

## EFFECT OF HEALTH EDUCATION ON IMPARTING HEALTHY LIFESTYLE AMONG UNDERGRADUATE MEDICAL STUDENTS IN MADURAI MEDICAL COLLEGE, TAMIL NADU – A RANDOMIZED CONTROL STUDY

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**ABSTRACT**

**Background:** A significant portion of the burden from NCDs is linked to lifestyle-related risk factors such as tobacco use, lack of physical activity, alcohol consumption, and obesity. In the realm of NCD management, it is crucial to have knowledge both about healthcare delivery at the grassroots level and about promoting healthcare to minimise exposure to major risk factors. This study aims to determine the effectiveness of a health education intervention on lifestyle behaviour of undergraduate first professional medical students. **Materials and Methods:** Approval from the institutional ethics committee was sought, and the randomised controlled trial (RCT) was registered prospectively in the Clinical Trials Registry of India (CTRI) under the registration number CTRI/2024/11/077038 (Registered on: 19/11/2024). Using a computer-generated random sampling method, 250 eligible students were chosen based on their roll numbers. **Results: Outcomes:** Participants in the intervention group were  $18.70 \pm 1.186$  years old on average, while those in the control group were  $18.62 \pm 1.091$  years old on average. Nutritional choices were successfully improved by the intervention. Compared to students who did not receive any intervention, the percentage of students who met dietary guidelines increased significantly as a result of the randomised controlled approach. In the Intervention Group, the number of participants in the highest BMI category dropped from 6 (30%) at baseline to 3 (17.6%) at the end. This suggests your intervention successfully moved individuals out of the high-risk BMI category. After the intervention, the mean stress score dropped significantly from  $30.02 \pm 7.28$  at baseline to  $24.66 \pm 8.95$ . With a mean difference of 5.36 (95 % CI: 4.00 to 6.72), this decrease was statistically significant ( $t = 7.787, p < 0.001$ ). The intervention had a clinically significant impact on stress reduction, as evidenced by the moderate effect size (Cohen's  $d = 0.49$ ). **Conclusion:** This study demonstrates that non-communicable disease (NCD) risk factors, particularly diet, physical activity, stress, and body mass index (BMI), can be effectively modified among medical students using a randomised controlled strategy that incorporates health education and behaviour change communication (BCC). These findings highlight the urgent need for a paradigm shift in medical education that equally prioritises academic achievement and student well-being.

## INTRODUCTION

Noncommunicable diseases (NCDs) are responsible for the deaths of 41 million individuals annually, accounting for 74% of all global fatalities. Annually, over 15 million people succumb to an NCD between the ages of 30 and 69, with 85% of these "premature" deaths occurring in low- and middle-income nations.<sup>[1]</sup> The main causes of NCDs include cardiovascular diseases (CVDs), cancer, chronic respiratory conditions, and diabetes. A significant

portion of the burden from these NCDs is linked to lifestyle-related risk factors such as tobacco use, lack of physical activity, alcohol consumption, and obesity. In the realm of NCD management, it is crucial to have knowledge both about healthcare delivery at the grassroots level and about promoting healthcare to minimize exposure to major risk factors.<sup>[2]</sup>

Medical students face significant challenges in adapting their lifestyle and dietary habits due to busy schedules and demanding tasks. An unhealthy diet

and low levels of physical activity during university years predispose students to future health issues. During their academic tenure, students experience greater autonomy in their food choices, health-related behaviors, engagement in sports, and overall lifestyle formation. Consequently, the transition to a new living environment, characterized by hectic schedules, unhealthy food options, and the risk of skipping meals, is likely to alter eating behaviors over time.<sup>[3]</sup> The adoption of healthy habits among medical students is particularly crucial, as they are future physicians. Students who neglect to adopt a healthy lifestyle are more likely to fail in establishing health promotion opportunities for their patients. Furthermore, medical students have been shown to exhibit early risk factors for chronic diseases.<sup>[4]</sup>

Social media is a strong tool for communication and learning today. Its use has grown, especially during the COVID-19 pandemic, making it essential in teaching and learning.<sup>[5]</sup> However, there are concerns about how screen time, including social media, affects students' grades.<sup>[6]</sup> Using social media on phones distracts students during class, negatively impacting their grades. Additionally, it increases stress levels and decreases outdoor activities and physical exercise. Stress occurs when individuals struggle to manage the demands placed on them, including self-imposed pressures. Many studies indicate that stress levels are rising among medical students. The stress of becoming a doctor can harm students' exercise habits.<sup>[7]</sup> Stress can also hurt their classroom and clinical performance, cause stress-related disorders, and lower their performance. Stress is linked to current mental distress and future health issues. Students face pressure to succeed, an uncertain future, and challenges in fitting into the system. They also deal with social, emotional, physical, and family problems that can affect their learning and grades.<sup>[8]</sup>

This study aims to find the effectiveness of health education on imparting a healthy lifestyle among undergraduate medical students in Madurai Medical College, Tamil Nadu – a randomised control study

#### **Justification**

In the medical profession, there is less time for self-care and there is increased stress as the curriculum duration has changed. Studies on delivering health education on physical activity, diet, social media usage, and stress among medical students were found to be minimal after an exhaustive literature review. Health education is the main, and at the same time, integral part of complementary health promotion and it is the most effective and easiest tool for primary prevention. And if the results show improvement in the lifestyle behavior of the first professional medical students then BCC can be included during the foundation course. Hence, this study was taken up

#### **Objective**

1. To determine the effectiveness of health education intervention on lifestyle behaviour of undergraduate first professional medical students.

2. To estimate the post-interventional change in Body Mass Index (BMI) among first professional medical students.
3. To estimate the post-interventional stress change among first professional medical students.

#### **Ethical Consideration**

Informed and written consent was obtained from the subjects prior to their interview, which included a questionnaire and a physical examination. Confidentiality of the subjects was maintained throughout the study. Approval from the institutional ethics committee was sought, and the randomized controlled trial (RCT) was registered prospectively in the Clinical Trials Registry of India (CTRI) under the registration number CTRI/2024/11/077038 (Registered on: 19/11/2024).

## **MATERIALS AND METHODS**

A randomised controlled study was conducted at Madurai Medical College among first-year students from the 2024 batch, running for one year from December 2024 to December 2025.

Using a computer-generated random sampling method, 250 eligible students were chosen based on their roll numbers. The complete list of roll numbers for all eligible students was sourced from institutional records, with each student being assigned a unique identifier linked to their roll number. The random selection process utilized an online-based random number generator. The roll numbers were input into the online software, and a randomisation function was employed to produce a sequence of random numbers. From this sequence, 250 students were selected without replacement, ensuring each student had an equal chance of being part of the study. The chosen participants were then enrolled and assigned to study groups according to the randomisation protocol of the randomised controlled trial. This approach minimised selection bias and strengthened the study's internal validity.

The study commenced with a common health education session for both the intervention and control groups. This initial session was followed by three reinforcement sessions for the intervention group, each lasting 40 minutes and scheduled every three months. Overall, the intervention aimed to provide health education focused on promoting a healthy lifestyle, while the control group did not receive any follow-up sessions.

Baseline data were collected from all participants. The intervention group participated in three health education sessions spaced three months apart. At the conclusion of the one-year period, data were collected from all participants for analysis.

The health education module included motivational pictures, phrases, posters, and videos designed to encourage participants to adopt healthier lifestyles and prevent obesity. This module was implemented in a classroom setting for the intervention group,

along with handouts and posters illustrating healthy living strategies.

Anthropometric measurements were recorded at the beginning of the study and after the fourth session for both groups. Additionally, a printed questionnaire was administered through face-to-face interviews during the first session and again after the fourth session for both groups.

#### Selection Criteria

##### Inclusion Criteria

- All First year MBBS students

##### Exclusion Criteria

- Students who are not willing to participate in the study & chronic absentees

##### Sample Size

The total number of first year MBBS students is 250. And all the first year students are included in the study.

**Sampling Method:** Simple random sampling method was adopted.

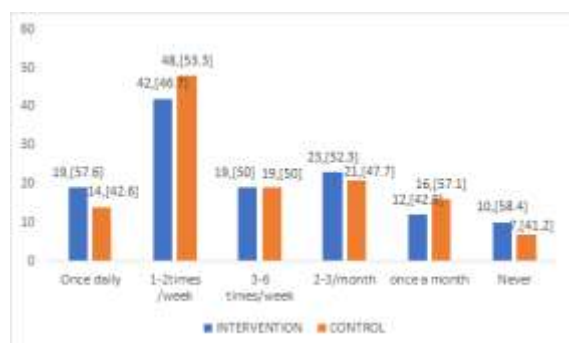
**Statistical Analysis:** Data was entered in Microsoft excel; analysis done by using SPSS version 27.

## RESULTS

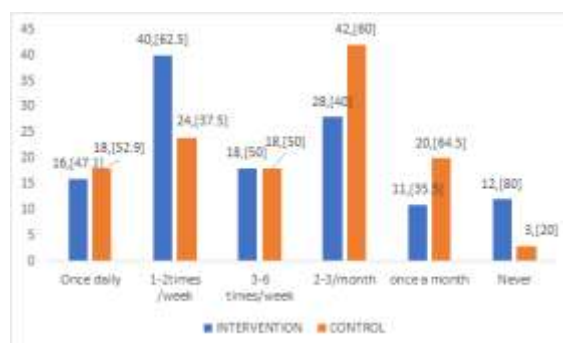
the control group were  $18.62 \pm 1.091$  years old on average. Age (Cohen's  $d = 0.07$ ) and gender (Cohen's  $d = -0.16$ ), two baseline characteristics, demonstrated negligible to small effect sizes with confidence intervals crossing zero, suggesting sufficient comparability between groups.

**Table 1: Gender distribution of study participants[n=250]**

GENDER	INTERVENTION n[%]	CONTROL n[%]
MALE	71[53.8]	61[46.2]
FEMALE	54[45.8]	64[54.2]
TOTAL	125[50]	125[50]



**Figure 1: Frequency of refined foods in baseline**



**Figure 2: Frequency of refined foods in end**

**Table 2: Fruit & vegetable intake of study participants[n=250]**

Fruit & vegetable intake Frequency Category	Baseline		End	
	INTERVENTION n (%)	CONTROL n (%)	INTERVENTION n (%)	CONTROL n (%)
<1 / week	20 (43.5%)	26 (56.5%)	22 (48.9%)	23 (51.1%)
3-4 / week	20 (58.8%)	14 (41.2%)	22 (53.7%)	19 (46.3%)
Every time in diet	3 (60.0%)	2 (40.0%)	2 (50.0%)	2 (50.0%)
Never	7 (38.9%)	11 (61.1%)	17 (68.0%)	8 (32.0%)
Once a week	59 (47.6%)	65 (52.4%)	46 (42.2%)	63 (57.8%)
Once a day	16 (69.6%)	7 (30.4%)	16 (61.5%)	10 (38.5%)
<b>Total</b>	<b>125 (50%)</b>	<b>125 (50%)</b>	<b>125 (50%)</b>	<b>125 (50%)</b>

Nutritional choices were successfully improved by the intervention. Almost no change was observed in the control group. Compared to students who did not

receive any intervention, the percentage of students who met dietary guidelines increased significantly as a result of the randomised control approach.

**Table 3: Social Media Usage of study participants During Studying [n=250]**

Response	Baseline		End	
	INTERVENTION n (%)	CONTROL n (%)	INTERVENTION n (%)	CONTROL n (%)
YES	82 (50.3%)	81 (49.7%)	74 (57.4%)	55 (42.6%)
NO	43 (49.4%)	44 (50.6%)	51 (42.1%)	70 (57.9%)
<b>Total</b>	<b>125 (50)</b>	<b>125 (50)</b>	<b>125 (50)</b>	<b>125 (50)</b>

Compared to CONTROL Group, a larger percentage of INTERVENTION

Group (57.4%) reported using social media while studying at baseline. Both groups displayed nearly

equal distribution (~50%) at the endline, suggesting a decrease in group disparity.

**Table 4: Perceived Effect of Social Media of study participants on Academic Performance [n=250]**

Response	Baseline		End	
	INTERVENTION n (%)	CONTROL n (%)	INTERVENTION n (%)	CONTROL n (%)
Yes	94 (51.6)	88 (48.4)	78 (49.7)	79 (50.3)
No	31 (45.6)	37 (54.4)	47 (50.5)	46 (49.5)
<b>Total</b>	125 (50.0)	125 (50.0)	125 (50.0)	125 (50.0)

At baseline, approximately 50% of both groups believed that social media had an impact on academic performance. This perception somewhat declined at

the endline, with a more evenly distributed "Yes" and "No," indicating potential awareness or behavioral adaptation.

**Table 5: Sleeping Hours/day of study participants [n=250]**

Sleep Duration	Baseline		End	
	INTERVENTION n (%)	CONTROL n (%)	INTERVENTION n (%)	CONTROL n (%)
<6 hrs	44 (45.8)	52 (54.2)	35 (46.7)	40 (53.3)
6–8 hrs	77 (52.4)	70 (47.6)	82 (52.2)	75 (47.8)
8–10 hrs	3 (60.0)	2 (40.0)	4 (28.6)	10 (71.4)
>10 hrs	1 (50.0)	1 (50.0)	4 (100.0)	0 (0.0)
<b>Total</b>	125 (50.0)	125 (50.0)	125 (50.0)	125 (50.0)

At both baseline and endline, the majority of participants reported getting 6–8 hours of sleep. At the endline, both groups showed a slight increase in adequate sleep (6–8 hours), as well as slight increases in the 8–10 hour category, suggesting a marginal improvement in sleep duration.

The BMI differences between the two groups at baseline and at the conclusion of the study were examined using an independent samples t-test. The independent samples t-test revealed no statistically significant difference between the CONTROL Group

(23.43± 3.01) and the INTERVENTION Group (22.98± 2.48) at baseline,  $t(239.41) = -1.28, p = .200$ . Due to the small effect size (Cohen's  $d = 0.16$ ), there was little practical significance. At the conclusion of the study, the analysis showed that there was no statistically significant difference between the CONTROL Group (23.43± 3.01) and the INTERVENTION Group (22.95± 2.38),  $t(235.41) = -1.39, p = .166$ . A negligible practical difference was indicated by the small effect size (Cohen's  $d = 0.18$ ).

**Table 6: BMI of study participants [n=250]**

BMI	Baseline		Tests	End		Tests
	INTERVENTION n (%)	CONTROL n (%)		INTERVENTION n (%)	CONTROL n (%)	
18.5-22.9	66[50.4]	65[49.6]	chi-square=3.703 p=0.157	66[50.4]	65[49.6]	chi-square=8.106 p=0.017
23-27.4	53[53.5]	46[46.5]		56[54.9]	46[45.1]	
≥ 27.5	6[30]	14[70]		3[17.6]	14[82.4]	

In the Intervention Group, the number of participants in the highest BMI category dropped from 6 (30%) at baseline to 3 (17.6%) at the end. In the Control Group, the number remained stagnant at 14, but due to the shifting denominators, the percentage actually rose from 70% to 82.4%. This suggests your intervention successfully moved individuals out of the high-risk BMI category. Stability in the "Normal" Category (18.5–22.9): Both groups remained

perfectly stable in this bracket (66 in Intervention, 65 in Control). This indicates that the intervention didn't cause "underweight" issues but rather targeted those in the higher brackets. Shift in the "Overweight" Category (23–27.4): The Intervention group saw a slight increase from 53 to 56 individuals. In the context of the drop in the ≥ 27.5 category, this is actually a positive result—it implies that 3 people "downgraded" from Obese to Overweight.

**Table 7: PSQ-14 scores of study participants [n=250]**

Variable	Group	Mean	SD	t(df)	p-value	Mean Difference	95% CI	Cohen's d
Baseline psq-14	INTERVENTION	30.38	7.42	0.80 (248)	.425	0.74	[-1.08, 2.55]	0.10
	CONTROL	29.65	7.16					
End psq-14	INTERVENTION	19.63	6.58	-10.71 (248)	<.001	-10.05	[-11.90, -8.20]	1.36
	CONTROL	29.68	8.17					

After the intervention, the mean stress score dropped significantly from 30.02 ± 7.28 at baseline to 24.66 ±

8.95. With a mean difference of 5.36 (95 % CI: 4.00 to 6.72), this decrease was statistically significant (t

= 7.787,  $p < 0.001$ ). The intervention had a clinically significant impact on stress reduction, as evidenced by the moderate effect size (Cohen's  $d = 0.49$ ).

The PSQ-14 was used to measure stress at baseline and at the conclusion of the study, and an independent samples  $t$ -test was used to determine whether there were any significant differences between the two groups. There was no statistically significant difference between the INTERVENTION Group ( $30.38 \pm 7.42$ ) and CONTROL Group ( $29.65 \pm 7.16$ ) in the baseline PSQ-14 score, according to the independent samples  $t$ -test ( $t(248) = 0.798$ ,  $p = .425$ ). The effect size was extremely small (Cohen's  $d = 0.10$ ), indicating that there was little difference between the groups.

The independent samples  $t$ -test results for the PSQ-14 at the conclusion of the study showed a statistically significant difference between the two groups,  $t(248) = -10.71$ ,  $p < .001$ . Compared to the CONTROL Group ( $29.68 \pm 8.17$ ), the INTERVENTION Group's mean score ( $19.63 \pm 6.58$ ) was significantly lower. According to Cohen's  $d$  ( $d = 1.36$ ), the effect size was large, suggesting a significant practical difference between the groups. Overall, the results show that there is a significant difference between the groups for PSQ-14 scores at the conclusion of the study, but there is no such difference for baseline PSQ-14 scores.

## DISCUSSION

The results of this study show how a randomized control intervention can improve dietary choices, lower stress levels, and positively change first-professional medical students' BMI categories. Given that medical students are a vulnerable group dealing with demanding academic requirements and high levels of stress, which frequently predispose them to unhealthy lifestyle behaviors, these findings are especially important.

### Nutritional Choices and Dietary Habits

While the control group barely changed, the intervention successfully raised the proportion of students who met dietary recommendations. This is consistent with earlier studies showing that structured health education improves diet-related knowledge, attitude, and practices (KAP) by a study done by Rizvi et al in Schools of Udupi district of Karnataka, India.<sup>[9]</sup> Our intervention indicates that targeted behavioural change communication (BCC) can effectively bridge the gap between nutritional knowledge and practice, in contrast to the baseline susceptibility of medical students to poor eating habits and meal skipping reported in other Indian studies similar to the study done by Anuradha et al among medical students in TamilNadu.<sup>[8]</sup>

### BMI and Obesity-Risk Reduction

Three people were able to "downgrade" from the obese to the overweight category, and the highest BMI category ( $\geq 27.5$ ) significantly decreased in the intervention group, falling from 30% to 17.6%. This

favorable result is consistent with the randomized controlled trials (RCTs) conducted in South India by Rizvi et al, where students' mean BMI significantly decreased as a result of structured health education.<sup>[9]</sup> The stability seen in the "Normal" BMI range (18.5–22.9) attests to the intervention's proper targeting of high-risk individuals without resulting in unintended weight problems. Early intervention is essential because unhealthy habits from college often carry over into later life, raising the risk of chronic non-communicable diseases (NCDs) similar to findings of a study done by Anuradha et al.<sup>[8]</sup>

### Social Media Usage and Academic Perception

At the beginning of the study, 57.4% of the intervention group reported using social media while studying; by the end of the study, this difference had decreased to about 50%. This implies a change in behaviour or a greater understanding of the possible detrimental effects of social media on academic achievement. High social media use has a detrimental effect on medical undergraduates' academic performance and has been strongly linked to psychological distress.<sup>[10]</sup> The shift in perception observed in our study, where students became more divided on whether social media affects grades, may indicate a growing sense of digital literacy, which is necessary for future healthcare professionals to use technology responsibly.

### Stress and Psychological Well-being

The intervention group's mean stress score significantly decreased from 30.02 at baseline to 24.66 at the endline ( $p < 0.001$ ), which was one of the study's most significant findings. At the end of the study, the intervention group's PSQ-14 scores (19.63) were considerably lower than those of the control group (29.68). This suggests that the intervention was effective in reducing the high stress levels that are common during the start of medical school as recommended by Monisha et al in Puducherry.<sup>[10]</sup> Although clinical aspects of diseases like diabetes and hypertension have historically been the focus of medical curricula in India, there has been a documented lack of emphasis on stress management and health promotion.<sup>[2]</sup> In order to prevent psychological morbidity, our findings support the inclusion of resilience-building techniques and holistic wellness in the undergraduate medical curriculum.

### Sleep and Physical Activity

Even deeply ingrained habits like sleep patterns, which are essential for cognitive competence and medical education, can be positively impacted by lifestyle interventions, as evidenced by the slight improvement in sleep duration toward the adequate 6–8 hour category. This data summary did not primarily focus on physical activity outcomes, but the positive changes in BMI point to an improved energy balance, which is crucial for preventing NCDs.<sup>[11,12]</sup>

## CONCLUSION

This study demonstrates that non-communicable disease (NCD) risk factors, particularly diet, physical activity, stress, and body mass index (BMI), can be effectively modified among medical students using a randomized control strategy that incorporates health education and behavior change communication (BCC). These findings highlight the urgent need for a paradigm shift in medical education that equally prioritizes academic achievement and student well-being. By addressing these risk factors during the early years of medical training, institutions can cultivate resilient and healthy future doctors who are better equipped to serve as role models for their patients. Furthermore, it is essential to initiate health promotion starting in school and continuing through college, and students should also be encouraged to engage in regular sports and physical activities.

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