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KNOWLEDGE, ATTITUDE AND PRACTICES AMONG MEDICAL AND DENTAL UNDERGRADUATES ON SUNLIGHT EXPOSURE AND VITAMIN D DURING THE PANDEMIC PERIOD – A QUESTIONNAIRE SURVEY.

KEY WORDS: Sunlight exposure, Vitamin D, COVID -19

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ABSTRACT

Objective: Vitamin D is needed for the proper functioning of the immune system. Sunlight exposure is essential for the synthesis of Vitamin D. Covid-19 pandemic and the subsequent lockdowns have resulted in reduced outdoor activities in the student community because of online education. This could lead to the deficiency of Vitamin D. We undertook this study to assess the knowledge, attitude, and awareness of sunlight exposure and Vitamin D among the medical and dental students during the lockdown period. **Methods** This study was conducted as a pre-validated voluntary cross-sectional observational online survey, using the Google form in 347 medical and dental undergraduates after obtaining the approval from Institutional Ethical Committee. The questionnaire was aimed to assess the level of knowledge and practices about sunlight exposure, sunscreen usage and Vitamin D of the participants. Data was analysed statistically using Kruskal–Wallis and Chi square tests. **Results** Among 347 respondents, 46% of dental and 57.3% of the medical students preferred to go out in the sun. This was statistically significant ($p<0.05$). There was a statistically significant difference between the groups in the questions pertaining to sources of Vitamin D. **Conclusion** This is a preliminary exploratory survey pertaining to the knowledge and practices about sun exposure and Vitamin D during the pandemic period. Even though majority of our participants were aware of the significance of Vitamin D and sunlight for bone health, it is emphasized that they consume Vitamin D fortified foods, expose themselves to direct sunlight which in turn will strengthen their immunity.

INTRODUCTION

An active lifestyle and a balanced diet are essential to maintain good health. Physical activities are an integral part of a healthy lifestyle and have been markedly impaired by the lockdown during the COVID -19 pandemic. Work from home, and online education were the way of life for all. Physical activities are an integral part of a healthy lifestyle and have been markedly impaired by the lockdown during the COVID -19 pandemic. . One of the consequences of the lockdown is the decrease in time spent on outdoor activities, leading to less sunlight exposure, which may lead to reduced Vitamin D levels in our body. . Indoor exposure to sunlight during lockdown may not be useful because the Ultraviolet B [UVB] rays, cannot penetrate the glass or wooden windows to stimulate Vitamin D production. [1] It has been proved that vitamin D boosts immunity by inducing monocyte differentiation and inhibiting lymphocyte proliferation. [2] Vitamin D is also involved in insulin secretion, neurological function, and cardiovascular function. [3]

The dietary contribution of Vitamin D is very less whereas cutaneous synthesis by UVB supplies more than 90% of the human needs of Vitamin D. [4] Vitamin D deficiency is one of the major nutritional causes affecting health in all age groups, both in rural and urban areas. [5] The prevalence of Vitamin D deficiency in India ranges from 40% to 99% with most studies reporting a prevalence of 80% to 90%. Awareness about the importance of Vitamin D and the detrimental effect of its deficiency needs to be created among the public as well as healthcare workers. [6] Especially medical students, as they are the future caretakers of mankind, need to be well equipped with knowledge about Vitamin D. Given the fact that the Covid -19 pandemic is recurring in waves across the world for the past 2.5 years, healthcare awareness among medical students is of prime importance. [7] Awareness about Vitamin D during the early stage of medical or dental training could bring healthy behavioural changes in personal and professional life. [8]. The present study aims to assess the knowledge, attitude, and awareness of sunlight exposure and Vitamin D among the medical and dental students during the lockdown period.

MATERIALS AND METHODS

The study included 280 dental and 300 medical undergraduate students during August and September 2020, who were asked to fill out a questionnaire, of this, only 171 medical and 176 dental students participated in the study. The students were from the first year to the final year of graduation. The students were contacted via email and WhatsApp. The study population was selected by convenience sampling. Ethical clearance was obtained.

The study was conducted as a voluntary cross-sectional observational online survey, using Google form. The questionnaire was formulated from the study done by Kung AW et al and was modified to adapt to the present situation. It

consisted of the consent form, an information sheet, and the questionnaire related to Vitamin D. Validation of the questionnaire to assess reproducibility and suitability was done using a small pre-test in 20 students who were chosen randomly from the list of students of both institutions. In-depth telephonic interviews for these 20 subjects were conducted by investigators. These 20 subjects were not included in the final study. The 20 questionnaires with responses were circulated to a panel of experts to assess the face validity. This panel was constituted by 3 experts in the field of medicine who had 19 years, 16 years and 10 years of teaching and research experience respectively. After thoroughly assessing the interview notes, the experts discussed and came to a consensus to modify and include 13 questions in the final questionnaire. The 13 questions were aimed to assess the level of knowledge and practices about sunlight exposure, sunscreen usage and Vitamin D of the participants.

Statistical analysis was performed using EPI-INFO [version 7.2.2.6, CDC license: Atlanta, Georgia US: public domain] software. Categorical data were analysed using frequency distribution and presented as frequency percentage; continuous data were analysed using descriptive statistics and presented as mean and standard deviation. Kruskal–Wallis test was used for inter-group comparison. Chi square test was performed to check the association between variables and study groups. Significance level was fixed at 5% [α = 0.05]. p-value <0.05 was considered statistically significant

RESULT

The questionnaire was sent to 580 students out of which 347 responded. They belonged to the age group of 20.26±1.60 [medical students] and 19.51±0.97 [dental students].

Attitude and behaviour towards sun exposure:

When compared to 80[46.0%] dental students, 98[57.3%] medical students preferred to go out in the sun. This was statistically significant *[p<0.05].* Both the dental and medical students did not prefer using the umbrella. In response to the question on the use of sunscreen products, 128 [74%] dental students and 145[85%] medical students did not prefer to use it and this was also statistically significant.

Both our study groups preferred outdoor activities before and during the lockdown. On comparing the outdoor activity among the study groups, we found that 103 [60%] medical and 65[37%] dental students worked outdoor before lockdown and this finding was statistically significant. But when we compared the time spent outdoor before lockdown and during the lockdown, there was no statistical significance between the groups.

Regarding the knowledge about the adequacy of sun exposure, both the groups responded uniformly that they did not have enough sun exposure.

Awareness and knowledge of the role of Vitamin D:

All the study participants were aware that sunlight was one of the sources of Vitamin D. Among our participants, 107[61.5%] dental and 131[76.6%] medical students answered that sunlight was the main source of vitamin D(Fig 1)

With regard to diet, 67[38.5%] dental and 40[23.4%] medical students responded that it was the main source of vitamin D. (Fig 2) This was statistically significant. All our participants responded that vitamin D was good for bone health.

Regarding the source of knowledge about the role of sunlight as the major source of vitamin D, 61[35%] dental and 58[31%] of medical students responded that they had acquired this knowledge in school. Around 67[39%] dental and 93[54%] of medical students had learned that sunlight was the main source of vitamin D in college. About 34[19.5%] dental and 17[9.9%] medical students had no knowledge about the sources of vitamin D and which was statistically significant. (Fig 3& 4)

Self-perception about the adequacy of sun exposure:

66% of our participants felt that they did not have adequate sun exposure. (Table :1)

DISCUSSION

This study was conducted to explore the attitude and knowledge of medical and dental students regarding the sources and health benefits of vitamin D. Vitamin D is essential for all metabolic activities in our body and is needed for overall health and wellbeing. [12] Deficiency of Vitamin D is prevalent worldwide both in sunlight deficient and sunlight sufficient countries including India. Decreased dietary intake of Vitamin D leads to poor absorption of calcium from the diet which results in reduced bone mineral density.

Modernization and lifestyle changes in India have led to a reduction in the number of hours spent outdoors during the daytime. The food habits of the younger generation may also contribute to low dietary intake of Vitamin D. [6] The recommended dose of Vitamin D by the Indian Council of Medical Research [ICMR] is 400 IU/day for Indians under situations of minimal exposure to sunlight. [13]

Sensible sun exposure:

The percentage conversion of Cholesterol to provitamin D [25-dihydroxycholicalciferol] and provitamin D to active vitamin D_3 [1,25-dihydroxycholicalciferol] was maximal between 11 a.m. to 2 p.m. [14]

A study by Patwardhan VG et al, [2018] from Pune stated that, in the urban population, approximately 15% of the skin area like the face, forearms, and hands are exposed to sunlight. This exposure should provide more than the required daily allowance [RDA] of vitamin D_3. [15] But the absorption of vitamin D depends on various factors such as age, skin colour, season, weather, latitude, altitude, time of day, clothing, holiday habits, use of sunscreen, and skin type. [16] Cutaneous production of vitamin D is further limited by increased melanin content of skin or sun avoidance by use of sunscreens, extensive clothing cover due to sociocultural practices or staying indoors for most of the day. [17]

Air pollution due to industrialization prevents the reach of UVB to the earth which is a barrier for the optimal synthesis of Vitamin D. Since fair complexion is believed to be an elite status, young students are at a higher risk of Vitamin D deficiency. [18] Even though India is closer to the equator, Vitamin D deficiency is common. This disproves the common myth that Vitamin D deficiency is unlikely in countries where ample sunlight is available. [19]

Vitamin D has been reported to improve immunity and protect against respiratory illnesses. Vitamin D deficiency may predispose sensitive populations, especially the elderly and individuals with pre-existing noncommunicable systemic diseases such as diabetes, hypertension, etc to the cytokine storm. A positive correlation exists between Vitamin D levels and COVID-19 susceptibility and hence, Vitamin D could prove to be an essential element to fight against COVID-19. [20] The innate immune system generates both pro-inflammatory and anti-inflammatory cytokines in patients suffering from COVID-19. [21] Vitamin D can decrease the release of pro-inflammatory cytokines by macrophages and increases the anti-inflammatory cytokines. [22] According to Ebadi et al high dose of vitamin D supplement, which is found to be safe and non-invasive for the patients affected by COVID-19, reduces the severity of the illness and mortality. [23]

Attitude and behaviour towards sun exposure:

In our study, 46% of dental students and 57.3% of medical

students preferred to go out in sun. In contrast to our result, a study done by Arora et al [2016], Uttar Pradesh, North India, states that 64.2% of their participants did not like to go out in sun, for the fear of getting skin tan. [24] Both our dental [82.8%] and medical students [84.2%] did not prefer using the umbrella. This is on par with the study done on medical students by Haq et al [2017], from Pakistan, wherein 81.7% of their participants never used umbrellas. [25]

In response to the question on the use of sunscreen products 74% of the dental students and 85% of medical students did not prefer using it. The reasons for not using sunscreen could be the stickiness, white residues on the face after application, burning and stinging sensation in eyes, etc of the sunscreen products. [26] Our finding contrasts with the study from North India, where 67.2% of their participants used sunscreen. [24] In the study from Pakistan, 59.6% of their participants used sunscreen during summer, 2.9% used it in winter and 32.5% never used sunscreen. [25]

When we compared the time spent outdoor before lockdown and during the lockdown, there was no statistical significance between the groups. On comparing the time spent outdoor before lockdown by our study group, we found that 60% of medical and 37% of dental students worked outdoors. The study from Malaysia by Krishnappan et al stated that 60% of their participants spent 1 to 3 hours/day outdoor, which is similar to the data of our medical students before lockdown this may be due to the movement of our students from the college to the hospital blocks. [12]

Both our groups preferred outdoor activities. Our results agree with the study from Pakistan wherein 88.5% of their participants liked to go out in sun. [25] In contrast, in the study from North India, 64.2% of their participants did not prefer outdoor activities. The reasons cited by their study participants were that they had adequate sunlight exposure and that exposure to sunlight would harm the skin. [24] Our study participants and participants from Pakistan, were aware that sunlight was the major source of vitamin D and also knew about its health benefits, so they preferred outdoor activities. [25]

Awareness and knowledge of the role of Vitamin D:

In our study, 66% of both medical and dental students perceived that they had enough exposure to sunlight. This finding is in agreement with a study by Zhou et al [2016], from China wherein 67.5% felt that they have enough exposure to the sun. [27]

Knowledge about the source of Vitamin D:

All our study participants were aware that sunlight was one of the sources of Vitamin D. About 61.5% of dental and 76.6% of medical students answered that sunlight was the main source of vitamin D. In this study, 38.5% of dental students and 23.4% of medical students responded stating that diet was the main source of vitamin D. This difference among the medical and dental students maybe because of the difference in weightage given to this topic in their curriculum. [28] [29] In the study done in North Indian medical students, 53.3% of their participants said that sunlight was the main source of vitamin D. Compared to our results [38.5%, 23.4%] only 0.5% of their study participants cited diet as the main source of vitamin D. [24] This difference may be because of prior knowledge acquired in the school curriculum.

Regarding the knowledge about sunlight as the major source of vitamin D, 35% of dental and 31% of medical students responded that they had acquired this knowledge in school. Around 39% of dental and 54% of medical students had learnt that sunlight was the main source of vitamin D in college. About 6.9% of dental students and 1.8% of medical students reported that they acquired this knowledge from other sources like media and books. The study by Arora et al states that 45.4% gained knowledge about vitamin D from school, 16.6% from books, 14.75 from family, and 10% from physicians. [24] About 19.5% of dental and 9.9% of medical students had no knowledge about the sources of vitamin D.

All our participants responded that Vitamin D is needed for bone health. This is in agreement with the study from North India which reported a comparable response of 88.4% pertaining to vitamin D and bone health. During the pandemic lockdown, people spend most of their daytime indoors and do not get sufficient vitamin D from sunlight. Inadequate direct sun exposure might lead to vitamin D deficiency which subsequently can affect bone health. [24] They are advised to consume RDA of vitamin D to maintain their general as well as bone health. [30]

In India, most market preparations contain 60,000 IU, and are usually recommended as a single dose per week for 6 to 8 weeks for obtaining adequate serum provitamin D concentrations. Monthly maintenance therapy is usually required and should be continued for over one year. [8]

CONCLUSION

Our study is a preliminary exploratory survey into the knowledge and practices about sun exposure and Vitamin D among medical and dental undergraduates during the Covid 19 pandemic period. We believe that this initial result will pave way for further pan-Indian studies across the student population. Such questionnaire surveys, further enhanced and supported by baseline serum assays of vitamin D, will go a long way in improving the immunity of the student community who are the future of India. Protocol modification and recommendations for vitamin D in the treatment of COVID infection are recommended. As the micronutrients are essential to prevent and cure diseases, the knowledge about these can be emphasized more in the health sciences curriculum which will bring a positive impact on the health of the society. [31]

Table 1: Frequency Distribution And Percentage Of The Questionnaire Responses

Questions	Dental Undergraduates [n=176]		Medical undergraduates [n= 171]		p value
	n	%	n	%	
Like to go out in the sun	80	46.0	98	57.3	.035*
No umbrella use	144	82.8	144	84.2	.717
No sunscreen usage	128	73.6	145	84.8	.010*
Like outdoor activities	141	81.0	141	82.5	.733
Frequency of outdoor activities	65	37	103	60	.001
Knowledge about the Sources of Vit. D	174	99	171	100	.002
Perception-inadequate sun exposure	114	65.5	113	66.1	.912

Questionnaire:

1. Do you like going out in the sun?
2. Do you often use an Umbrella to shade from the sun?
3. Do you use sunscreen products containing SPF ≥ 15?
4. On an average weekday before lockdown, from 6:30 am to 7:00 pm, how many hours did you spend outdoors?
5. On an average Sunday before lockdown, from 6:30 am to 7:00 pm, how many hours did you spend outdoors?
6. Do you like outdoor activities?
7. How often did you engage in outdoor activities before lockdown?
8. On an average weekday, during lockdown from 6:30 am to

7:00 pm, how many hours do you spend outdoors?
9. On an average Sunday, during lockdown from 6:30 am to 7:00 pm, how many hours do you spend outdoors?
10. Do you think you have enough exposure to sunlight?
11. What are the sources of vitamin D?
12. Do you know that vitamin D is good for bone health?
13. From where did you learn about vitamin D?

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