Prevalence of Non Communicable Diseases' Risk Factors among Medical Students in South Kolkata, West Bengal

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ABSTRACT

Introduction: Evidence indicates that the pathophysiological process of major Non communicable diseases (NCDs) begins at early age, though the manifestations of the disease do not appear until middle age. The prevalence of each risk factor for NCDs might differ among different age-groups, which will affect the implementation of intervention programs. Seeing the role of medical students as future physicians and role models in public health intervention programs, research related to the risk factors for NCDs among them is need of hour.

Methods: A cross-sectional study was conducted using the WHO global STEPS- approach to know the prevalence of risk factors for NCDs among 166 undergraduate medical students of a medical college in Kolkata. STEPS questionnaire version 2.1 was used to collect information on behavioral risk factors, followed by physical measurements and blood sampling for biochemical profile.

Results: It was observed that most of students are at risk to develop NCDs. The cumulative effect of risk factors bundles-up and eventually leads to disease as student advance through their life.

Conclusion: Developing strategies targeting at this age-group is necessary to reduce the premature morbidity and mortality due to major NCDs.

Key words: Risk factors, Non Communicable Diseases, Medical students

INTRODUCTION

Non- communicable diseases (NCDs) and their associated risk factors have emerged rapidly and have become a major public health threat globally. The impact of NCDs is devastating in terms of premature morbidity, mortality and economic loss. This invisible epidemic is an under-appreciated cause of poverty and hinders the economic development of many countries. The burden is growing - the number of people, families and communities afflicted is increasing. Of the latest (2015) data available on mortality statistics, of 56.4 million global deaths, 39.5 million, or 70%, were due to NCDs. In the same year, over three quarters of NCD deaths, 30.7 million occurred in low- and middle-income countries with about 48% of deaths occurring before the age of 70 in these countries. The leading causes were cardiovascular diseases (17.7 million deaths, or 45%), cancers (8.8 million, or 22%), respiratory diseases, including asthma and chronic obstructive pulmonary disease (3.9 million) and diabetes (1.6 million)of all NCD deaths .[1]

Particular behaviors such as tobacco use, physical inactivity, unhealthy diet, and alcohol abuse may lead to key metabolic/physiological changes like raised blood pressure, overweight/obesity, raised blood glucose and raised cholesterol, which may eventually results in major NCDs. Most previously reported work[2, 3] has studied the prevalence of behavioral risk factors and physical measurements for NCDs thus missing biochemical and physiolog-

ical alterations. As the major NCDs risk factors are well documented, exposure to modifiable risk factors start in younger ages hence screening medical college students is definitely justified who will also be our future medical experts. Moreover, any study regarding prevalence of risk factors of NCDs among this age-group would surely help in establishing baseline data to monitor trends in health behavior and planning prevention strategies.

OBJECTIVES

The study was conducted to determine the prevalence of risk factors for selected NCDs i.e. Diabetes, Cardiovascular diseases, and Stroke among the medical students and to compare prevalence of risk factors for selected NCDs i.e. Diabetes, Cardiovascular diseases, and Stroke among the medical students across gender

MATERIALS AND METHODS

Study design, setting & period

The cross-sectional study was carried out in the Community Medicine department among the Medical students of ESI-PGIMSR, ESIC Medical College & ESIC Hospital, Joka between July 2016 to October 2016. During the study period three undergraduate batches of 100 capacities each were running in this institute.

Sample Size & Sampling technique

The study population comprised of 300 undergraduate medical students of three consecutive batches. Sample size was calculated based on equation n = N*X / (X + N – 1) where X = $Z_{α/2}^2$*p* (1-p) / MOE. $Z_{α/2}$ is the critical value of the Normal distribution at α/2 (for a confidence level of 95%, α is 0.03 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. A finite Population Correction has been applied to the sample size formula. Earlier study reported prevalence of smoking among medical students as 9%.[4] So, p was set at 0.09. Desired sample size was calculated as 162. A non-response rate of 10% expected. Finally, 180 students were approached to participate. Sample selection done randomly using students list.

Study Plan, tools & technique

This study was undertaken after obtaining Institutional Ethical Committees approval. Written informed consent was obtained from all the subjects before initiating the interview and examination. The study was conducted using the WHO global STEP-wise approach for risk factor surveillance for NCDs. The WHO STEPS Questionnaire covers in-

formation on demographic, behavioral, physical and biochemical measurements under 3 Steps.[5]

For maintaining anonymity and confidentiality, the participants were given Unique Identification Numbers. Step 1of the questionnaire pertaining to behavioral risk factors was filled by the study subjects themselves in separate sheets. Step2 and Step 3 were done by the investigators themselves.

Step-1 includes questions regarding the demographic information of individual, i.e., age, sexand behavioral information questions on tobacco use, alcohol consumption, diet, and physical activity, history of raised blood pressure and history of diabetes.

Step-2 includes several physical measurements. The height of the individual participant was taken in centimeter by using a stadiometer to nearest 0.1 cm and weight in kilogram to nearest 10 gm. using a portable electronic weighing scale. Waist and Hip circumference were taken to provide additional information on overweight and obesity. Constant tension tape (Figure finder tape) was used for the same. Blood pressure was measured with mercury sphygmomanometer in seated position. Blood pressure and Heart Rate was measured three times with three minutes interval and average was taken.

In Step 3, biochemical measurements were done in the department of biochemistry. Venous blood specimens was taken after 12 hours fasting for the measurement of glucose, total cholesterol, fasting plasma triglyceride (TG), high density lipoprotein cholesterol (HDLC) and low density lipoprotein cholesterol (LDLC) by using glucose oxidase peroxidase test, CHOD-PAP, GPO-PAP, Direct HDL immunoseparation and Direct LDL immunoseparation method respectively.

Definitions used

Cut off values recommended by STEPS were used for prevalence estimation.[5] Current smoking (smoked in the past 30 days) and Current Drinker (consumed one or more than one standard drink of any alcohol in past 30 days) was considered a NCD risk factor.

Individuals who consumed less than five servings of fruits and vegetables per day were considered as 'at risk' group.

Overweight was defined as BMI between 25–29.9 kg /m² and obesity as ≥30 kg/m².

Abdominal obesity was defined as a waist circumference of ≥90 cm in men and ≥80 cm in women.

Hypertension was defined as a systolic blood pressure of ≥140 mm of Hg, or a diastolic blood pressure of ≥90 mm of Hg or the use of blood pressure-lowering medications for hypertension.

Individuals with fasting capillary blood glucose of ≥110 mg/dl or on medications for high blood sugar were considered to have diabetes mellitus.

A raised serum cholesterol level was defined as total cholesterol ≥190 mg/dl, whereas hypertriglyceridemia was defined as a serum triglyceride value ≥150 mg/dl.

The energy use of each physical activity (PA) domain was calculated as metabolic equivalent (MET)-min/week. The summation of energy use of work, energy use of travelling and energy use of recreation was 'energy use of overall PA'. The ≥600 MET-min/week of energy use of overall PA was considered as the recommended levels of PA[6].

Data Analysis

Collected data were entered in the Excel spreadsheet and analysis was carried out using Statistical Package for Social Studies (SPSS) version 20.0. Data were analyzed by gender of the subjects. Prevalence of different risk factors and proportion above acceptable levels was determined. In addition mean values of relevant behavioral risk factors and other continuous variables such as body mass index (BMI), waist circumference, blood pressure, and different biochemical variables were determined. Normally distributed data were presented as means and 95% confidence intervals (CI).

OBSERVATIONS

Overall response rate of the survey was 92.2%.Of 180, a total of 166 students gave consent to study STEP 1and 2. Similarly for STEP 3, out of166, 142 gave consent to blood sampling. Mean age of the respondents was 21.66+1.15years ranging from 19 years to 25 years.

Table 1 and 2 shows prevalence and mean distribution of behavioural risk factors among medical students of ESIC medical college Joka Kolkata.

Prevalence of current tobacco smokers (25.9%) was more than smokeless tobacco users (4.8%). More boys (32.2%) smoked than girls (10.4%). No girl was found to be using smokeless tobacco. There were 57% of students who were consuming tobacco on daily basis. Prevalence of daily consumption of tobacco was higher in boys (38.9%) than in girls (22.9%).

Around 39% of medical students were found to be current alcohol drinkers. Prevalence of current alcohol consumption was found more in boys (46%) than in girls (20.8%). Mean number of standard drinks per day was 3 and 2.4 in boys and girls respectively.

Inadequate level of fruits and vegetable consumption was found in majority (94%) of students. More boys (96%) than girls (90%) were found to be consuming inadequate amount of fruits and vegetables on daily basis.

Low level of physical activity less than 600 MET per week was present in 31.3% of subjects. Boys have lower prevalence (26.27%) of low physical activity than girls (43.8%). Mean total physical activity MET were 1086 min/week for boys and 711 min/week for girls.

Table 3, 4 and 5 depict physical and biological risk factors, mean distribution of physical measurements and biochemical parameters respectively.

Overweight and obesity were found in 47% and 13.3% of participants respectively. Prevalence of overweight was more in females (54.2%) than in males (44%). Obesity was more prevalent in males (16%) than in females (6%). Mean BMI of boys (25.99) and girls (25.74) was almost same. The abdominal obesity was found to be more prevalent in girls (64.6%) than in boys (39.8%). Mean waist circumference in boys and girls were found to be 86.26 cm and 83.16 cm respectively.

Table1. Prevalence of Behavioral Risk Factors in Medical Students, overall and stratified by Sex

Variables	Males (n=118)	Female (n=48)	Total (n=166)
Current Tobacco users			
Smokers	38 (32.2)	05 (10.4)	43 (25.9)
Smokeless tobacco users	08 (6.8)	00 (00.0)	08 (4.8)
Any form of tobacco use	41 (34.7)	05 (10.4)	46 (27.7)
Currently exposed to tobacco products daily	46 (38.9)	11 (22.9)	57 (34.3)
Alcohol abuse			
Current drinkers	55 (46.6)	10 (20.8)	65 (39.2)
Ever consumed alcohol	61 (51.7)	16 (33.3)	77 (46.4)
Fruits & Vegetables Intake			
Inadequate intake of fruits& Vegetables (servings<5 in a day)	113 (95.8)	43 (89.6)	156 (94.0)
Inadequate intake of fruits (servings<5 in a day)	114 (96.6)	46 (95.8)	160 (96.4)
Inadequate intake of vegetables (servings<5 in a day)	111 (94.1)	40 (83.3)	151 (90.9)
Low physical activity (Total Physical Activity MET minutes per week is <600)	31 (26.27)	21 (43.8)	52 (31.3)

Figure in the parenthesis indicate percentage

Table2.Mean distribution of different parameters for behavioral informationin Medical Students, overall and stratified by Sex

Variables	Males (n=118) Mean (CI)	Females (n=48) Mean (CI)	Total (n=166) Mean (CI)
Mean amount of tobacco used by smokers on average per day	4.89 (4.32-5.45)	2.8 (1.80-3.80)	4.65 (4.07-5.28)
Mean number of standard drinks consumed on average per day	3.05 (2.42-3.75)	2.4 (1.60-3.20)	2.95 (2.39-3.55)
Mean days of fruits consumption per week	3.62 (3.23-4.00)	4.27 (3.63-4.92)	3.81 (3.48-4.16)
Mean intake of fruits per day	1.57 (1.47-1.67)	2.17 (2.00-2.40)	1.75 (1.64-1.85)
Mean days of Vegetables consumption per week	6.37 (6.15-6.56)	6.21 (5.73-6.63)	6.32 (6.13-6.51)
Mean intake of vegetables per day	1.83 (1.73-1.92)	2.56 (2.23-2.92)	2.04 (1.90-2.17)
Mean total Physical activity MET (min./week)	1086.2 (923-1257)	711.2 (601-823)	910.9 (834-988)

Table3. Prevalence of physical and biological risk Factors in Medical Students, overall and stratified by Sex

Variables	Males (n=118)	Female (n=48)	Total (n=166)
Physical Measurements (N=166, M=118, F=48)			
Overweight (BMI=25.5-29 kg /m²)	52 (44.1)	26 (54.2)	78 (46.9)
Obesity (BMI≥30 kg /m²)	19 (16.1)	03 (6.3)	22 (13.3)
Abdominal Obesity (Males≥90cm, Females≥80cm)	47 (39.8)	31 (64.6)	78 (46.9)
Elevated Blood Pressure (SBP≥140 and/or DBP≥90 or currently on medication)	16 (13.6)	03 (6.3)	19 (11.4)
Biological Risk Factors (N=142, M=99, F=43)			
Hyperglycemia (>110mg/dl)	02 (2.0)	00 (0.0)	02 (1.4)
Hypertriglyceridemia (>150mg/dl)	10 (10.1)	04 (9.3)	14 (9.9)
Hypercholesterolemia (>190mg/dl)	29 (29.3)	08 (18.6)	37 (26.1)
Low HDL (M<45 mg/dl, F<55 mg/dl)	87 (87.9)	37 (86.1)	124 (87.3)
Others (N=166, M=118, F=48)			
Family History of Diabetes and/or Hypertension	43 (36.4)	9 (18.8)	52 (31.3)
Documented Diabetes	0 (0.0)	0 (0.0)	0 (0.0)

Figure in the parenthesis indicate percentage

Table4.Mean distribution of different physical measurements in SI units and different biochemical parameters among Medical Students, overall and stratified by Sex

Variables	Males (n=118) Mean (CI)	Females (n=48) Mean (CI)	Total (n=166) Mean (CI)
Height (cm)	171.00 (169.00-175.00)	157.16 (155.19-159.14)	164.73 (163.04-166.56)
Weight (Kg)	73.49 (70.97-75.89)	63.58 (60.63-66.53)	70.51 (68.44-72.51)
BMI (kg /m²)	25.99 (25.13-26.92)	25.74 (24.79-26.74)	25.92 (25.27-26.61)
Waist circumference (cm)	86.26 (83.58-88.65)	83.14 (80.63-85.72)	85.31 (83.32-87.29)
Hip circumference (cm)	97.17 (94.32-99.76)	100.72 (98.74-102.65)	98.30 (96.28-100.15)
Systolic blood pressure (mm of Hg)	121.92 (119.57-124.29)	113.42 (110.30-116.67)	119.28 (117.38-121.29)
Diastolic blood pressure (mm of Hg)	76.58 (75.25-77.87)	73.95 (71.54-76.28)	75.77 (74.63-76.89)

Table5.Mean distribution of different biochemical parameters among Medical Students, overall and stratified by Sex

Parameters (mg/dl)	Males (n=99) Mean (CI)	Females (n=43) Mean (CI)	Total (n=142) Mean (CI)
Glucose	75.56 (74.40-76.74)	75.70 (74.07-77.30)	75.6 (74.62-76.59)
Triglycerides	120.39 (111.72-129.65)	89.93 (80.44-101.01)	111.21 (103.96-119.16)
Total Cholesterol	170.12 (163.66-177.29)	173.56 (164.81-183.23)	171.60 (166.28-176.67)
HDL	40.15 (38.80-41.61)	47.23 (44.88-49.67)	42.29 (41.09-43.65)
LDL	107.17 (101.32-113.52)	107.77 (100.35-115.74)	107.28 (102.45-111.98)
VLDL	23.33 (21.99-24.81)	17.58 (15.70-19.60)	21.60 (20.32-22.94)

The prevalence of hypertension was 11.4% among medical students.Higher prevalence was observed in boys (13.6%) than in girls (6.3%). Mean systolic and diastolic blood pressure was also higher among boys (121.92/76.58 mm of Hg) than in girls (113.42/73.95 mm of Hg).

Only two boys and no girl were found to be having hyperglycaemia. Mean fasting blood glucose levels in males and females were found to be 75.56 mg/dl and 75.70 mg/dl respectively.

High serum cholesterol, high serum triglycerides and low serum HDL were present in 26%, 10% and

87% of subjects respectively. Hypercholestremia was more prevalent in boys (29.3%) than in girls (18.6%). Mean S. TG and S. VLDL were respectively higher in males 120.39 and 23.33 mg/dl than in females 89.93 and 17.58 mg /dl. However, mean S. Cholesterol and S.HDL were respectively higher in females (173.56 and 47.23 mg/dl) than in males (170.12 and 40.15 mg /dl).

DISCUSSION

The present study assessed the risk factors of NCDs among undergraduate medical students of ESIC medical college Joka, Kolkata by using WHO STEPS survey method. [5] Various studies have shown that Indian population is more prone to develop CVD and develops at younger age.[7] The medical students seem to be at higher risk of developing NCDs owing to stressful inner and outer environment. Our study found that 34 % of students are currently exposed to tobacco on daily basis, of them are boys and girls constitute 39.9% and 23% respectively. A study done on general population using WHO STEPS method in West Bengal showed that 41.5 % of population in age group of 18-24 years uses tobacco. Studies among medical students done in other states of India show lesser prevalence of tobacco consumption i.e.8.7% in Odisha,[4] 5% in Tamilnadu[2] and 6.4% in Uttar Pradesh. [9] A national survey on tobacco use found that Kolkata is in top ranking of Indian cities with respect to cigarette consumption. A total of 49% of sample surveyed in Kolkata smoked tobacco compared to 43% nationally. [10] As per NFHS 2011-12, the amount of Rupees spent per head on cigarettes in West Bengal is 19.5 in comparison to 3.36 in all India level.[11]NFHS-4, 2015-16 reports high tobacco consumption in west Bengal males 59% and females 7.4%in comparison to TN (males 32%, females 1.5%) and UP (48% and 5.9%).[12] The reason for higher tobacco consumption in West Bengal is social norm. Peer pressure, academic stress, anxiety, depression, lack of parental supervision in medical students as most of them are hostellers, higher accessibility and lower price of tobacco[13] are the factors behind high consumption. Cultural taboos or resistance explains low tobacco use among females.

Our study shows 39.2% participants to be the current drinkers, of them males are 46.6% and females are 20.8%, similar to the study done among Delhi medical students. [14]Mean number of standard drinks consumed on average day was almost equal i.e.3 and 2.4 for boys and girls. Alcohol consumption among students is phenomenally more than 18-24 age general population of west Bengal.[8]It can be explained by the fact that majority of medical students stay in campus hostels without any check

on their behavior. Consumption of alcohol among female students can be anxiety of academic performance. Our observations are not in accordance to other studies among medical students where prevalence of alcohol consumption in Tamilnadu is 5%[2] and UP (3.8%) [9] .This discrepancy can be explained by cultural and geographical factors.

It was observed that majority (94%) of study population consumed less than WHO recommended daily five servings of fruits and vegetables similar to the observation of other studies among medical students.[2] As majority of students live in hostels, unavailability of adequate vegetables and fruits in the canteen, erratic eating habits, intake of instant and other energy dense food available at cheaper rates may be the reasons of inadequate intake of fruits and vegetables on daily basis.

Prevalence of low physical activity was higher among girls (43.8%) than among boys (26.27%), consistent with the observations of other similar studies.[2,9,15] Due to continuous pressure of studies and long sitting hours, students do not get time for regular sports and other physical activities. Another study done on 18-24 years population, observed that 58.5% participants are having inadequate physical activity.[8] Addiction of smart phones, video games and easy accessibility to technology gadgets dissuade young generation to undertake regular physical activity.

About 47% of students were found to be over overweight. More of girls were found to be overweight than boys (BMI=25.5-29).However more boys were found to be obese (BMI≥30), than girls. Similar findings were observed in other studies.[2, 8,9] However studies done in similar age group in states of Gujarat and Tamilnadu, depict lower prevalence of overweight and obesity.[3,16] Almost half of the students had abdominal obesity, that was more prevalent in females than in males. More females are having abdominal obesity is observed in other studies also.[8, 16, 17]

Hypertension is more prevalent in male students similar to the findings of other studies.[2, 3, 9] Mean systolic and diastolic blood pressure is also higher in males than in females. Apart from biological preponderance to hypertension, higher consumption of tobacco and alcohol by male students can be attributed to higher blood pressure.

Mean fasting blood sugar in our students is comparatively less than the students of Uttar Pradesh, whereas total Cholesterol and triglycerides are raised in present study. However mean HDL and mean LDL levels are consistent with that study. Mean value and prevalence of serum triglycerides was more in males than in females similar to the findings of study conducted in UP by Anurag

Shrivastva et al.[9]Mean serum VLDL value was raised in males whereas mean serum HDL was raised in females. This can be justified that more tobacco consumption in males leads to hypertriglyceridemia and low HDL levels and more alcohol consumption causes diabetes, hypertension and hypercholesterolemia. More unhealthy dietary habits and hypertension causes hypercholesterolemia, hypertriglyceridemia and low HDL levels.[8]

CONCLUSION

Results of present study indicate high prevalence of modifiable NCDs risk factors among medical students. There is an urgent need to bring change in students'lifestyle by health education and interventions. The medical curriculum should be redesigned as to have regular period of physical activity including yoga and meditation. The medical colleges should have timely provision of healthy food in the mess. The availability of carbonated drinks and junk food should be replaced by healthy beverages and snacks in the college canteen.

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