## **Original Research Article**

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# Complementary and alternative medicine use in the prevention of COVID-19 pandemic: a cross-sectional survey in Kerala, India

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#### **ABSTRACT**

**Background:** Globally, there is evidence of increased Complementary and alternative medicine (CAM) use during epidemics, and pandemics. Recent studies have shown that there is an increased use of CAM during the coronavirus disease (COVID-19) pandemic. The aim of the study was to investigate the pattern of CAM practice in the prevention of COVID-19 pandemic among adults in Kerala state, India.

**Methods:** This was a cross-sectional descriptive study conducted in the first week of June 2021 among adults residing in Kerala state. The study used a pre-tested google form to collect the data. A total of 548 individuals aged 18-84 years answered an online questionnaire for the present study.

**Results:** A higher proportion (52.4%) of participants were aged <30 years, 30.8% were males, 55.3% rural residents, 26.6% health care professionals, and 51.1% had a regular income. CAM use prevalence was 59.3% (95% CI: 55.1 to 63.3). Social media (46.9%) was the most frequently reported source of CAM. The age-adjusted analysis results showed that CAM use was higher among health professionals (OR: 2.15, 95% CI: 1.41-3.27), those who did not believe that vaccine could prevent coronavirus (OR: 1.91 CI: 1.08-3.39), and those who were having no regular income (OR: 1.56, CI: 1.04-2.34), compared to their counterparts.

**Conclusions:** Close to 60% of CAM use in this population is a public health concern since the efficacy of CAM use for the prevention or treatment of COVID-19 is not known. The CAM users will be under a sense of false protection, which is likely to negate vaccination and seeking proper treatment for COVID -19 in Kerala.

**Keywords:** COVID-19, Complementary medicine, Alternative medicine, India

#### INTRODUCTION

The Coronavirus disease (COVID-19) pandemic caused by coronavirus 2 (SARS-CoV-2), spread to all countries globally and is still without any specific treatment. As of 07<sup>th</sup> September 2021, there were more than 221 million COVID-19 cases and nearly 4.5 million reported deaths globally.<sup>1</sup>

So far, practices like physical distancing, self-isolation, hand washing and appropriate wearing of the mask have been shown to mitigate the spread of the infection. As there are no recommended preventive or therapeutic agents, and also because of the fact that the immune status of the

patients plays a significant role in COVID-19 infection, people in the community used complementary and alternative medicine (CAM) believing it will have an immunomodulatory effect and could have a potential role as a preventive measure or even as a therapeutic agent in patients with COVID-19 infection. CAM practice was common and increased during COVID-19 worldwide.<sup>2</sup>

Earlier findings reported a high level of CAM use (70%) for health problems in low and middle-income countries.<sup>3</sup> India reported the second-largest number of 33 million cases after the United States of America (USA) with 39.7 million cases and the third-largest number of 0.44 million deaths after the USA (0.64 million deaths) and Brazil (0.58 million deaths).<sup>1</sup> India has a long tradition of CAM use as

a prevention strategy and treatment for several diseases.<sup>4,5</sup> The Government of India has formally promoted the use of CAM during COVID-19.<sup>6</sup>

There is limited evidence on the effectiveness of CAM use in the prevention and treatment of COVID-19. A telephonic survey among 495 asymptomatic COVID-19 patients from the Rajasthan state of India reported CAM use of 74%.7 Generally, a robust immune system has protective effect against infection and disease severity. Some earlier studies reported the role of Ayurveda for the prevention and as adjunct therapy for COVID-19.8 The usefulness of traditional practitioners for psychological support and risk reduction strategies for COVID-19 was reported earlier.9 The complementary nature of AYUSH (CAM practiced in India like Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy), with modern medicine is still controversial. 10 However, increased use of alternative medicine was reported earlier during the outbreaks like influenza and severe acute respiratory syndrome (SARS). 11,12

The first confirmed COVID-19 case in India was reported from Kerala state on 31 January 2020.<sup>13</sup> Kerala is the most literate state in India and the human resource for health in the state is one of the best reported from the country.<sup>14,15</sup> Kerala's epidemiological and demographic features are different from other parts of India.<sup>16</sup> Nearly 33.2% of the state's population was vaccinated at least one dose.<sup>13</sup> The state continues to have one of the lowest case fatality rate (0.51%) among the major states in India.<sup>13,17</sup> However, currently, there is a lack of information on CAM use during the COVID-19 pandemic in Kerala.

The aim of the study was to investigate the pattern of CAM practice in the prevention of COVID-19 pandemic among adults (≥18 years) in Kerala state, India.

#### **METHODS**

We conducted a web-based cross-sectional study among the general population in the Kerala state of India. The participants were adults (≥18 years) who could read and understand English or Malayalam (local language) who were residents of Kerala at the time of the survey. We prepared the questionnaire after reviewing related published literature in print and social media. The questionnaire was pre-tested and scrutinized by a multidisciplinary team consisting of public health experts and nutritionists.

Data were gathered on background characteristics like age, sex, place of residence, education, and colour of the ration card [an official document given by the state government under public distribution system and card's colour is based on their Socio-economic status (SES). We collected details of their use of complementary and alternative medicine including herbal medicines and dietary supplements; and how the pandemic affected their mental health, presence of disease and COVID status. We enquired about the source

of information to the CAM users. We asked questions on treatment of chronic diseases like diabetes, hypertension, hyperglycemia, cardiovascular disease, kidney disease, liver disease, asthma/Chronic obstructive pulmonary disease (COPD), tuberculosis, cancer and other diseases. 'Under treatment' refers to those who were under treatment for any of the conditions.

The survey was conducted using google forms during the first week of June 2021. The survey link was sent online through email and WhatsApp to heterogeneous groups, including students, working and non-working people all over the state, with a request to share information. The purpose of the study, expected time taken to complete the survey and voluntary nature of the survey were detailed at the beginning of the survey. The anonymity of participation was also stated. The questionnaire was bilingual (English and Malayalam). A total of 548 individuals who answered the questionnaire were included in the present study.

In this study, CAM use was defined as all practices, which are not integrated into the dominant healthcare system. <sup>18</sup> This includes dietary supplements, relaxation techniques, AYUSH and herbal medicines.

Perceived health status was assessed using a four-point scale: very bad, bad, good and very good. There was also an option like 'no opinion'. We combined 'very bad' or 'bad' as "bad" and 'good' or 'very good' as 'good' for the analysis purpose. SES was assessed using two questions: colour of the ration card and average monthly household expenditure since there were missing information on the colour of the ration card and some of the participants did not reveal their actual spending. We defined SES as; 'low' if the colour is yellow or pink or an average monthly expenditure was below Rs. 5000, 'medium' if the colour is blue or average monthly income between Rs. 5000-10000 and 'high' if the colour of the ration card is white or average monthly expenditure >10000.

Ethical clearance of the study was obtained from the Institutional Ethics Committee. Consent to participate in the survey was also obtained at the beginning of the study through online consent.

Analysis of data was done using SPSS (SPSS Inc., Chicago, IL, USA, version 23.0 for Windows). Bivariate analysis was done using the Chi-square test for categorical variables. A p value of <0.05 was fixed as the minimum statistical significance. Multivariate logistic regression analysis was performed to find out the correlates of CAM use during the COVID-19 pandemic.

#### **RESULTS**

Baseline characteristics of the study population is presented in Table 1. Participants' age ranged from 18 to 84 years. A higher proportion (52.4%) of participants were aged <30 years. Higher proportions (88.1%) of the

participants were having education above graduation. There were nine participants with only school education. More than half of the participants were women (69.2%) and 55.3% from rural areas. Around 35% of the participants were students; seven were retired persons, 49.8% working and 14.2% not working at the time of the Among the working people, 37.7% were government employees, 20.1% private employees and 28.9% were health care workers, 5.9% self-employed, 1.5% agricultural work and 5.9% were other workers. Overall, there were 146 (26.6%) health care professionals in the study. Among them, 40.4% were CAM practitioners (26.4% Ayurveda, 4.6% Homeopathy, and the remaining in other health-related work like yoga, siddha, and physiotherapy). More than half (55%) of the participants were in high SES.

CAM use prevalence was 59.3% (95% CI: 55.1 to 63.3), among them 72.0% were using AYUSH. Among the CAM users, 40.3% used Homeopathic medicines, 23.1% used Ayurveda, 13.8% practiced yoga, 11.1% herbal, 19.4% special diet, 1.2% acupuncture, 23.1% relaxation techniques, and 12.6% meditation and 1.8% opted massage (reported multiple uses) (Figure 1). The prevalence of CAM use was higher in the lower age group, among women, those who resided in rural areas. The use of CAM was comparatively higher among those who had a healthrelated educational qualification and among those who were unemployed compared to their counterparts. CAM use was reported by majority of the AYUSH professionals (94.9%) and half (50.4%) of the modern medicine professionals. The use of CAM was higher in higher SES groups and all these associations were statistically significant. Social media (46.9%) was the most commonly reported source of information for CAM use, followed by health care practitioners (29.0%), families and friends (19.5%), television/radio (18.0%) and 13.7% chose to use CAM on their intuition.

More than half (55.5%) of the participants reported initiating some behaviour, believing that it will protect them from getting COVID-19 infection. Nearly one third (31.0%) reported increased physical activity, 18.1% herbal drinks, 17.2% vitamin supplements, 10.0% special diet during the pandemic.

Forty-two per cent reported the use of dietary supplements during the pandemic. The main supplements used were vitamin C (30.3%), vitamin D (8.0%) and multivitamins (8.0%). Overall, 54.3% used lemons, 9.3% oranges, 4.6% used grapes and 7.3% used other citrus fruits during the pandemic believing that it will prevent COVID-19. Forty four percent reported the use of other food products like ginger, turmeric, garlic, dates, gooseberry and honey and 30% used some type of herbal tea for the prevention of COVID. More than three fourth (76.4%) reported their increased use of water intake during the pandemic. The awareness level on the established prevention strategies of

COVID-19 was very high, majority opted for the use of the mask (95.8%), social distancing (95.3%), and sanitizing/washing hands (94.2%). Nearly 88% of the participants believed that vaccines would prevent the disease. More than one fourth (26.8%) believed that Homeopathic medicine could prevent coronavirus infection, 20.8% believed in Ayurveda and 24.3% believed in fumigation to tackle the spread of coronavirus. The initiation of habits like physical activity, herbal drinks, vitamin supplements and special diet were significantly higher among CAM users than non-users of CAM.

Eighty (14.6%) participants and 25.9% of their family members tested positive for coronavirus. For the treatment of coronavirus, eight persons reported that they have not depended on any medicine or relaxation techniques for treating their symptoms. Nearly 68% depended on modern medicine/along with other practices and 23% relied on different methods, including CAM use.

Co-morbidities were also prevalent among the respondents. One-fifth of the participants reported that they were under treatment for at least one disease (males: 27.2%, females: 16.6%, p=0.005). The major diseases reported were diabetes (5.5%), hypertension (5.1%), hyperglycaemia (4.9%), asthma or COPD (3.8%), and cardiovascular diseases (1.5%). The proportion of those under treatment of any disease was significantly higher for the low SES group than the high SES group (25.8% vs. 12.2%, p<0.001).

Perception of health status varied among the participants. Around 24.8% reported no opinion or being neutral on their perceived health status, 59.9% reported 'good', 13.0% 'very good'. However, 2.0% perceived their health to be in a 'bad' status and two persons (0.4%) reported their health status as 'very bad'. The effect of the pandemic on their mental health status was also accessed. More than half of them (58%) reported that their mental health status was negatively affected by the pandemic to some extent, 15.3% great extent and 19.2% reported no negative effect. Forty-one participants had no opinion on this. In this context we note that, in our study, three participants initiated tobacco use and two participants initiated alcohol consumption during the pandemic.

Nearly three fourth (71.7%) of the CAM users were women and 20.3% of the CAM users were under treatment for other diseases (Table 1).

The age-adjusted logistic regression analysis results are presented in Table 2. CAM use was higher among health professionals (OR: 2.15, 95% CI: 1.41-3.27), those who did not believe that vaccine could prevent coronavirus (OR: 1.91, CI: 1.08-3.39), and those who were having no regular income (OR: 1.56, CI: 1.04-2.34), compared to their counterparts.

Table 1: Background characteristics and CAM use.

	Frequency N=548		CAM use			
Characteristics			Yes N=325		No N=223	
	N	%	N	%	N	%
Age (years)						
<30	287	52.4	180	55.4	107	48.0
30-59	239	43.6	132	40.6	107	48.0
≥60	22	4.0	132	4.0	9	4.0
Sex						
Men	169	30.8	92	28.3	77	34.5
Women	379	69.2	233	71.7	146	65.5
Place of residence						
Rural	303	55.3	182	56.0	121	54.3
Urban	245	44.7	143	44.0	102	45.7
Education						
Below graduation	65	11.9	35	10.8	30	13.5
Graduate and above	483	88.1	290	89.2	193	86.5
Having regular income						
Yes	280	51.1	155	47.7	125	56.1
No	268	48.9	170	52.3	98	43.9
SES						
Low	94	17.2	46	14.1	48	21.5
Medium	148	27.0	88	27.1	60	26.9
High	306	55.8	191	58.8	11	51.6
Perceived health status						
Very bad/bad	13	2.4	6	1.8	7	3.1
Good/very good	399	72.8	244	75.1	155	69.5
No opinion	136	24.8	75	23.1	61	27.3
<b>Tested positive for Coronavirus</b>						
No	468	85.4	275	84.6	193	86.5
Yes	80	14.6	50	15.4	30	13.5
Family members tested positive for Coronavirus						
No	406	74.1	247	76.0	159	71.3
Yes	142	25.9	78	24.0	64	28.7
Under treatment for any disease						
No	439	80.1	259	79.7	180	80.7
Yes	109	19.9	66	20.3	43	19.3
Vote: CEC: socio economic status						

Note: SES: socio-economic status.

Table 2: Correlates of CAM use- results of age adjusted logistic regression analysis.

Variables	Adjusted OR (95% CI)	P value	
Having regular income			
Yes	Reference	0.030	
No	1.56(1.04-2.34)	0.030	
Believed that vaccine can prevent coronavirus			
Yes	Reference	0.020	
No	1.91(1.08-3.39)	0.020	
Health professional			
No	Reference	<0.001	
Yes	2.15(1.41-3.27)	< 0.001	

Note: CAM- Complementary and alternative medicine; OR- Odds ratio; CI: Confidence interval.

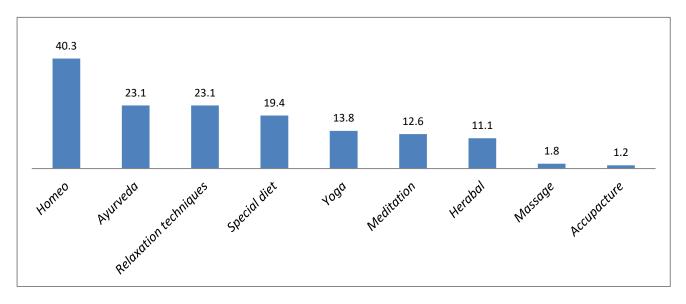


Figure 1: Proportion of different type of CAM used for prevention of COVID-19.

#### **DISCUSSION**

To the best of our knowledge, this is the first study to investigate the prevalence of CAM use during COVID-19 among adults in Kerala, India. Our study findings suggest that prevalence of CAM use was high among Keralites. Awareness level on the non-medical methods of COVID prevention like mask use, social distancing and hand washing was high among the population. Interestingly, the use of CAM was higher among those individuals who did not believe that COVID vaccine as a prevention strategy. Self-reported negative mental health status due to pandemic was also reported by a majority of participants.

Across the world, there were reports of the increased use of CAM during the pandemics. For example, more than three fourth (76%) of people used CAM during the MERS (Middle East Respiratory Syndrome) outbreak in South Korea. <sup>19</sup> The long-term sustainability of CAM use in our population is to be explored with longitudinal studies. The population-level perspectives and experiences of CAM use during COVID-19 are important information regarding their future practices. In India, 4.4% of diseases are treated under AYUSH system while that in Kerala is 8.3%, which is one of the highest in India after Karnataka state (10.2%). <sup>20</sup> In the present study, CAM use was reported by 59.3% for the prevention and treatment of COVID. This was lower than the reported CAM use of 74% from Rajasthan during the pandemic. <sup>7</sup>

CAM use was much higher for COVID-19 compared what was reported in National Sample Survey Organization (NSSO) for treating other diseases. Previous studies in Kerala reported the use of alternative medicine for several diseases like cancer (34%) and diabetes (39%). 4.5 The use of herbal products during the pandemic was reported as 22% in Saudi Arabia. A higher proportion of CAM users

do not reveal its use with their health practitioners.<sup>21</sup> So the proportion of people who are using CAM during this pandemic might be higher than that reported in the present study. The international clinical guidelines do not recommend healthcare professionals to encourage patient use of CAM.<sup>2</sup> However, recently, a higher proportion (75%) of the human clinical trials registered in the Clinical trial registry of India (CTRI) are related to AYUSH and the findings of most of these trials are yet to come.<sup>22</sup> A randomized controlled trial conducted asymptomatic mild to moderate COVID-19 cases in the Tamil Nadu state of India, reported added benefit of Siddha medicines in the accelerated recovery of patients against the standard treatment.<sup>23</sup>

The greater use of CAM among CAM practitioners is the main reason for higher CAM use among health professionals in this study (40% of the health professionals are CAM practitioners). A very high proportion of AYUSH professionals reported the use of CAM, and half of the modern medicine practitioners were also used CAM for prevention of COVID-19. However, a study from Norway reported that only one third of their CAM practitioners were able to advise or provide treatment for COVID-19 and more than 40% them reported that they would not recommend COVID patients to modern medicine doctors. <sup>24</sup> Even though the awareness level on preventive measures of coronavirus like mask usage, social distancing, and sanitizing was high, the role of vaccine in preventing the disease was comparatively low.

Our findings showed that those who did not believe that vaccine could prevent COVID-19 were two times more likely to use CAM to prevent and treat the disease than those who believed that vaccine could prevent coronavirus infection. A higher proportion of CAM use among those with no regular income contrasts with that

reported among diabetes patients in Kerala.<sup>5</sup> The use of vitamin C (6.9%), relaxation techniques (3.1%), prayer (2.1%) and ginger (1.9%) to prevent COVID-19 infection was also reported.<sup>24</sup> Furthermore, the use of vitamin D, garlic, dietary supplements and use of turmeric during the pandemic were also reported earlier.<sup>25</sup> Unlike the earlier studies reported from different regions of the world, our study reported no significant difference of CAM use between sex, age groups and place of residence. The higher proportion of CAM use among high SES participants in our study can be connected to their higher purchasing power for CAM.<sup>5</sup>

Globally, Homeopathy has been used in 100 countries, and is the third most widespread specific complementary medicine in the world, after acupuncture and herbal medicine <sup>18,26</sup> Homeopathy, has the third largest health infrastructure supported by the Government of India after modern medicine and Ayruveda, but there were 20 countries where Homeopathy is illegal.<sup>27</sup> More than 100 million people in the country depend exclusively on Homeopathy.<sup>27</sup> Recent findings from Australia suggested the usefulness of adjunctive Homeopathic treatment for COVID-19 patients.<sup>28</sup> However, the National Health Service (NHS), United Kingdom, recommended the general practitioners and other prescribers to stop providing homeopathic medicine because they found no scientific evidence to support the use of Homeopathy.<sup>29</sup> The House of Commons Science and Technology Committee report of the UK reported that homeopathic remedies perform no better than placebos.<sup>30</sup> Currently, United States' Food and Drug Administration (FDA) has not approved any homeopathic drug.<sup>31</sup>

Poor mental health status in terms of anxiety, fear and depression related with the COVID-19 pandemic has been reported globally.<sup>32</sup> During the pandemic, 40% of the United States adults reported symptoms of anxiety or depression and several people reported a negative impact of the pandemic with poor mental health outcomes.<sup>33</sup> In the present study, 74% of the participants reported negative impact of the pandemic on their mental health status. This is an important public health problem since the negative impact of COVID-19 on the mental health of the population would increase the psychological crises.<sup>34</sup> The increased negative effect of the pandemic found in participants who experienced COVID-19 was similar to that reported earlier from China.<sup>27</sup> Many studies were conducted on mental distress related to the pandemic on health care workers and the general population. 35,36 However, the extent of association on the impact of the pandemic on mental health status is still inconclusive.

More than half of the WHO member states have a national policy on CAM use.<sup>19</sup> Ministry of AYUSH in India released specific guidelines for CAM practitioners on the prevention and treatment of COVID-19.<sup>37</sup> CAM practitioners are working in India's public and private sector with the Government of India issued license to practice. There is an urgent need for scientific

investigations to find out the role of CAM in preventing and treating COVID-19. In addition, more follow up studies on patient perspectives are also needed. Several factors like clinical evidence of CAM for the treatment of COVID-19, high-quality data, studies with a statistically significant number of participants, long term efficacy, appropriate follow-up with comparative control groups and adherence to quality norms in clinical trials were the main concerns reported on the use of CAM in treating COVID-19.<sup>38</sup>

In the country, several other complementary systems have been used for the treatment of a variety of diseases. For example, more than a century old 'fish medicine' (the herbal medicine is hired in the mouth of a five to seven centimetre long Murrel fish and the patient swallows the live fish) for treatment of asthma which were evaluated critically and there were several movements against this unscientific practice.<sup>39,40</sup> An estimated quarter-million people are receiving this mysterious therapy annually, with the support of the state Government of Andhra Pradesh.<sup>39</sup> government has been provided transport, accommodation, food, electricity and water for the patients coming for this therapy. Another method practicing in India is 'faith-healing', the way of treating diseases through faith. 41,42 A study from Kerala reported a very high proportion (69%) of faith healing practices with psychiatric treatment.<sup>43</sup> There is also evidence for the use of unscientific methods for some diseases like cancer and mental illness, where effective treatments might not be available. 44,45 There is no scientific evidence to the faith healing and many practices are dangerous to the patients.<sup>46</sup> These unscientific practices reported no improvement after treatment.<sup>47</sup> So it should be careful that this type of treatment need not be considered antagonistic to modern medicine.46

China and India took national government strategies on traditional and complementary and alternative medicine to prevent and treat COVID-19.<sup>48-50</sup> The Government of Kerala interlinked the traditional medicine use with the public health administrative system to overcome the COVID-19 pandemic with the approval of the traditional Ayurveda medicinal system for COVID-19 treatment. This might have contributed to the higher proportion of CAM use in our study despite the higher awareness of preventive measures for COVID-19 infection. However, the increased demand for CAM for the management of COVID-19 might change with increased vaccination coverage and drop in infection rate in the state.

#### Limitations

There were some limitations for the study. The data was collected through a web based self-completed questionnaire and there is a chance of self-selection bias. The survey was conducted for adults residing in Kerala state using web based google from. The sample includes non-representative demographic and socioeconomic characteristics of the state. This was an educated group

with more representation from social media users. The results of the study may not be generalizable to the community. The pattern of CAM use found in this study may change in future with the changes in vaccination rate and disease spread.

#### **CONCLUSION**

Close to 60% use of CAM reported in this population is a public health concern since the efficacy of CAM use for the prevention or treatment of COVID-19 is not known. The CAM users will be under false sense of protection which is likely to negate vaccination and seeking proper treatment for COVID-19. They will not undertake scientific practices such as masks, hand washing, social distancing because of this false protection. Since the proportion of high-risk groups for COVID-19 infection, like the elderly and those with co-morbidities are higher in the state, the safety of CAM use for the prevention and treatment of COVID-19 is to be given paramount importance.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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