need for ongoing research into the effectiveness and safety of these approaches. By examining the potential role of CAM as part of an integrated healthcare system, we can work towards providing comprehensive, evidence-based care that considers the diverse needs and preferences of individuals worldwide.

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