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AWARENESS OF MEDICAL STUDENTS ABOUT LIFESTYLE MODIFICATIONS IN PREVENTION AND MANAGEMENT OF DIABETES MELLITUS AND HYPERTENSION- A CROSS SECTIONAL STUDY

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ABSTRACT

BACKGROUND:

Lifestyle modifications, such as adopting a healthy diet, engaging in regular physical activity, and ensuring sufficient sleep, have proven effective in managing and preventing diabetes and hypertension.

To assess the knowledge of lifestyle interventions for Non-communicable diseases(NCD) among medical students, exploring their willingness to engage in patient counselling and adhere to healthy practices themselves.

METHODOLOGY

In a cross – sectional study a structured validated questionnaire, assessing the medical students' knowledge, willingness to spread awareness, and self-assessment of healthy lifestyle habits was administered to medical students.

RESULTS

250 survey responses were collected from medical students, with an 83.9% response rate. Students were categorized into two groups: Group A (first and second-year) and Group B (third, fourth, and internship year). Group B students exhibited significantly better knowledge than Group A students ($p = 0.0049$). More than 90% students had positive attitudes toward lifestyle assessment and counselling. Group A students had healthier practices ($p = 0.0012$), but 4th-year students and interns showed lower adherence ($p = 0.0066$). Knowledge had a non-significant positive influence on spreading awareness ($p = 0.1862$) but not on adopting healthier lifestyles ($p = 0.2329$). Over 17.47% of the students, despite having at least an average level of knowledge, had unhealthy lifestyles.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

CONCLUSION

Medical students in general had good knowledge levels, yet significant gaps remained. Despite their positive attitudes toward promoting healthy lifestyles and sufficient knowledge, a notable number of students faced challenges in adopting these practices, highlighting the need to address the knowledge-to-practice gap.

KEY WORDS: awareness, lifestyle modification, medical students

INTRODUCTION

In recent decades, there has been a significant shift in the universal burden of disease, with lifestyle-related disorders associated with non-communicable diseases (NCDs) overtaking communicable diseases as a major challenge for healthcare systems worldwide. The World Health Organization (WHO) recognizes chronic respiratory diseases, diabetes, cardiovascular diseases including hypertension, and cancer, as the four primary NCDs. These diseases are responsible for more than two-thirds of all deaths worldwide, largely influenced by unhealthy eating habits, poor dietary choices, and sedentary lifestyles, as is also demonstrated by the Framingham Study. [1,2,3]
According to a global study, between the years 1990 and 2019, the absolute numbers of adults between the age of 30 and 79 with hypertension has almost doubled. The global prevalence of Diabetes Mellitus in 2019 was approximately 9.3% among adults [4,5]. Addressing these issues necessitates a comprehensive approach that emphasizes the importance of a healthy diet, regular physical activity, and sufficient sleep – the fundamental pillars of good health and disease prevention. [6,7]

However, effectively managing these chronic disorders poses a significant burden on healthcare systems. Thus, it becomes crucial to raise awareness among the general population about the importance of disease prevention. In this context, healthcare providers, especially doctors, play a vital role in effectively disseminating health-related information. [2]

To be able to influence their patients, doctors must first embody a healthy lifestyle and possess the requisite knowledge and attitude towards it. This highlights the significance of assessing and educating undergraduate medical students about healthy lifestyle choices, prevention strategies, and management techniques, while also encouraging personal adoption. [7,8,9]

With this understanding, the primary objective of our study is to assess the lifestyle habits of undergraduate medical students – the starting point – by evaluating their knowledge, attitudes, and self-practices regarding healthy living. Given the limited studies available to assess the current levels of knowledge, attitude, and self-practices among undergraduate medical students regarding healthy lifestyle modifications for preventing NCDs in settings such as ours, our study seeks to bridge this gap. The findings will serve as a foundational reference for policy-making, adaptation of teaching methods, and further extensive research in this field.

In light of these objectives, our study aims to address the following key questions:

1. Do the participants possess adequate knowledge and understanding of lifestyle modifications that can prevent and manage Diabetes Mellitus and hypertension ?

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

2. How does the participants' level of knowledge influence their willingness to raise awareness among their patients?

3. How does the participants' knowledge and understanding of the importance of lifestyle modifications in these diseases impact their own adoption of healthy habits?

4. Does the participants' year of professional study or training have any effect on their levels of knowledge, attitude, and adherence to healthy self-practices?

By answering these questions, we aim to gain valuable insights into the current state of knowledge, attitudes, and practices among medical students, ultimately working towards reducing the global burden of NCDs.

MATERIALS AND METHODS

ETHICAL CONSIDERATIONS

All informed consent procedures, and research protocol was submitted to, and reviewed by, the Institutional Ethical Committee of Hinduhridaysamrat Balasaheb Thackeray Medical College & Dr. R.N. Cooper Municipal General Hospital, Mumbai, India, and were subsequently approved. Each participant signed an informed consent form as the first part of the Questionnaire.

STUDY DESIGN

A survey-based cross-sectional study was conducted in Hinduhridaysamrat Balasaheb Thackeray Medical College & Dr. R.N. Cooper Municipal General Hospital, Mumbai, India, amongst the undergraduate clinical level medical students (including interns), for a period of 6 months.

STUDY POPULATION

The source and study population were taken to be all the undergraduate level medical students (including interns) of Hinduhridaysamrat Balasaheb Thackeray Medical College & Dr. R.N. Cooper Municipal General Hospital, Mumbai, India, currently studying the MBBS course in this institution.

SAMPLE SIZE

A sample size of 284 (5% more will be taken to compensate for non-respondents) was determined using a single proportion formula. All the participants were briefed about the objectives of the study and requested to sign a consent form as per the protocol of the Institutional Ethical Committee.

INCLUSION AND EXCLUSION CRITERIA

All undergraduate medical students (including interns), male and female, were eligible to participate in the study, and all those who volunteered to participate were included in data collection.

STUDY PROCEDURE

The study protocol was implemented by first informing all participating students about

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

the topic, purpose, and relevant details of the research. Prior to distributing the survey questionnaire in a paper-based format, students were provided with a comprehensive explanation of the study's confidentiality, anonymity, and voluntary participation aspects. To ensure compliance with ethical standards, students were required to sign an informed consent form before proceeding to complete the questionnaire.

The questionnaire itself was designed as a self-reported structured instrument, incorporating validated questions sourced from previous studies [10-16]. It comprised of three distinct sections. The first section involved the presentation of the informed consent form. The second section aimed to collect demographic information from participants, including age, gender, and year of professional study.

The third section of the questionnaire focused on assessment questions, divided into three categories: knowledge assessment, willingness to spread awareness, and self-assessment of healthy lifestyle habits for the prevention and management of Diabetes Mellitus and hypertension. This section contained a total of 24 questions. The knowledge assessment category included 14 questions covering the importance of healthy nutrition (8 questions), sleep (3 questions), and exercise (3 questions) for individuals at risk of developing DM and hypertension. Multiple-choice options were provided for participants to select their responses.

The section on willingness to spread awareness aimed to evaluate participants' attitudes toward the importance of educating patients about the prevention, early diagnosis, and management of diabetes mellitus and hypertension. Participants were asked to assess their agreement using a 5-point Likert scale, ranging from 0 (strongly disagree) to 5 (strongly agree).

Lastly, the self-assessment section focused on whether participants implemented the knowledge and information discussed in the survey in their own lives. This section consisted of 7 questions specifically designed to assess participants' adherence to healthy lifestyle habits.

Throughout the study, students were encouraged to actively participate, as their involvement would also help them test their own knowledge and lifestyle habits related to the prevention and management of NCDs.

STATISTICAL ANALYSIS

The collected data was entered into an MS Office Excel worksheet and processed manually. Correct responses received a score of +1, while incorrect responses were given a score of 0, enabling the conversion of data into numerical format.

To assess the differences between Group A (comprising first and second-year students) and Group B (comprising third, fourth, and internship year students), the responses were categorized into "Good," "Average," and "Poor" levels of knowledge. Chi-square test was performed to compare the proportions of students falling into each knowledge level category between the two groups. Furthermore, the same was extended to compare the proportions of students within each group as well.

For attitude assessment, responses were categorized as ‘Correct Attitude” or “Incorrect Attitude”. Chi-square test was used to compare the proportions of students falling into each category between the 2 groups, as well as amongst the different academic years.

To evaluate self-assessment of healthy lifestyle habits, responses were categorized as "Healthy" or "Unhealthy." Chi-square test was used to compare the proportions of

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

students falling into each category between the 2 groups, as well as amongst the different academic years.

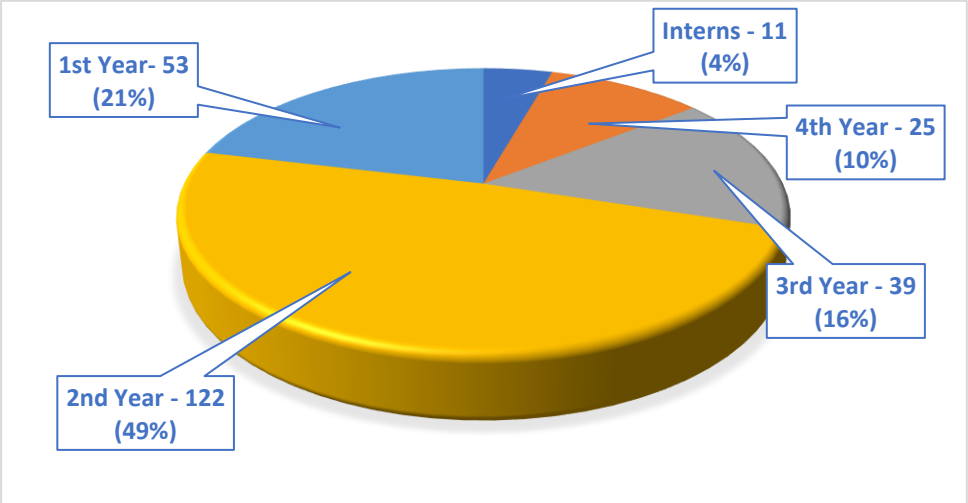
To assess the association between knowledge levels, attitude, and self-practices, Chi-square test was used.

The statistical significance level was set at $p<0.05$ for all analyses, denoting that a p-value less than 0.05 was considered statistically significant.

The statistical analyses were conducted using SPSS software, version 29 (2022). The results were presented using tables, bar graphs, and appropriate statistical measures, facilitating a comprehensive understanding of the data.

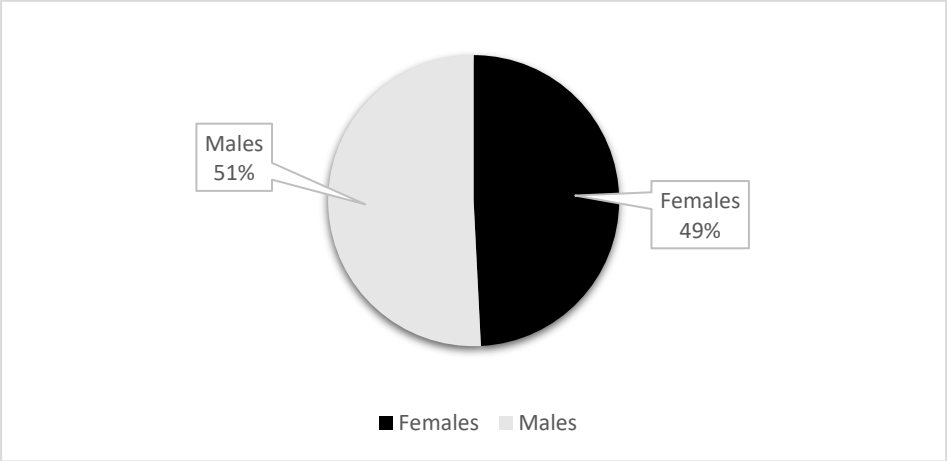
RESULTS

From a total of 298 survey sheets distributed, 250 were returned (Response Rate of 83.9%). Out of these, 53 responses were collected from 1st year, 122 responses were collected from 2nd year, 39 responses were collected from 3rd year, 25 from 4th year and 11 interns were included (Pie Chart 1). For simplicity, 1st and 2nd year students were combined to form Group A, and 3rd, 4th and internship year students were combined to form Group B. Hence, a total of 175 responses were collected from Group A, and 75 were from Group B. Out of all the responses, there were a total of 123 females and 127 males (Pie Chart 2), with their ages ranging from 18 to 25 years.



Pie Chart 1: Distribution of students across subsequent years out of 250 students

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023



Pie Chart 2: Distribution of students as males and females out of 250 students

Knowledge Related Findings

The results of the study revealed notable differences in knowledge levels between Group A and Group B students across all three aspects assessed, namely nutrition, sleep, and exercise (Table 1 and 2). Group B students exhibited a significant improvement in their knowledge compared to Group A students ($p = 0.0049$).

Analysis of the knowledge assessment within Group A, comprising first and second-year students, indicated that second-year students scored significantly higher than first-year students ($p = 0.17$). Similarly, analysis of the knowledge assessment within Group B, consisting of third, fourth, and internship year students, revealed that internship year students scored better than final year students ($p = 0.9532$), although not significantly. Notably, final year students scored significantly higher than third year students ($p = 0.0268$) (Double Bar Graph 1 and Triple Bar Graph 2).

Overall, among the total of 250 students, 5.6% demonstrated good knowledge, while 60.8% displayed average knowledge, and 33.6% exhibited poor knowledge. Scores tended to improve with higher clinical years, with an observed improvement from second year to third year students, although this difference was not statistically significant ($p = 0.0828$).

Furthermore, no significant variation was observed in the responses between female and male students.

These findings indicate that Group B students, particularly those in higher clinical years, exhibited higher levels of knowledge compared to Group A students. The study highlights the need for interventions targeting knowledge enhancement among medical students, particularly in the early years of their training, to improve overall understanding of healthy lifestyle habits.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Table 1: Knowledge questions versus responses of group a and group b

(correct answers were given a score of 1, and incorrect answers were given a score of 0)

Knowledge based on	Q. No.	Question	Score	Group A	Group B
Nutrition	1.	The food item that decreases Glucose absorption	0	144	63
			1	31 (17.7%)	12 (16%)
	2.	The fruit most preferred in cases of hypertension is	0	136	47
			1	39 (22.2%)	28 (37.3%)
	3.	The kind of oil NOT suggested in Hypertension is	0	135	56
			1	40 (22.8%)	19 (25.3%)
	4.	If you have hypoglycaemia during, or after an exercise, what would be an appropriate food choice?	0	83	30
			1	92 (52.57%)	45 (60%)
	5.	A patient has recently been diagnosed with type 1 Diabetes Mellitus and asks you for help formulating a nutrition plan. Which of the following recommendations would you make to help him increase calorie consumption to offset absorption problems?	0	53	16
			1	122 (69.71%)	59 (78.67%)
	6.	All Sugar-free food items can be consumed in unlimited amounts by a diabetic patient. Do you agree?	0	46	11
			1	129 (73.7%)	64 (85.3%)
	7.	According to the American Heart Association (AHA), what is the upper limit of salt consumption per	0	154	40
			1	21 (12%)	35 (46.67%)

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

		day for the patients of hypertension?			
	8.	The DASH Diet is a lifelong approach to healthy eating that is designed to help treat or prevent -	0	104	13
			1	71 (40.57%)	62 (82.67%)
Exercise	1.	What exercise should be avoided in Hypertension?	0	103	40
			1	72 (41.1%)	35 (46.67%)
	2.	What type of Diabetics can NOT benefit from a moderate exercise routine?	0	167	66
			1	8 (4.57%)	9 (12%)
	3.	A patient is taking NPH insulin daily every morning. Which is NOT a good time for him to exercise?	0	159	62
			1	16 (9.1%)	13 (17.3%)
Sleep	1.	What goals could be set for a patient who is not sleeping well?	0	99	37
			1	76 (43.4%)	38 (50.67%)
	2.	If a patient complains of reduced sleep at night but feels sleepy in the morning, you discourage naps in the morning?	0	130	54
			1	45 (25.7%)	21 (28%)
	3.	Too little sleep can result in (Please tick all that seems applicable)	0	41	9
			1	134 (76.57%)	66 (88%)

Table 2: Summary of students of Group A vs Group B falling under the knowledge level category of Good, Average, and Poor

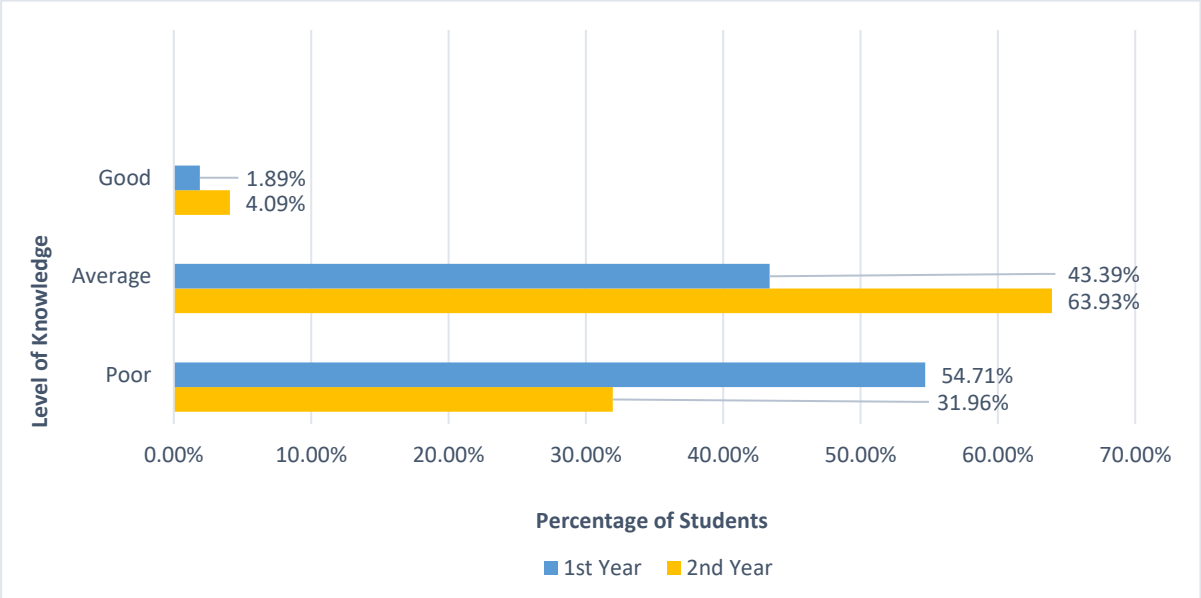
(Good Knowledge is taken as a score of minimum 6 for nutrition-based questions, and at least 3 for sleep and exercise related questions; Average Knowledge is taken as a score of 3 to 5 for nutrition-based questions, and at least 2 for exercise and sleep related questions; Poor Knowledge is taken as a score of less than 3 for nutrition-based questions, and less than or equal to 1 for exercise and sleep related questions)

Assessment of Knowledge level	Group A	Group B
Good	6 (3.42%)	8 (10.67%)

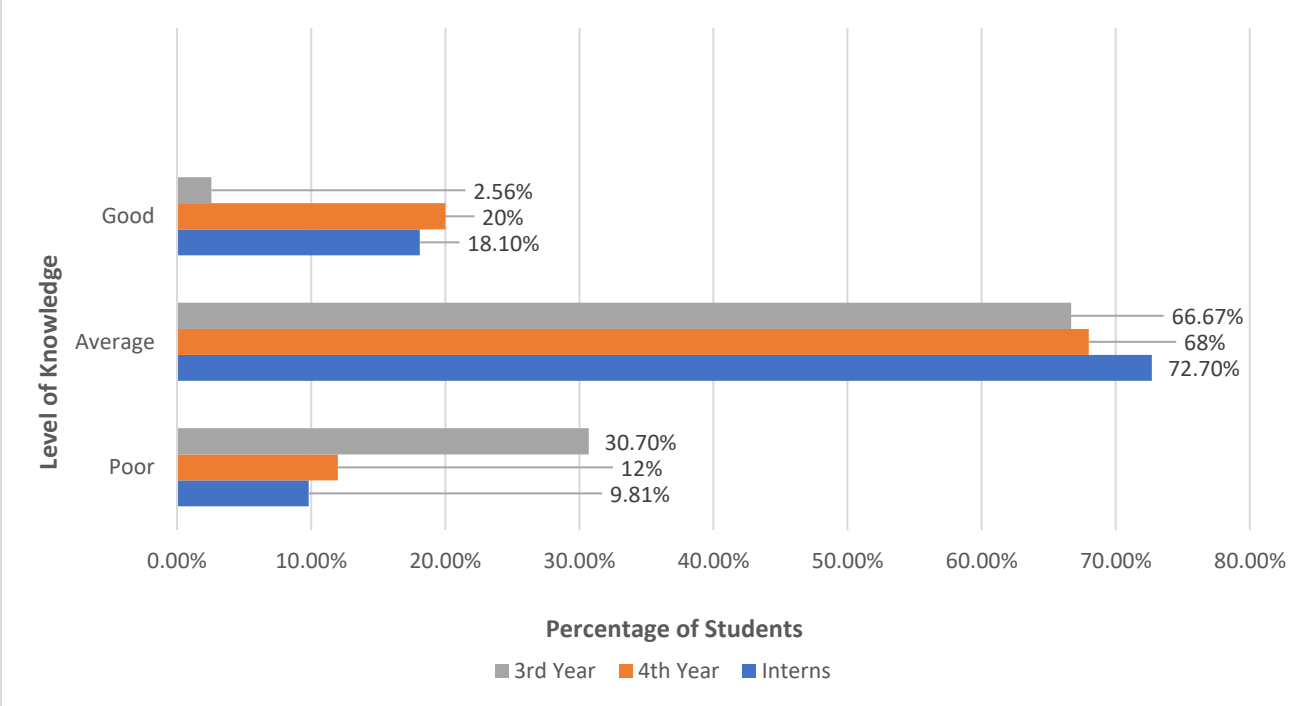
ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Average	101 (57.7%)	51 (68%)
Poor	68 (38.8%)	16 (21.33%)

Bar Graph 1: Percentage of students within Group A falling within knowledge level category of Good, Average, and Poor



Bar Graph 2: Percentage of students within Group B falling within knowledge level category of Good, Average, and Poor



ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Attitude Related Findings

In the present study, the responses of Group A and Group B students were compared and analysed. Table 3 present the per question responses of both groups. Overall statistical analysis (According to Table 4) revealed no significant difference in their responses ($p = 0.3759$), indicating that the groups did not differ significantly in terms of their attitudes.

Furthermore, the assessment results as depicted in Bar Graph 3, indicated no significant variations among students from different clinical years ($p = 0.8806$) or between the female and male students.

Overall, the majority of the 250 students showed a positive attitude towards lifestyle assessment and counselling. Specifically, 91.6% of students believed it was their responsibility to discuss a patient's lifestyle habits during general practice. Furthermore, 90.4% of students expressed their belief that lifestyle assessment should be an integral part of routine appointments, similar to diagnosis and treatment. Additionally, 74% of students agreed that physicians could significantly impact a patient's behaviour towards adopting a healthier lifestyle by dedicating time to discuss the issue and explain its benefits.

These findings suggest a positive attitude among medical students towards incorporating lifestyle assessment and counselling into their practice, regardless of their clinical year or gender.

Table 3: Attitude Questions versus Responses of Group A and Group B

Q. No.	Question	Response	Group A	Group B
1.	Discussing a patient's lifestyle habits (including nutrition, sleep and physical activities) with them in the general practice is my responsibility.	Correct	158 (90.28%)	71 (94.67%)
		Incorrect	17	4
2.	Lifestyle assessment (Including nutrition, sleep and exercising habits) should be officially included in any routine appointment, just like diagnosis and treatment.	Correct	157 (89.71%)	69 (92%)
		Incorrect	18	6
3.	Physicians cannot have much effect on a patient's behavior towards adopting a healthier lifestyle, even if they take the time to discuss the problem and explain to them the benefits of the same.	Correct	125 (71.43%)	60 (80%)
		Incorrect	50	15

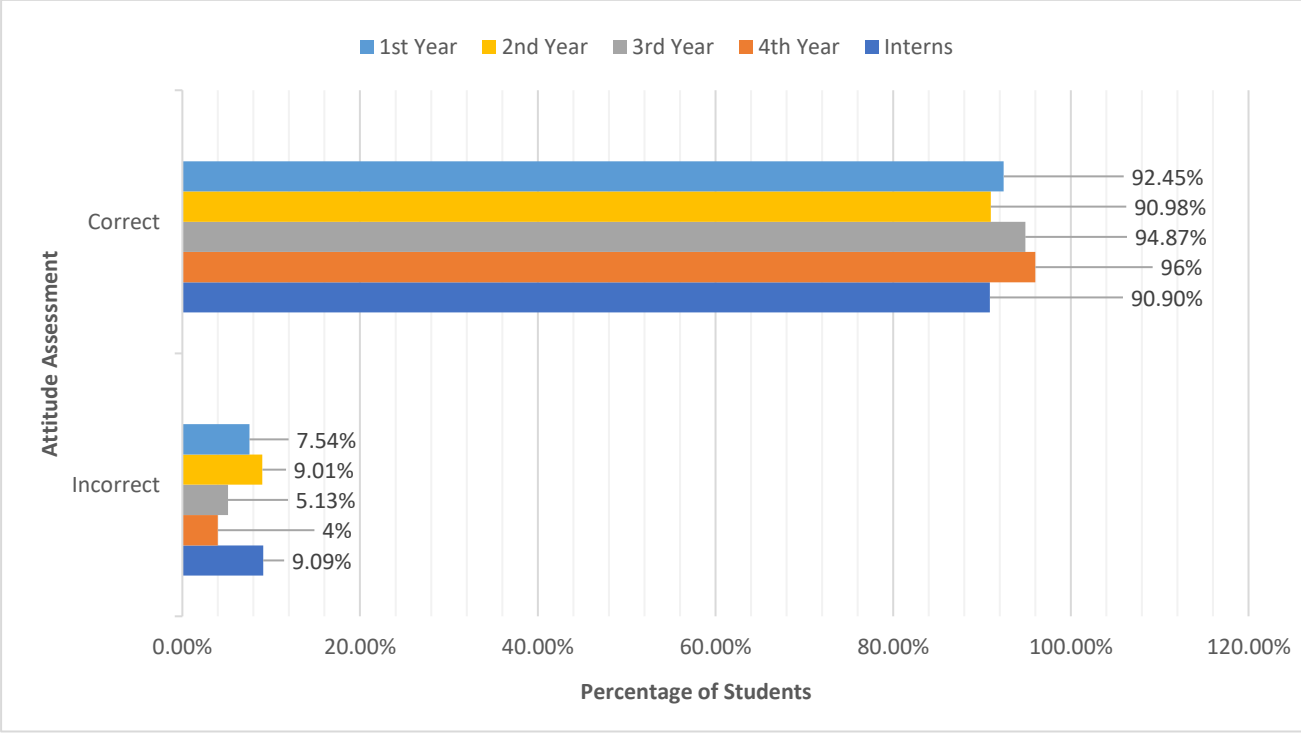
ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Table 4: Summary of students of Group A vs Group B falling under the Attitude type category of Correct and Incorrect

(Correct attitude was assigned to those who selected a score of at least 3 for both questions 1 and 2, along with a score of less than 3 for question 3; All responses other than this was considered under Incorrect Attitude)

Attitude Assessment	Group A	Group B
Correct	160 (91.42%)	71 (94.66%)
Incorrect	15 (8.57%)	4 (5.33%)

Bar Graph 3: Summary of students of all years falling under the Attitude type category of Correct and Incorrect



Self-Practice Related Findings

(Table 5 displays the per question responses of Group A vs Group B). The results revealed a significant difference in the practice of healthy lifestyle habits between the two groups of students. Group A students exhibited a significantly healthier practice compared to Group B students ($p = 0.0012$). Furthermore, a noteworthy finding was observed among the higher clinical years, where 4th year students and interns displayed a significantly lower adherence to healthy lifestyle habits compared to 3rd year students ($p = 0.0066$). However, no significant differences were found in the lifestyle habits among 1st, 2nd, and 3rd year students (Table 6 presents the distribution of healthy vs unhealthy students within each year). Additionally, approximately 19.6% of the total 250 students were identified as not following

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

healthy practices. Notably, no significant variation was observed in the responses between female and male students.

These findings suggest that Group A students demonstrated a significantly healthier lifestyle practices compared to Group B students. Furthermore, there was a decline in the adherence to healthy practices among 4th year students and interns, highlighting the need for interventions to promote and maintain healthy habits throughout medical education.

Table 5: Self-Assessment Questions versus Responses of Group A and Group B (All healthy answers were given a score of 1, and all unhealthy answers were given a score of 0)

Q. No.	Question	Score	Group A	Group B
1.	Which of the following conditions are applicable to you?	0	26	7
		1	149 (85.1%)	68 (90.67%)
2.	How many meals do you eat every day?	0	39	18
		1	136 (77.7%)	57 (88%)
3.	How often do you prefer fresh fruits and vegetables over packaged or fast foods for a snack?	0	53	29
		1	122 (69.7%)	46 (66.67%)
4.	How many times do you go for a walk or exercise during the day?	0	48	26
		1	127 (72.57%)	49 (78.67%)
5.	How many hours do you sleep every night at a stretch?	0	64	31
		1	111 (63.43%)	44 (72%)
6.	How often do you get a thorough medical check-up?	0	79	49
		1	96 (54.85%)	26 (40%)
7.	Which of the following Sleep Hygiene Practices do you follow? (Can select multiple)	0	29	18
		1	146 (83.3%)	57 (82.67%)

Table 6: Summary of students of Group A vs Group B falling under the Self-Assessment type category of Healthy and Unhealthy

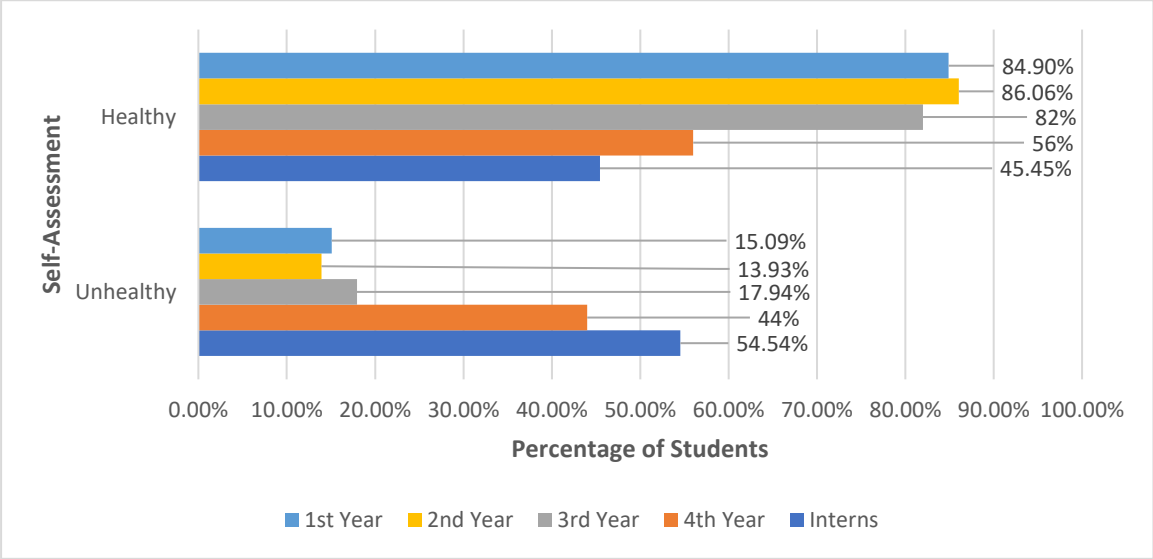
(An individual total score of 4 or more were categorized under Healthy, while those less than 4 were categorized under Unhealthy)

Self-Assessment	Group A	Group B
Healthy	150 (85.7%)	51 (68%)

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Unhealthy	25 (14.28%)	24 (32%)

Bar Graph 4: Summary of students of all years falling under the Self-Assessment type category of Healthy and Unhealthy



Findings associating Knowledge, Attitude and Self-practices

In comparing the levels of knowledge with attitudes and healthy lifestyle habits, it was observed that an average level of knowledge had a non-significant positive influence on the students' willingness to spread awareness among all 250 participants ($p = 0.1862$). However, it did not significantly motivate the students towards adopting healthier lifestyle habits ($p = 0.2329$). Furthermore, it was concerning to find that over 17.47% of the students, despite having at least an average level of knowledge, reported unhealthy practices. No significant differences were noted in the responses between female and male students.

Table 7: Comparison of students of Group A vs Group B, having the correct attitude associated with different levels of knowledge

Group A		Group B	
Knowledge level	**Correct Attitude**	**Knowledge level**	**Correct Attitude**
Good	6 (100%)	Good	7 (87.5%)
Average	94 (93.07%)	Average	49 (96.07%)
Poor	60 (88.23%)	Poor	15 (93.75%)

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Table 8: Comparison of students of Group A vs Group B, having a healthy lifestyle associated with different levels of knowledge

Group A		Group B	
Knowledge level	**Healthy**	**Knowledge level**	**Healthy**
Good	6 (100%)	Good	4 (50%)
Average	90 (89.11%)	Average	37 (72.55%)
Poor	54 (79.41%)	Poor	10 (62.5%)

DISCUSSION

Through this study, we aimed to evaluate the knowledge, attitude, and adoption of healthy lifestyle habits among medical students, specifically focusing on the significance of lifestyle modifications in non-communicable diseases such as Diabetes and Hypertension.

Our findings indicated that, in general, the knowledge levels of the students were above average, and there was a progressive improvement in knowledge with each higher level of professional and clinical studies. However, significant knowledge gaps still persisted. Notably, the knowledge levels of 2nd and 3rd-year students were comparable.

These findings may be attributed to individual differences in learning pace and their understanding of NCD topics. Each student may prioritize different subjects, which could affect their focus on NCD-related concepts. Additionally, the limited emphasis on prevention and lifestyle modification counselling during case discussions and bedside patient demonstrations might contribute to the students' difficulty in correlating theoretical knowledge with practical application. The sporadic inclusion of NCD topics across the medical education duration may result in knowledge gaps. Students before the introduction period could lack understanding, while those after might forget concepts, suggesting that this on-off approach is less effective and might hinder the students' ability to effectively apply their theoretical knowledge in practice.

To address these challenges, it is essential to introduce continuous NCD topics across all years of medical study, including regular revision classes for final year and internship students. Early integration of student-patient interactions and communication skills training through elective courses, along with demonstrations and simulations, can further promote the importance of healthy lifestyle habits in patient care [2,17,18,19,20]. Additionally, incorporating bedside case discussions that extensively cover lifestyle modification for NCD cases would better prepare students to manage these prevalent diseases effectively. [21,22]

Furthermore, no significant variation was found in the knowledge aspect between male and female medical students, which can be attributed to the standardized education they receive throughout their medical course.

Regarding attitude, it was encouraging to note that the majority of students demonstrated a positive attitude towards spreading awareness about the importance of lifestyle modifications. This assessment of students' willingness to spread awareness was also based on their personal belief in the efficacy of such efforts and it was noted that the levels of knowledge, even among different years of professional studies, did not significantly influence this attitude.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

This finding may be attributed to the mindset fostered in students from the first year itself, emphasizing their role as health caregivers who prioritize prevention alongside treatment. The early curriculum instils a strong sense of responsibility in all students, highlighting that their ultimate goals as healthcare providers extend beyond diagnosis and treatment to encompass disease control and prevention. This foundational perspective shapes their perception from the very beginning of their medical journey, inspiring a commitment to promoting healthy lifestyles and preventive measures for non-communicable diseases.

Furthermore, despite possessing adequate knowledge, a considerable number of students did not effectively translate it into their own lifestyle practices. Notably, this observation was more prominent in Group B students compared to Group A. Within Group B, there was a gradual decline in the adoption of healthy habits with increasing clinical years of study. This trend may be attributed to the more demanding curriculum during the clinical years, resulting in heightened stress and anxiety, including increased workloads during internship and later years [23,24]. Additionally, another contributing factor may be the influence of family routines followed since childhood, which may have ingrained unhealthy lifestyle practices in the students. Adjusting to a healthier lifestyle can be challenging for students from such backgrounds. Since mere knowledge isn't sufficient if the students themselves do not follow healthy lifestyle choices, encouraging student participation and volunteering in community health campaigns, activities like yoga and meditation, and attending lectures and simulations on effective time management and self-care strategies organized by medical associations, not only for themselves but for the community as well, can positively influence lifestyle choices among them, which is crucial [25]. Hence, these initiatives can help bridge the gap between knowledge and practice, while also enhancing their confidence in being able to provide good patient care, thus equipping the students to be advocates for holistic healthcare.

CONCLUSION

In conclusion, this study underscores the favorable attitude of medical students towards learning and spreading awareness about lifestyle modifications. However, it also highlights the need for continuous guidance, early practical exposure, revision classes, and effective strategies to translate knowledge into personal practice. By creating a supportive learning environment, medical students can play a significant role in promoting healthy habits and enhancing patient care, ultimately assisting in the global goal of reducing the burden of NCDs such as Diabetes Mellitus & Hypertension.

STRENGTHS AND LIMITATIONS

Our study sheds light on medical students' knowledge, attitudes, and practices, although with some constraints. While a single-institution sample and limited size may impact broader application, self-reported data introduces potential biases. The cross-sectional design restricts causal inferences, and the focus on specific diseases and incomplete lifestyle dimensions narrows our scope. Yet, our study employs validated survey instruments and a design transferable to similar settings. Hence, despite these limitations, our study provides insights and holds appropriate significance as it can become a basis or a reference for future similar (and even advanced) studies.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

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ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

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