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Dietary patterns and risk of cardiovascular events among school teachers: Exploring an ignored facet of occupational health.

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Abstract

Introduction: Diet is a major lifestyle-related risk factor for various chronic diseases. Unhealthy dietary patterns influence the risk of cardiovascular disease occurrence. Cardiovascular deaths are the largest cause of mortality, accounting for half of all deaths resulting from NCDs. Occupation is one of the important factors determining the health of an individual. Teachers constitute a large and important occupational group. Thus, the present study was taken up to assess the dietary patterns among school teachers, to estimate the prevalence of risk factors for cardiovascular diseases, and to predict the 10-year risk of cardiovascular events among school teachers.

Methodology: Cross-sectional study, was conducted from October 2018 to February 2019 among 470 school teachers (p=46%) aged ≥40 years working in rural areas of southern Karnataka. Data was collected using a semi-structured, pretested questionnaire. The 10-year risk of (cardiovascular disease) CVD events was done using World Health Organization/ International Society of Hypertension (WHO/ISH) risk prediction charts.

Results: 55% of teachers were males. Dietary practices were poor among teachers. The prevalence of tobacco use was 3.8%. Hypertension, Diabetes, and Obesity prevalence was 34.2%, 29.0%and 67.4% respectively. The prevalence of physical inactivity was 41.4%. 56% had low risk (<10%) for 10-year cardiovascular events and 24% had high risk (>20%).

Conclusion: The prevalence of CVD risk factors was high. Teachers having >20% (High risk) estimated risk of CVD events in 10 years was high. This is a cause of concern and necessitates aggressive screening and steps towards promoting their health and prevention of cardiovascular events among them.

Keywords: Dietary pattern, cardiovascular disease, estimated 10-year CVD risk, WHO/ISH risk prediction chart, school teachers.

Introduction

Non-communicable diseases like hypertension, diabetes, malnutrition, and cancer are on the rise in India in the 21st century. According to the WHO's country report for India, increased blood sugar among adults over the age of 25 was 11.1% in males and 10.8% in females in 2018, increased blood pressure among adults over the age of 25 was 23.1% in males and 22.6% in females in 2018, obesity among adults over the age of 20 was 1.3 percent in males and 2.3 percent in females in 2018, and tobacco use among individuals over the age of 15 was 25% in males and 4% in females in 2018[1].

The majority of these diseases, on the other hand, can be avoided by limiting exposure to known risk factors like poor diet, inactivity, smoking, and alcohol consumption[2].

Chronic disease risk is influenced by lifestyle and diet. Over time, health-oriented dietary changes prove to be beneficial. The prediction of cardiovascular disease risk has benefited from dietary data[3]. Understanding the impact of dietary factors on disease may be seriously hampered by inaccurate dietary assessments. Despite the availability of biomarkers for assessing dietary intake, biomarker-based results cannot offer dietary recommendations for subject modification.

Therefore, compared to biomarkers, a direct assessment of dietary intake may be more informative[4].

In the 21st century, the prevalence of non-communicable diseases has risen. As the leading cause of death, cardiovascular disease accounts for half of all NCD-related deaths. One of the most important aspects of a person's health is their occupation. Mine workers, factory workers, construction workers, software engineers, teachers, and others are among the occupations in which they are most likely to be exposed to certain factors that have an impact on their health. are prone to particular health issues [5, 6, and 7].

Because they are the most important resource for educating the community's children, teachers are a felt need. Teachers will be present everywhere, in every community. A traditional occupation is teaching; has been replaced by a social, cultural, and bureaucratic occupation. Teaching in the modern era is characterized by social and interactive emotional labor, as well as high demands and numerous stresses. It is anticipated that the ideal educator will fulfill a variety of roles, including educator, advisor, mediator, social worker, professional manager, and political thinker.

Teachers' physical, mental, and social well-being can be negatively impacted by a variety of occupational factors. In many nations, stressful working conditions for teachers have become a growing issue in recent years. Through a recommendation regarding the status of teachers, the WHO and UNESCO promote quality teaching principles[8].

The hard-to-manage young children, the workload, the delayed salaries, the non-teaching responsibilities, the head's and colleagues' lack of cooperation, political interference, the misbehavior of students, personal family issues, etc. have an effect on the teachers' health[9]. The health of teachers affects how well they teach, which in turn affects how well students learn and succeed in learning. Until now, a couple of investigations of fluctuating quality have been distributed on educators' wellbeing in India[10]. The mental health and stress levels of teachers have been the focus of numerous studies.

As a result, the purpose of this study was to determine the dietary habits of school teachers, the prevalence of cardiovascular disease risk factors, and the teachers' 10-year risk of cardiovascular events.

Methodology

This cross-sectional study was conducted among government school teachers aged ≥40 years working in rural areas southern Karnataka. The study was conducted from October 2018 to February 2019. The sample size calculated was 470 based on the prevalence of 46%[10] using the formula 4pq/d2 with the allowable error of 5% and a relative precision of 5%.

The selection of teachers for the study was by systematic random sampling method. 2,090 teachers are working in Govt. Schools in rural areas of southern Karnataka who are aged > 40 years. To calculate the frequency of sampling, the total number of teachers (2090) was divided by the sample size (470). The selection of teachers was made based on the list obtained from the BEO (Block Education Office) office, which contained names in alphabetical order. The first number was selected randomly within the sampling interval, thereafter every 4th teacher was selected till the sample size was met, based on the primary list. Selected teachers were visited in their respective schools on a pre-fixed day and were provided with an information sheet regarding the study. Those who agreed to participate in the study were included in the study. If the selected teacher was on leave on that particular day, they were revisited for the second time after one week and taken for study. If they were not present on the second visit, they were excluded and the next teacher in the list was selected for study. If the selected teacher was on long leave for more than 6 months, they were excluded and the next teacher in the list was selected for study.

The data was collected using a pretested, semi-structured questionnaire. The 24-hour dietary recall method was used to assess dietary intake and consumption of vegetables, fruits, oily food, etc was collected in detail. A weighing machine, non-stretchable tape, BP Apparatus, and Glucometer were the instruments used which were validated before use. World Health Organization /International Society of Hypertension (WHO/ISH) Cardiovascular Disease (CVD) risk prediction charts were used to predict the 10-year risk of Cardiovascular Events. Ethical clearance was obtained by the institutional ethics committee of a medical college in southern Karnataka. Anthropometric variables such as weight (kg) nearest to 100 g and height (cm) nearest to 0.2 cm were measured using standard equipment and procedures. Body mass index (BMI) is classified as per WHO Asian classification. Waist circumference was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest. Hip circumference was measured at the level around the widest portion of the buttocks using non-stretchable tape. Subjects with a waist circumference of ≥102 cm (men); ≥88 cm (Women) and Waist to Hip

Ratio (WHR) ≥0.90 cm (Men); ≥0.85 cm (women) were said to have abdominal obesity or substantially increased risk of metabolic complications. Two measurements of blood pressure were taken (the first reading after 5 min of rest and the second at the end of the interview) using a mercury sphygmomanometer in a sitting position in the right arm with an appropriate size cuff. The average of two readings was taken as the final reading. Random capillary blood glucose (RCBG) was collected under aseptic precautions using an Accucheck glucometer. An individual was diagnosed as diabetic if random capillary blood glucose ≥200 mg/dl and/or with a previous history of diabetes and on anti-diabetic medications. SEAR-D specific WHO-ISH Risk prediction chart without cholesterol set was used to estimate the individual's 10-year risk of a fatal or non-fatal major cardiovascular event (Myocardial Infarction or stroke). The variables included in estimating risk were age, sex, blood pressure, smoking status, and the presence or absence of diabetes mellitus. The ten-year risk was classified into five levels>10%; 10 to 40% risk. Data were entered into a Microsoft Excel sheet and analyzed using SPSS (Statistical Package for Social Sciences) version 24, trial version. Descriptive statistics like percentages, mean, and standard deviation were used. Inferential statistics like the student t-test for comparing means between two continuous variables and the chi-square test for association between groups (categorical data) were used. The statistical significance was evaluated at 95% confidence level ($p < 0.05$).

Results

Among the 470 teachers who participated in the study 259 (55.1%) were males and 211 (44.9%) were females. 60.2% of female teachers belonged to the age group of 40-49 years and 57.9 % of males belonged to the age group of 50-59 years. Current smokers among 259 males were 30

(11.6%) and it was nil among female teachers. Alcohol use was 9 (3.4%) among males and none among females. 281 (59.8%) teachers were doing moderate-intensity physical activity for 5 days a week. Among them, 180 (69.5%) male teachers were doing physical activity compared to 101 (47.9%) female teachers and the difference was statistically significant ($p<0.001$). Total calorie intake was deficit by 23% for female teachers and 8.3% for male teachers. However, the protein requirement was adequate in 88% of teachers.28 (5.95%) consumed 2 to 3 servings of vegetables per day, 72 (15.3%) consumed 2-3 servings of fruit per day and only 52 (11.06%) consumed less than one serving of oily food/ junk food per day (Table 1).

Female teachers 75.8% were obese compared to male teachers which was 57.1% (Fig 1) and the difference was statistically significant (X2 21.22 p value < 0.001). 364 (83) teachers had abdominal obesity. 36% of teachers had hypertension and 32% of teachers had diabetes mellitus (Fig 2). 52% of teachers did not perceive stress due to their job. 82.1% of teachers had <10% chance of CVD events risk in the next 10 years, 7.2% had 10-20% risk, 3.1% had 20 to 30% risk, and 5.5% had > 40% risk of CVD events in the next 10 years. With the increasing age group, the risk of CVD events increased, 10.39% in the age group of 50-59 had >40% risk compared to 0.8% in the 40-49 years age group and the difference was statistically significant. Male teachers, those with overweight and obesity, diabetes mellitus, and hypertension had more risk of CVD events (Table 2).

Discussion

With the epidemiological transition from communicable diseases to NCD and CVD being a leading cause of

NCDs death, prevention of CVD is an essential component in reducing overall mortality. Multiple risk factors play a role in the development of CVD. Detecting these risk factors at the earliest along with predicting the risk of CVD in the next 10 years helps in preventing any untoward outcomes in the future. This community-based study was conducted to estimate the prevalence of various CVD risk factors and estimate the 10-year CVD risk using WHO/ISH risk prediction charts. The prevalence of tobacco and alcohol consumption was 11.6% and 3.4% respectively and was significantly lower than the overall prevalence among men. Obesity and abdominal obesity were statistically higher among females than males calling for a more women-centered approach in rural areas to sensitize them about these risk factors and preventive measures. In our study, 59.8% were doing adequate physical activity which was similar to INDIAB study[11]. The diet was defeceint in calories and proteins. The study population intake of vegetables and fruits were poor and that of oily/junk food were high compared to ICMR-NIN 2020 recommendations [12].

Studies done on group C employees at JIPMER, Puducherry and supporting staff of a tertiary hospital, Mysore found the estimated 10 year risk of having a cardiovascular event of >10% in only 1.7% and 3.7% of study participants respectively[13,14]. As these estimates were done in a staff of tertiary care hospitals, where they have more opportunity to get screened early for risk factors of CVD and take necessary therapies required for it, the results are much lower as compared to our results which were estimated in a rural community. Yet another study performed by Ghorpade et al in rural Puducherry found 17% of the participants had >10% risk of occurrence of cardiovascular events [15].A study done in central India found the estimated 10 year risk of a cardiovascular event of ≥30% risk in 4%, 20-29 % risk in 7%, 10-19% risk in 17% of study participants attending the OPD of a tertiary hospital using without cholesterol charts. Estimated 10 year CVD risk of more than 20% was found to be 6%, 2.3%, and 1.3% of the study population of Cambodia, Malaysia, and Mongolia, respectively in a multicentric study conducted by Otgontuya et al. similar study conducted in Nepal by Dhungana et al reported an estimated risk of more than 20% in 14.6% of the study population [16]. The proportion of estimated CVD risk in our study is higher than general population which needs more research to explore the reasons. However, these studies were conducted in different sets of populations across world, population differences related to genetic as well as environmental, socio-demographic and lifestyle factors may contribute to the wide difference in the prevalence of the higher risk of CVDs.

Conclusion

Significant proportion of study population have an increased prevalence of risk factors for CVD. Dietary practices were poor though the physical activity was better. CVD risk for 10 years is higher compared to the general population and calls for aggressive preventive measures. WHO/ISH risk prediction charts which are simple and color-coded serves as an outpatient/community-based screening tool to educate individuals about their CVD risk in the next ten years and motivate them to adopt necessary measures which can prevent future catastrophe of cardiovascular diseases.

Limitation

One limitation is blood cholesterol level which is an important risk factor for CVD could not be included in the study due to logistic constraints. Second limitation is that dietary assessment methods are mainly focused on short-term intake, but long-term dietary exposure is especially of interest when investigating chronic diseases.

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Legend Figures and Tables

Fig 1: Distribution of male and female study subjects according to BMI (N=470)

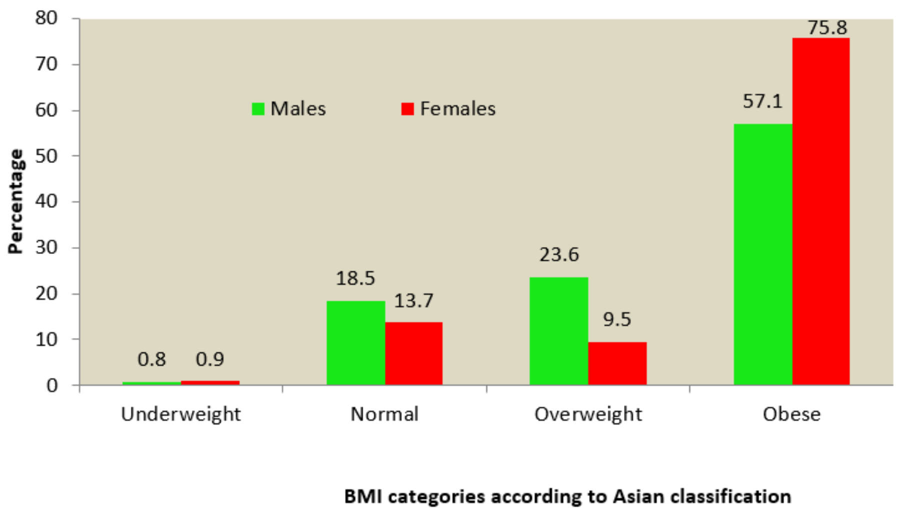

Fig 2: Distribution of male and female study subjects according to diabetes and hypertension (N=470)

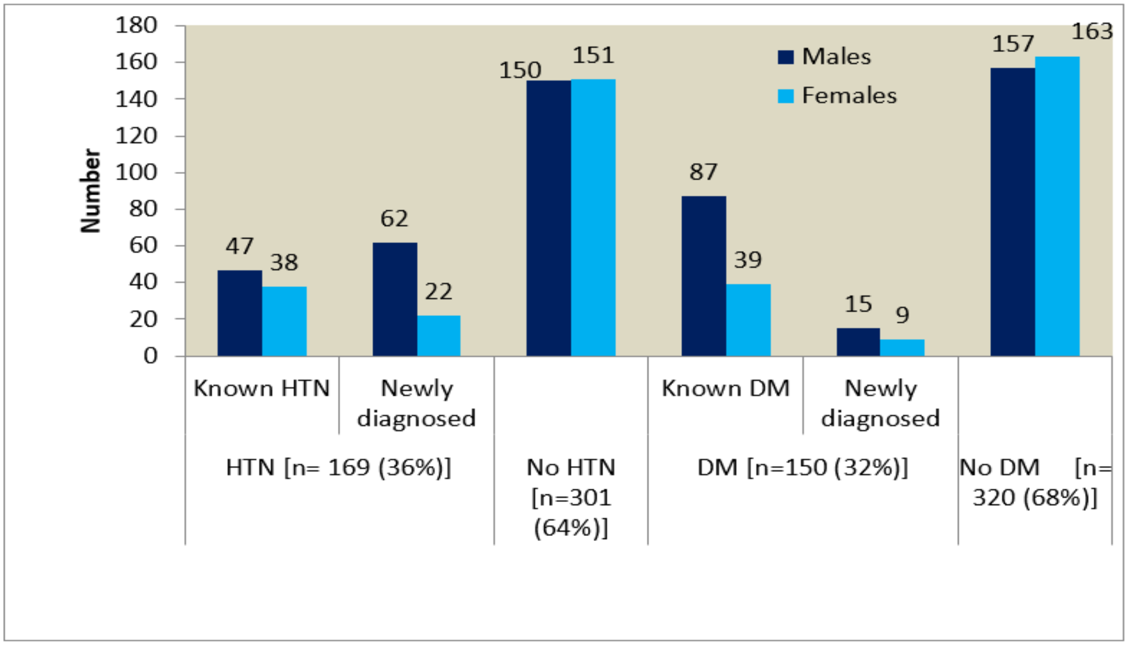

Table 1: Consumption of vegetables, fruits and oily foods (N=470)

Serving/day	Vegetable	Fruits	Oily food/junk food
< 1	420 (89.3)	216 (45.9)	52 (11.1)
1-2	22 (4.6)	182(67.4)	94 (20)
3-4	28 (5.6)	72 (15.3)	324 (68.9)

Table 2: Association between CVD risk factors and CVD events risk (N=470)

CVD risk factors		< 10% risk	10 - < 20% risks	20 - < 30% risks	30 - < 40% risks	≥ 40% risk	Total	p value
Age group	40 – 49 years	224 (94.9)	1 (0.4)	9 (3.8)	0	2 (0.8)	236	< 0.001
	50 – 59 years	162 (69.2)	33 (14.1)	5 (2.1)	10 (4.3)	24 (10.3)	234	
Sex	Male	199 (76.8)	23 (8.9)	9 (3.5)	8 (3.1)	20 (7.7)	259	0.017
	Female	187 (88.6)	11 (5.2)	05 (2.4)	02 (0.9)	06 (2.8)	211	
Regular physical	Yes	220 (78.3)	24 (8.5)	11 (3.9)	09 (3.2)	17 (6.0)	281	0.059

activity	No	166 (87.8)	10 (5.3)	3 (1.6)	1 (0.5)	9 (4.8)	189	
BMI	Normal*	66 (80.5)	06 (7.8)	02 (2.6)	03 (3.9)	04 (5.2)	81	0.295
	Overweight	67 (82.70	03 (3.7)	01(1.2)	04 (4.9)	06 (7.4)	81	
	Obesity	253 (82.1)	25 (8.1)	11 (3.6)	03 (1.0)	16 (5.2)	308	
WHR	risk	254 (79.6)	23 (7.2)	13 (7.2)	08 (2.5)	21 (6.5)	319	0.271
	Normal	132	06	06	02	05	151	
Abdominal obesity	Yes	310 (80.7)	26(6.7)	17 (4.4)	7(1.8)	24(6.4)	384	0.256
	No	76 (88.4)	03 (3.5)	02 (2.3)	03 (3.5)	02 (2.3)	86	
Diabetes	Yes	96 (64)	28 (18.7)	04 (2.7)	0	22 (14.6)	150	< 0.001
	No	290 (19.6)	06 (1.9)	10 (3.1)	10 (3.1)	04 (1.3)	320	
Hypertension	Yes	94 (55)	30 (17.5)	14 (8.2)	10 (5.8)	23 (13.5)	171	< 0.001
	No	292 (97.7)	04 (1.3)	0	0	03 (1)	299	
Stress	Yes	199 (81.9)	23 (9.5)	07 (2.9)	01 (0.4)	13 (5.3)	243	0.006
	No	207 (91.4)	11 (5)	07 (3)	01 (0.3)	01 (0.3)	227	