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Original Research Article

Knowledge and lifestyle practices associated with non-communicable diseases risk factors among undergraduate students, Thiruvananthapuram, India: a mixed method study

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ABSTRACT

Background: Behaviors established in youth especially in college, have lifelong implications on themselves and their close family members. We intended to assess the knowledge of non-communicable diseases (NCDs) risk factors and associated lifestyle practices among undergraduate students.
Methods: We conducted a cross-sectional concurrent mixed method study among undergraduate students (n=486) aged 18-21 years, Kerala, India. A self-administered structured questionnaire was used to collect data. In-depth interviews of five students were conducted from each college. Physical measurements including height and weight of the students were measured and reported to the participants. Data was collected from January to March 2019.
Results: Forty-four percent (n=200) participants' fathers were laborers or semi-skilled workers. Only 42.8% (n=208) of students had body mass index (BMI) within normal range. Nearly three fifth of students (58%, n=282) had poor knowledge of NCDs and proportion of students with knowledge of balanced breakfast was 11% (n=53). Regarding lifestyle practices, daily fruit intake was low (10%, n=45) and participants consuming vegetables daily was less than 40% (n=191). Lack of infrastructure supporting physical activities and healthy food choices at home and outside are some reasons mentioned by participants for sedentary lifestyle and unhealthy dietary practices. Parental involvement played an important role in practicing healthy dietary practices and performing physical activity for leisure.
Conclusions: The knowledge and practices of undergraduate students regarding primary prevention of NCDs was poor. Community level action with involvement of parents will be helpful in the primary prevention of NCDs.

Keywords: Lifestyle practices, Young adults, NCDs, Prevention, Risk factors

INTRODUCTION

Non communicable diseases (NCDs) account for 74% of all deaths globally with cardiovascular diseases, cancer, diabetes and chronic respiratory diseases being the major causative factors.[1] Unhealthy diet, physical inactivity, tobacco and harmful use of alcohol are modifiable lifestyle factors which are also the major contributors for the four major groups of NCDs.[1,2] In individuals aged 18-21 years, social behaviors and problems either start or peak during these years; these lifestyle practices can have long term established risk on the development of NCDs.[3,4]

In India, 55% of all disability adjusted life years (DALYs) and 66% of deaths are contributed by NCDs.[5,6] A systematic review found high prevalence of NCD risk factors in Kerala mostly due to unhealthy dietary patterns and sedentary lifestyle.[7] A 10-year prospective study done in Kerala reports a high incidence of prediabetes showing an epidemic trend towards the development of type 2 diabetes mellitus and that it requires immediate public health action.[8]

Literature review showed that most previously reported work from various countries have either investigated a combination of biological and clinical risk factors for

NCDs in the general population or has studied specific groups of adults and elderly populations thus missing youth or young adults. Increased attention to improving participation rates of young people is necessary to improve their knowledge, capacities and skill.[9] Universities and colleges are the final destinations, where knowledge to take measures to prevent NCDs can be imparted at large scale.[10] Once a problem of old age, now NCDs are prevalent even among the youth.[11] Most programs are focused on older adults and at community level. Moreover, these are curative and not preventive.[12] It is necessary to know the knowledge level of young adults in order to develop preventive programs to control NCDs.

The present study primarily intends to determine the knowledge level about the risk factors of NCDs among the undergraduate students (18-21 years) of Thiruvananthapuram district, Kerala. Also, we intend to study prevalence of lifestyle factors associated with NCDs among college students and assess the BMI among this age group.

METHODS

The study was conducted in undergraduate colleges of Thiruvananthapuram district, capital of Kerala among students aged 18-21 years. This was designed as a cross-sectional concurrent mixed method design and the sample size was calculated using Open Epi version 3.01 based on a similar study conducted among college students in Delhi.[13] The sample size estimated was 444 and was rounded up to 450. Data was collected from January to March 2019.

Sampling procedure

A stratified sampling method was followed. All the 136 colleges including professional, arts and science colleges in Thiruvananthapuram district were enlisted. All colleges were grouped under three categories; government (23), aided (20) and private colleges (93). From each category, two colleges were picked randomly using random number generation method. All undergraduate students between 18-21 years were eligible to be a part of the study. From each college, 75 to 100 students were selected. Five students from each college were selected for in-depth interviews.

Data collection technique

Data collection form

A pre-tested, self-administered questionnaire was used to gather data from the study participants.

When preparing the questionnaire, the use of technical terms was kept to a minimum. Questionnaires was pretested multiple times in colleges not included in the sample and the feedback of the students were considered and required changes were made. In-depth interviews were conducted using in-depth interview guides among five students from each college. In-depth interviews of students were conducted based on an interview guide regarding their daily practices, hobbies and awareness about NCDs that was developed and hand-written by researcher.

Written informed consent was obtained from all participating students. Height and weight of each student was measured and informed to them. Weight (using a digital weighing scale) and height (using a standard stadiometer) were obtained using standard techniques, rounding to the nearest 100 g for weight, and 0.5 cm for height.

Study variables

Knowledge

To understand the knowledge of the undergraduate students, a questionnaire containing 30 questions was designed. The questions were based under the domains of diet, physical activity (PA), alcohol and tobacco use and basic knowledge about the most prevalent NCDs. Ten questions were on knowledge of dietary risk factors. The questions dealt with common practices and food preferences. The questions asked were used to identify if the participants had knowledge on common food choices and balanced meals.[14,15] Five questions each covered domains on PA, tobacco and alcohol risk factors and five questions on common non-communicable disease symptoms that a general population should be aware of.[16,17] The response intended were whether true, false or don't know. One point was awarded for every correct response and no score for incorrect answer and 'don't know' response. The sum of all scores provided the health knowledge score. All participants who obtained a score above 17 (median) that is a score of 60% or above was considered to have high health knowledge.

BMI

BMI was calculated for each student using his or her weight and height measurement. BMI is a person's weight in kilograms (kg) divided by his or her height in meter square and is universally expressed in units of kg/m^2. WHO BMI classification for Asian adults (Indians) was used to categorize overweight and obesity. According to this classification, adults with BMI<18.5 are considered underweight, 18.5-22.9 as normal weight, 23.0-24.9 as overweight and the 25.0 and above as obese.[18]

Lifestyle

The practice of healthy lifestyle was assessed in the context of dietary habits including fruit and vegetable intake, PA, and behavioral risk factors like tobacco and alcohol use.[13]

Dietary habits

Questions were asked to collect information on the dietary habits of the students. The dietary habits considered as good in this study were: a) consuming breakfast daily, b) consuming regular meals daily, c) consuming fruits daily, f) consuming vegetables daily, g) no practice of consuming fried bakery items, h) no practice of consuming food outside residence, i) no practice of consuming carbonated drinks, j) no practice of consuming fast food and, k) no practice of adding extra salt in food.

These questions were designed based on a similar study.[19] The dietary practices of the students were assessed and each question was scored 1 point if they practiced doing the healthy habit "daily" or if they "never" practiced the unhealthy habits.

Physical activity

PAs include movements which increase heart rate above its resting rate, whether done for pleasure, work or transportation. After thorough literature review, a pilot study was conducted. All PAs usually performed by students were listed by the researcher.[20,21] Data was collected on activities including walking, household work, outdoor games, bicycling, gardening, jogging, running, gym, time spent on working on computer or studying, attending class in class room, dancing, yoga, watching television, computer games, phone chat and time spent on traveling. The students were asked to tick against the activity in the column for "yes or "no" depending on whether they did that particular activity. If yes, they were asked to mention on the number of hours in a day each week they spent on performing that activity.

Personal habits

Smoking: A smoker was defined as one who smokes currently. Those who had smoked previously (but not currently) was considered past smoker and those who never smoked were considered as non-smokers.[19]

Alcohol: A student who was currently consuming alcohol was considered as 'consuming alcohol'. Those who had previously consumed alcohol (but not currently) was considered as 'past alcohol user', and never consumed was considered as never user.[19]

Data analysis

The data from the questionnaire was coded, entered and cleaned in Microsoft excel 2013 and statistical analysis was done using the statistical software SPSS.[16] The data was reported as mean with ± standard deviations and medians for continuous variables. Proportions and percentages were used to represent categorical values. Bivariate analysis were conducted using chi-square test; one way ANOVA was used to find the significance in cases where the output variable was continuous and the input variable was categorical with more than two categories. One sample test for means (t test) was used to compare the means of two continuous variables. The test was considered significant if the probability (p) value was less than 0.05. The in-depth interviews were transcribed, translated, coded and analyzed thematically.

Ethical considerations

Written informed consent was taken from all participants and details about the investigator were given to each student to facilitate clarification of any doubts regarding the study that arose among the participants. Ethical clearance was obtained from the institutional ethics committee (IEC) of Ananthapuri Hospital and Research Institute.

RESULTS

A total of 500 students participated in the study. We excluded incomplete datasheets from the analysis resulting in a total of 486 participants. The general profile of the sample showed that there was a higher percentage (72.6%, n=353) of female participants. More than half the students (62.6%, n=304) were from rural area. Among the male students 35.4% (n=47) were obese or overweight and 18.8% (n=25) were underweight. Among the female students, 29.7% (n=105) were obese or overweight and 28.6% (n=101) were underweight (Table 1).

Table 1: General profile of the sample of college undergraduates (n=486).

Variables	Descriptive	Total N (%)
Age (in years)	18-19	292 (60.1)
	20-21	194 (39.9)
Gender	Male	133 (27)
	Female	353 (73)
Father's occupation	Abroad/business	106 (23.6)
	Skilled employees	137 (30.4)
	Semi-skilled/laborer	200 (44.4)
	Unemployed	7 (1.6)
Father's education	Postgraduate and above	51 (11.1)
	Graduate and 10+2	221 (48.1)
	Up to high school	187 (40.7)
Mother's occupation	Abroad/ Business	4 (0.8)
	Skilled employees	90 (18.5)
	Semi-skilled/laborer	33 (6.8)
	Unemployed	359(73.9)
Mother's education	Postgraduate and above	52 (10.9)
	Above 10th to graduate	289 (60.8)
	Primary to 10th grade	134 (28.2)
BMI (kg/m^2)	Underweight	126 (26)
	Normal weight	204 (42)
	Overweight	64 (13)
	Obese	92 (19)

Knowledge about NCD risk factors among study participants

This outcome variable was the sum of all scores acquired in the knowledge section of the questionnaire which gave the health knowledge score (Figure 1). All participants who obtained a score above 17 (median) that is a score of 60% or above was considered to have a high health knowledge and those below were considered as having low knowledge. More than 58% (n=282) of the students had a low health knowledge score.

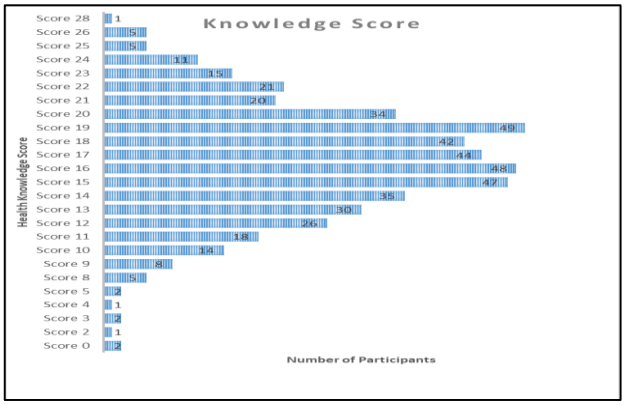

Figure 1: Health knowledge score of participants, (n=486).

Lifestyle

Lifestyle practices of the students were assessed under domains of diet, PA, tobacco and alcohol use (Table 2).

Table 2: An assessment of lifestyle practices in a typical week (n=486).

Variables	N (%)
Dietary practices	
Having breakfast daily	300 (61.7)
Having all meals regularly	294 (60.5)
Having vegetables daily	104 (21.4)
Having fresh fruits daily	28 (5.8)
Never added extra salt	348 (71.6)
Never consumed food from bought from outside residence	45 (9.3)
Never used carbonated drinks	219 (45.1)
Never consumed fast food	191 (39.6)
Physical activities (n=486)	
Walking	373 (76.7)
Household work	308 (63.4)
Bicycling	45 (9.3)
Gardening	157 (32.3)
Dancing	120 (24.7)
Yoga	35 (7.2)
Jogging	67 (13.8)
Running	130 (26.7)
Outdoor games	140 (28.8)
Gym	47 (9.7)
Computer/study time	330 (67.9)
Attending class	477 (98.1)
Watching TV	371(76.3)
Mobile/social media/gaming	406 (83.5)
Travel time	413 (85.0)
Smoking (n=131)	
Current	3 (2.30)
Past	6 (4.60)
Never	122 (92.36)
Alcohol (n=475)	
Current	5 (1.0)
Past	9 (1.8)
Never	461 (97.2)

Dietary practices

Out of a maximum score of 9 points, 80% of the students obtained a score ≤5 and 25% of the students obtained a score ≤2 indicating low overall dietary practice score.

Out of max score of 9 points, 80% (n=389) of students obtained score of 5/below and 25% (n=121) of students obtained score ≤2 indicating unhealthy overall dietary practice score. Among males and females, 15% (n=20) males consumed fruits daily while less than half

proportion of males, 7% females (n=25) consumed fruits daily (Table 2). Most students (94%, n=458) had habit of consuming fried/bakery items at least 1-3 times in week.

The non-availability of healthy options at home and the student's choice for modern food options were the common factors obtained from the interviews responsible for the un-healthy food choices. Additionally, lack of time due to long traveling hours was found to be a factor.

Physical activity

PA was assessed collecting data on the different activities the students performed in a week and the duration it was performed for. Data was collected from students based on if they did particular activity and for how long in a week. Forty two percent (n=202) students walked for at least thirty minutes daily. A little more than half of participants (55%, n=266) did household or gardening activities. From interviews it was understood that gardening mainly involved watering and growing small plants.

Less than 1/3rd 31% (n=153) of participants involved in leisure activities like outdoor games, dancing/ bicycling. Among the females 27% (n=95) did yoga, gym, running or jogging while 54% (n=72) of males involved in these activities. Totally, 34% (n=167) of the students exercised to improve health. These percentages are not mutually independent as there were multiple options of activities. It was understood from interviews that lack of space to play, lack of sports activities in college and lack of time are some of the reasons why the participants do not involve in leisure activities. From the interviews, it was understood that many male students find time during the weekends and vacations to play outdoor games. However, many complain of lack of space to play games, 65% students travel more than/ equal to 5 hours in week.

Among those who had low PA, majority were girls. Most girls spent their free time reading books, watching television or chatting with friends. It was understood from interviews that female students have lesser options and are confined to the indoors. Lack of parental support was an important factor for girls not participating in games.

Tobacco and alcohol use

Tobacco and alcohol use of the study participants was assessed and categorized as past users, current users or never users. Data was collected on all forms of tobacco use. None of the female participants reported use of tobacco. The prevalence of self-reported tobacco and alcohol use was low in the study population.

Association of BMI with other variables

A bivariate analysis of the different categories of BMI with the age, sex, parents' education, parents' occupation dietary practices and health knowledge score has been given in Table 3. A significant difference in BMI was seen in participants with respect to their fathers' educational qualification and occupation, with high BMI in participants where father was a postgraduate or above (p=0.00) and where fathers were occupied abroad or did business (p=0.00).

However, mothers' occupation or education had no influence on the BMI of the participants. There was no significant difference in the BMI based on the health knowledge of the students. This fact was reiterated from the in-depth interviews. The students are left with very little choices when they have to spend long hours outside for study purposes. Extensive time spent in coaching classes and long gaps between food was stated as a reasons for opting fast foods.

Table 3: Association of BMI with other variables (n=486).

Variables	Under weight (n=126) (%)	Normal weight (n=208) (%)	Overweight (n=66) (%)	Obese (n=86) (%)	P value
Age (in years)					
18-19	80 (27.4)	135 (46.2)	37 (12.7)	40 (13.7)	0.02
20-21	46 (31.7)	73 (42.8)	29 (13.1)	46 (12.4)	
Gender					
Male	25 (18.8)	61 (45.9)	15 (11.3)	32 (24.1)	0.03
Female	101 (28.6)	147 (41.6)	51 (14.4)	54 (15.3)	
Father's education					
Postgraduate and above	34 (18.7)	73 (40.1)	30 (16.5)	45 (24.7)	0.00*
10th pass-graduate	68 (28.9)	106 (45.1)	31 (13.2)	30 (12.8)	
Below 10th	18 (42.9)	13 (31.0)	4 (9.5)	7 (16.7)	
Mother's education					
Postgraduate and above	46 (22.3)	80 (38.8)	33 (16.0)	47 (22.8)	0.01
10th pass-graduate	63 (26.7)	110 (46.6)	31 (14.1)	32 (13.6)	
Below 10th	15 (45.5)	11 (33.3)	2 (6.1)	5 (15.2)	
Father's occupation$					
Category 1	16 (15.1)	47 (44.3)	19 (17.9)	24 (22.6)	<0.00*
Category 2	36 (26.3)	44 (32.1)	24 (17.5)	33 (24.1)	
Category 3	64 (32.0)	94 (47.0)	19 (9.5)	23 (11.5)	

Continued.

Variables	Under weight (n=126) (%)	Normal weight (n=208) (%)	Overweight (n=66) (%)	Obese (n=86) (%)	P value
Mother's occupation$					
Category 1	0 (0)	2 (50.0)	1 (25.0)	1 (25.0)	0.26
Category 2	26 (28.9)	31 (34.4)	16 (17.8)	17 (18.9)	
Category 3	14 (42.4)	13 (39.4)	3 (9.1)	3 (9.1)	
Category 4	86 (24.0)	162 (45.1)	46 (12.8)	65 (18.1)	
Dietary practices					
Good	19 (26.8)	37 (52.1)	6 (8.5)	9 (12.7)	0.057
Poor	107 (25.8)	171 (41.2)	60 (14.5)	77 (18.6)	
Health knowledge					
High Score	53 (26.1)	84 (41.4)	24 (11.8)	42 (20.7)	0.436
Low Score	73 (25.8)	124 (43.8)	42 (14.8)	44 (15.5)	

$Occupation categories-Category 1-Occupied abroad or did business, category 2-a government employee, management sector or skilled employee, category 3-parents who worked as semi-skilled workers or laborers and category 4-mothers who were homemaker.

DISCUSSION

This study among the young undergraduate students of Thiruvananthapuram, Kerala assessed their knowledge about the risk factors of NCDs and the associated lifestyle factors. The other objective was to examine the association between the knowledge level of young college going student with their anthropometric parameters (especially BMI) and other factors. We found the knowledge associated with NCDs to be poor. Additionally, knowledge was not found to be associated with BMI.

The overall knowledge of the participants about the risk factors of NCDs was poor (58.2%; 95% CI=53.8-62.56). There was no significant difference in knowledge depending on the type of course the student pursued. A study done in undergraduate medical students in Karnataka reported low knowledge of the students on preventing common NCDs. Knowledge was poor about prevention of diabetes (68.9%), stroke (61.6%), and osteoporosis (33.8%).[22] A study on medical curriculum in India also supports this finding.[23] There was also no significant difference in the knowledge of the students depending on the type of college.

Knowledge about a healthy diet was very poor among the participants. The proportion of participants who knew about a balanced diet was very low. Most students did not know about portion sizes of rice. Common foods that are often seen as healthy choices may not be balanced.[15] This trend calls for attention towards the importance of promotion of nutritional knowledge in college curriculums.[24] The changing trends in food pattern with greater consumption of increased quantity of calorie rich food calls for conscious decision making. Students are mostly not aware that high fat, high calorie food can cause liver disease.

Most participants knew about the preventive action of PA on heart disease and diabetes but less than one third of the participants did PA for pleasure and a little above one third participated in health promoting activities like yoga, gym, running and jogging. PA for leisure and for health is not a trend common in Kerala.[25] Leisure-time PA is seen as harmful in depleting one from energy needed for work.[26] Only half the proportion of females did health promoting activities as that of males. Studies done in Kerala reiterate this trend reasoning that women are expected to focus on household chores and cooking instead of exercising and doing PA for leisure.[12,26]

The knowledge on the harmful effects of alcohol was good in a little less than three fourth of the participants. It was understood from the study that many participants considered alcohol use to cause mental and social problems and not always NCDs. Most of the participants were aware of the harmful effects of smoking and tobacco. This trend could be due to the multiple consistent and persistent campaigns that have been in the community spreading awareness on the harmful effects of tobacco and smoking and also the strict legislations against smoking in public places.

The overall knowledge on the common symptoms and conditions of diabetes, hypertension and other common NCDs was poor. This is a very disturbing trend keeping in view that these participants are going to enter an active phase of their life involving increased responsibilities and decision making.[27] Targeting this group can also influence the children of these individuals that they will have in future; an important step towards managing behavior from childhood.[28] College is the ideal place where such large number of youth can be addressed and knowledge can be imparted to them.[29]

The fact that less than half of the participants have normal BMI calls attention towards the need for improving their lifestyle practices. It is understood from the study that most participants were either underweight, overweight or obese. It is a well-established fact that being overweight is a major risk factor for most NCDs. Now, apart from the lack of adequate nutrition and muscle mass, it is proven that being underweight is a risk factor for heart disease.[30] It is also clear from this study that there is a lack of adequate knowledge about balanced meals. This is a definite indicator for the need for imparting knowledge

about healthy and mindful eating for the prevention of NCDs.

Although, the general dietary score obtained by most students was low, more than three fifth of the students had their breakfast and meals regularly and most students had food at their residence. Not many students had the habit of adding extra salt in their food. But, the vegetable and fruit consumption of the participants was very low. Just one tenth of the students consumed fruit daily. In a similar study conducted among college students in Delhi, 8.66% responded to consuming fruit daily.[13]

Less than half of the participants 42% (n=204) walked for at least half an hour every day. Although this qualifies for moderate PA, this is done mainly for travel and is not a conscious effort to exercise or stay healthy. Previous studies have reported that having knowledge of the guidelines for PA had a significant influence on the PA of college students and the general population.[31-33] Lack of PA is a major cause for chronic diseases. To minimize all risk factors for chronic disease, efforts starting in youth are needed to develop high cardio respiratory function and skeletal muscle strength within the limits of one's inherited genes.[34] From our study, it is understood that although students desire to participate in leisure sports, there is no such provision in many of colleges. Study done by Indian council of medical research (ICMR) across India points out that only 10% of the population in India engage in leisure PA.[35] Many male students may find time during the weekends to play, but with dwindling open spaces in the city, this is not always possible. Female students have no option left anyway because they limit themselves to their residence or residential area. A systematic review on burden due to NCDs in Kerala reports need for integrated and comprehensive approach with emphasis on health promotion, early detection, population-based interventions, prevention of exposure to risk factors, and strengthening of health system towards universal access to health services.[36]

This study has brought out several new insights which can be applied for designing intervention among young adults. However, our study has few limitations. For instance, tobacco and alcohol consumption as reported was found to be minimal. This could be due to smoke free policies existing in all colleges. It could also be due to under reporting by students. To best of our knowledge, current study was 1st to study level of knowledge about selected common NCDs among undergraduate students in this age group in Kerala. Another issue was higher proportion of female participants. This was due to inclusion of women's college during random sampling process. Therefore, this factor can be considered while selecting colleges in future studies.

CONCLUSION

The findings of this study suggest that knowledge about risk factors and lifestyle practices of the undergraduate college students with regard to NCDs and their primary prevention is unsatisfactory. Knowledge about balanced diet was also found to be low. The participants who involved actively in PAs for exercise or leisure was low. The BMI of more than half of the participants was outside the normal range. Fathers' education was a significant factor contributing to BMI. Obesity was significantly associated with higher education level of the parents.

Based on the above conclusions of the study, we would like to recommend educating undergraduate students on healthy diet and adequate PA and the influence these factors have in preventing NCDs. Programs to include a course on importance of lifestyle modification to prevent NCDs will go a long way in mobilizing the student community to inculcate healthy lifestyle choices early on in life. Facilities for games and sports should be made available and promoted among all students, irrespective of gender. College canteens should provide healthy food choices like fresh fruits and balanced meals. There is a need at the societal level to have a network of support system starting from home, and community level. Policies to support the youth in their wholesome development should be present in the community.

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