Tracking of Risk Factors of Non-Communicable Diseases in Students of a Private Medical College at Visakhapatnam (AP)

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ABSTRACT

BACKGROUND

Non-Communicable Diseases (NCDs) have evolved into a pandemic world-wide including India because of burgeoning population and adoption of unhealthy lifestyles often aping the west. Early identification of increasing trends in the rise of risk factors (RFs) of NCDs in all populations is of utmost importance. The present study aims to track the trends of certain RFs of NCDs in medical students.

METHODS

All the 141 students who had completed 3 years of medical college were included. 8 of them who were absent during study period were excluded. Base line data concerning the medical students was taken in the month of December 2016. Their anthropometric measurements like height, weight, waist circumference, waist-hip-ratio, and blood pressure were noted as per standard guidelines. The changes in the trends of hypertension, general obesity, and central obesity were analysed.

RESULTS

Out of the total 141 study subjects 93 (66 %) were female 48 (34 %) were male medical students. The mean age of students was 20.94 years with SD of 0.80. 64 (45.4 %), 62 (44 %) and 13 (9.2 %) students were aware of positive family history of hypertension, diabetes mellitus and obesity respectively. None of them were in the habit of smoking, drinking alcohol or tried narcotics. Undernourished students reduced from 28 (19.9 %) to 16 (11.3 %). Physical exercise among students increased significantly. General obesity (BMI ≥ 25 Kg / mt^2), central / abdominal obesity represented by waist circumstance and blood pressure were observed to have increased significantly. The combined obesity in the present study was 15.6 %.

CONCLUSIONS

Tracking of weight gain, blood pressure, physical activity in medical students was done after three years from the base line data collected in 2016. It was observed that certain risk factors of NCDs like obesity, hypertension, waist circumference, showed significant upward trends. Medical students should undergo periodic health check–ups (screening) to identify the emergence of RFs of NCDs in their nascent stage and transform themselves as role models in the community by maintaining and advocating healthy lifestyles.

KEYWORDS

Tracking, Risk Factors, NCDs, Medical Students

BACKGROUND

All parts of the world are now struggling with the non-communicable diseases. NCDs are the greatest challenge the medical profession is facing in the present era of civilization. The rapid changes in the life styles of populations across the globe due to increasing industrialization and urbanization brought about the NCDs. Modern life styles like physical inactivity, high calorie and salt consumption, high blood pressure, obesity etc. were noted as risk factors for NCDs. Higher blood pressure is associated with high incidence of cardiovascular events.[1] Since the aetiology of NCDs is of multifactorial origin, their prevention and control also require a multipronged approach.

The burden of NCDs is estimated to account for 70 % of all global deaths.[2] They are the leading causes of premature deaths globally. 15 million premature deaths in the productive age group (of 30 to 69 years) in 2018 could have been averted with proper adoption of preventive measures.

In India the estimated death rate due to NCDs like heart disease and stroke, diabetes mellitus, cancers, and chronic lung disease is about 63 % of all deaths.[3] The prevalence of high blood pressure in India is 25.4 %.[4] The underlying risk factors of NCDs such as consumption of tobacco, alcohol, physical inactivity and unhealthy diet arise as a result of behavioural and life style changes in modern times. In response to the "WHO (World Health Organization) Global Action Plan for the Prevention and Control of NCDs 2013 - 2020", India is the first country to adopt the National Action Plan with specific national targets and indicators aimed at reducing the number of global premature deaths from NCDs by 25 % by 2025.[5,6]

The risk factors take prolonged period to develop NCDs. Starting from early childhood and adolescence and affect in the peak period of economically productive life. NCDs are very much amenable to primordial prevention, through control of RFs. The comprehensive preventive approaches like tracking of RFs from adolescence and tackling them with awareness and behavioural change results in reduction of burden of NCDs. Tracking of RFs from early adolescence, detecting their trends and appropriate timely intervention would prevent NCDs to a large extent.[7]

Review of the literature revealed that most of the research took place in developed nations rather than in low and middle income nations, where there is lot of variability in diet, exercise, socioeconomic status unlike those in developed nations. Hence a longitudinal research has been chosen from a rapidly changing community that may yield new insights.[8]

The stress of present day life is one of the basic factors that provokes metabolism of the body to result in what is called the "metabolic diseases" or NCDs like hyperglycaemia, hypertension, high cholesterol, central obesity etc. The NCDs most often preceded by stress.[9] Medical students are subjected to lot of stress during course of their studies in terms of long study hours, extensive course, facing maximum number of examinations, uncertainty of future, social isolation, facing life and death. The chronic stress for lifelong commitment may result in NCDs. Several studies have proved the stress levels in medical students are more that may range from 27 to 44 %.[10]

Hence the study was conducted with an aim of tracking of risk factors of non-communicable diseases in medical students with the following objectives:

1. To estimate the prevalence of certain established risk factors of non-communicable diseases in medical students in the base line year of 2016.
2. To assess the changes in lifestyle and establish risk factors of NCDs of the students after undergoing the influence of medical curriculum for three years from baseline.

METHODS

It was a longitudinal observational study. All the medical students of 2016 batch of Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Visakhapatnam, were included in the study. The medical students who belong to 2016 batch and willing to participate were included in the study. Students who were absent during the period of study were excluded from the study.

A base line data was collected from medical students in 2016. After a period of 3 years, the same study population were tracked down with the above objectives. A total number of 149 students were present. Eight students were excluded because of their absenteeism during the period of study. Thus 141 medical students ultimately participated in the study. Approval from Institutional Ethics Committee has been obtained at the beginning of the study. Medical students were detailed about the study and its objectives and informed verbal consent was obtained from them.

Methods of Data Collection

A predesigned, pretested questionnaire was used to collect the data. The socio-demographic characteristics of the medical students, family history, personal history, morbid status, personal habits etc. pertaining to NCDs were recorded. Some of the risk factors of NCDs like Body Mass Index (BMI), Waist-Hip Ratio (WHR) were calculated from anthropometric measurements viz. height, weight, waist, hip circumferences, and blood pressure were recorded.

Anthropometric measurements were recorded by trained medico-social workers who were trained ahead of this study and blood pressure measurement was done by junior doctors. Weight was measured with a standard weighing scale, placed on plane surface in kilograms to the nearest 0.5 kg without footwear in a standing position. Height was measured with stadiometer and recorded in centimetres to the nearest 0.1 cm. Waist circumference (WC) was measured to the nearest 0.1 cm at the midpoint between the coastal margin and iliac crest with a measuring tape. Hip circumference (HC) measured at the level of greater trochanter (widest portion of hip) to the nearest 0.1 cm with a measuring tape.[11] Blood pressure (BP) was measured for all study subjects with a standardized sphygmomanometer in the left arm in a relaxed sitting position. An average of two readings of BP was taken.[12]

Obesity was classified according to BMI that was calculated as weight in Kgs divided by square of the height in meters. BMI ≥ 25 Kg / Sq.mt. corresponds to obesity as per South East Asian classification of obesity.[13] Waist circumference and waist hip ratio were also used to define obesity as additional measures. WC of ≥ 90cm in males and ≥ 80cm in females corresponds to truncal / central obesity. WHR ≥ 0.90 in males and ≥ 0.85 in females corresponds to truncal obesity.[14]

Blood pressure grading was done as per JNC VII Report on prevention, detection, evaluation and treatment of high BP. SBP of ≥ 140 mmHg and or DBP of ≥ 90 mmHg is considered as high BP in this study.[15] Tracking is defined as maintenance of certain status of risk factors (e.g. hypertension, obesity etc.) or a relative position within distribution values in a population over time[16]. The baseline data collected in December 2016 were compared with the data collected in December 2019 to observe changing trends of RFs of NCDs.

Statistical Analysis

Data was collected and analysed using Statistical Package for Social Sciences (SPSS) software version 24. The results were expressed in percentages. McNemar's test was applied to find the significance in baseline and 3 years data. $P < 0.05$ was considered as statistically significant.

RESULTS

Out of the total of 141 study subjects, 93 (66 %) were female and 48 (34 %) were male medical students. The mean age of students was 20.94 years with SD of 0.80. 64 (45.4 %), 62 (44 %) and 13 (9.2 %) students were aware of positive family history for hypertension, diabetes mellitus and obesity respectively.

All the students admitted that they were not addicted to smoking, alcohol and never tried narcotic drugs. 130 (92.2 %) of them said that they were taking non-vegetarian diet. 58 (41.1 %) of the students stated that they were doing regular physical exercises at the beginning of the MBBS course in 2016. Over a period of 3 years by 2019, 96 (68.1 %) students said that they adopted physical exercises as a part of their daily routine which is an improvement and a protective factor against NCDs like hypertension, diabetes, obesity etc. (Table 1). It has been observed that the number of students who were practicing yoga, 19 (13.5 %) dropped down to 4 (2.8 %) over a period of three years.

The study of BMI shows that the undernourished students reduced from 28 (19.9 %) to 16 (11.3 %). 70 (50 %) students maintained their normal weight for height i.e., normal BMI as they are conscious of maintenance of their health in general. From base line finding of 28 (100 %) undernourished, 12 (42.9 %) students had improved; out of these 12 students who improved from underweight category, 11 (91.7 %) had converted to overweight (BMI 25 - 29.9 kg / Mt^2) and 1 (8.3 %) became obese (BMI ≥ 30 kg / Mt^2) over a period of 3 years.

Waist circumference is an indicator for central obesity and a predictor for cardiovascular disease. In the present herd of medical students there was a threefold increase in WC (5 % to 17 %) from base line year of 2016 to 2019 (Table 2). Abnormal waist-hip ratio improved to normal level in 7 % of students. It is a healthy sign as far as cardiovascular morbidity is concerned. The combined obesity (CO) i.e., general obesity (GO) and abdominal obesity (AO) in the present study was 15.6 %.

When SBP of ≥ 140 mmHg and or DBP of ≥ 90 mm Hg are considered for hypertension, 10 more students were added over last 3 years (2016 - 2019) i.e. an increase of 7.09 %. It was observed an upswing in the trend of increased blood pressure in the present study (Table 2).

Risk Factors of NCDs	Base Line Data (2016)	
	Frequency	%
Non-Vegetarian Diet	110	78.0
No Physical Exercise	83	58.9
No Yoga Practice	122	97.1
BMI ≥ 25 kg / mt2 (Obese)	43	30.5
WC ≥ 102 cm (Male) / WC ≥ 88 cm (Female)	7	5.0
WHR ≥ 0.90 (M) / ≥ 0.85 (F)	48	34.0
SBP ≥ 140 mmHg & / DBP ≥ 90 mmHg	10	7.1

Table 1. Prevalence of Risk Factors of NCDs (n = 141)

Risk Factors of NCDs	Base Line Data (2016)		Data after 3 years (2019)		P-Value
	Frequency	%	Frequency	%	
Non-Vegetarian Diet	110	78.0	130	92.2	< 0.01
No Physical Exercise	83	58.9	45	31.9	< 0.01
No Yoga Practice	122	86.5	137	97.2	< 0.01
BMI ≥ 25 kg / mt2 (Obese)	43	30.5	55	39.0	0.012
WC ≥102 cm (Male) / WC ≥ 88 cm (Female)	7	5.0	24	17.0	< 0.01
WHR ≥ 0.90 (M) / ≥ 0.85 (F)	48	34.0	38	27.0	0.18
SBP ≥ 140 mmHg & / DBP ≥ 90 mmHg	10	7.1	20	14.2	0.04

Table 2. Changing Trends of Lifestyles and Risk Factors of NCDs from 2016 to 2019 (n = 141)
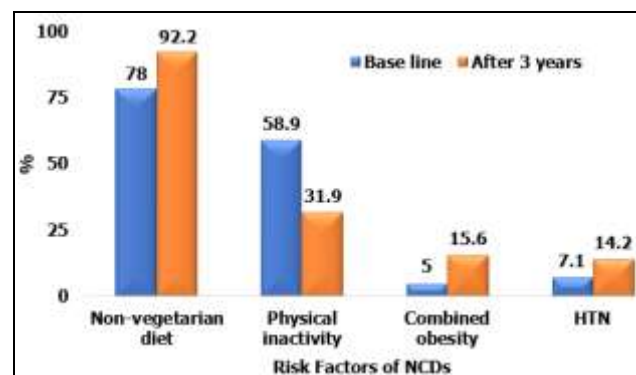
Figure 1. Trends of Risk Factors of Non-Communicable Diseases

DISCUSSION

Family history of obesity and underweight, person's initial BMI, dietary fat intake and family income help to predict changes in BMI. In adolescence phase obesity can emerge as a major public health problem.

Obesity is the RF for many NCDs like hypertension, diabetes, cancers etc. Higher the BMI, higher will be blood pressure.[17] In the present study 12 (8.5 %) students

developed overweight from baseline year 2016 in 3 years. There was a significant upward swing of obesity in the present study from 30.5 % to 39 % (p = 0.012) over the period of 3 years. Anitha M et al also observed 6.25 % of prevalence of obesity in their study on medicos.[18] Waist circumference is a more sensitive predictor of cardiovascular RF than BMI. WC ≥ 102 cms in males and ≥ 88 cms in females considered as cut off point for abdominal or central obesity. There was more than a threefold increase in students (7 to 24) with abnormal WC i.e., 12 % increase in abdominal obesity. Statistically there was highly significant rise in central obesity over the period of 3 years (p < 0.05) in this herd of students. Higher BMI (≥ 25) represents general obesity and Higher WC represents abdominal obesity. Recently it is evidenced by several studies that combined obesity (CO = GO and AO) has more risk than either GO or AO alone. The combined obesity in the present study was 15.6 % (Figure 1), whereas Sree M., & Dampetla S. observed 16.9 % combined obesity in medical students.[19]

On tracking, it was established that blood pressure (BP) levels either low or high in adolescents tend to remain low or high as the individual grows older.[1] So identification of RF in adolescence enables to take appropriate action. Hypertension is the most common and a known RF for heart diseases and stroke. In this study the prevalence of hypertension observed to be 14.2 % in the medical students. There was an upward trend from base line value which was statistically significant (p = 0.04). Most of the medicos were not aware of their own BP. They should be advised to check their BP periodically to prevent complications of the silent killer if it rises to hypertension. Bednaz J et al reported grade I hypertension in 29.1 % among first year and second year medical students. Prevalence of hypertension is found to be 2.4 times higher in medical students than in general population according to American Heart Association on Hypertension.[20] Generally medical students develop more stress in the initial academic years because of professional carrier and new atmosphere. Medical curriculum is associated with more stress in students. Moderate stress levels in academic domain among medical students was observed by Kokoli Ghosal et al.[21] Gradually they acclimatize to the stress of curriculum. So the stress and BP levels come down to normal levels.

In this study more medical students were involved in physical activity compared with base line level. The proportion of students involved in physical activity increased from 41.1 % in year of 2016 to the level of 68.1 % after 3 years. Similar result is also observed by Chythra R. Rao et al i.e., 61.9 % of practice of physical activity in medical students. Practice of physical activity in medical students is comparatively less because of little spare time, feeling of laziness, exhaustion after long study hours and most importantly encouraging environment and availability of facilities play an important role. Recent trend shows that all the world populations irrespective of economic status, experience the benefits of physical activity that has an evidence of controlling RFs of NCDs.[22]

The stress on some medical students is tremendous to meet the responsibilities of becoming good physicians and to withstand peer group competition. Stress adversely affects physical inactivity, eating and lead to obesity and other NCDs. Physical exercise for one hour per day and practice of Yoga are good to get rid of stress. There was a positive and statistically significant increase in students practising physical exercise in this study.

CONCLUSIONS

Tracking of weight gain, blood pressure and physical activity in medical students was done after three years from the base line data collection in December 2016. It was observed that certain risk factors of NCDs like general obesity, abdominal obesity and hypertension, showed significant upward trend. Tracking of RFs of NCDs is a useful tool for prevention and early treatment. Medical students should undergo periodic check-ups. They should become role models of the community by maintaining healthy life styles.

Limitations
Despite maintenance of strict confidentiality, students might not have divulged their personal habits.

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