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ORIGINAL ARTICLE

A SURVEY ON PHYSICAL ACTIVITY AND NON-COMMUNICABLE DISEASE RISK FACTORS AMONG PHYSICIANS IN TERTIARY CARE HOSPITALS, MANGALORE

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ABSTRACT

Background and objectives: Almost half of the adult disease burden in South Asia is attributable to non-communicable diseases. Earlier literature is limited to evaluating non-communicable disease (NCD) risk factor but, there is a limited literature evaluating physical activity (PA), a modifiable risk factor for NCD among physicians in India. We aimed to assess the NCD risk factors and physical activity using questionnaire among physicians.
Methods: 100 physicians with minimum of 5 years of clinical experience, volunteered were included in the present study. NCD risk factors and physical activity were evaluated through WHO STEPS instrument and self-report PA questionnaires. They were administered through face to face interviews. Prevalence of NCD risk factors and level of PA were analyzed.
Results: Age group was 37.86±8.85 years. Males and females were 52% and 48%. Alcohol and tobacco use was found in 6% and 1% subjects. HTN and DM were found in 2% population. 69% physicians were found to be in overweight category. Total cholesterol and triglyceride levels were high in 3% and 9% physicians. PA mean score was 1227.2±76 MET min/wk. 20% physicians were found to have low PA level.
Conclusion: This study provides first data on PA, a potential modifiable risk factor for non-communicable disease risk factors among physicians in India. Sitting time was found 'often' in them. 20% of physicians had a low level of PA and were at high risk for cardio-vascular diseases.

Key words: Non-communicable disease risk factors - physical activity level - physicians

INTRODUCTION

The importance of physician's well-being was probably first best articulated by prominent Greek physician Galen, who said, 'That the physician will hardly be thought very careful of the health of his patients if he neglects his own'. Physicians are unable to look after their own health despite being aware of adverse health outcomes in patients with increased cardio-metabolic risk factors. Lack of time, sedentary lifestyle, and higher socio-economic status could explain the propensity for increased risk among physicians, resulting in lack of adequate health care.[1]Physicians confront the stresses of increasing government regulations, malpractice suits, the business aspects of medicine, increased clinical demands, a rapidly expanding knowledge base, rising student debt, and balancing their personal and professional lives.[2]Altruistic tendencies could result in physicians putting their profession before their personal needs. [1] Illness among doctors include all the expected categories for the general population at large such as cardiovascular

diseases, respiratory disorders, musculoskeletal disorders, cancer, and psychiatric illness.[3]

Recently, a study was undertaken to assess the health status of young Indian doctors engaged in clinical practice compared with the general population and that showed that there was a higher prevalence of cardiovascular risk factors in young physicians.[4]Prevalence of cardiovascular diseases and other non-communicable diseases has almost half of the adult disease burden in south Asia. It also accounts for 60% all deaths and 47% of global burden disease and still expected to rise. Physical activity is one of modifiable and independent risk factors for prevention of burden of the non-communicable diseases. [5]Physical activity evaluation is essential to determine whether physical inactivity is a problem, to set goals for physical therapy interventions to increase physical activity, to track adherence to recommendations made for increasing physical activity, and to utilize physical activity as an outcome measure for physical therapy interventions.[6] It can be determined with three distinct dimensions such as physical activity at work, sports during leisure time and other physical activity during leisure time. [7]

Earlier literature was limited to evaluating non-communicable disease risk factors among physicians in India.[4] But, there was a limited literature evaluating physical activity, a modifiable risk factor for non-communicable diseases among physicians in India. The current study was aimed to assess the non-communicable disease risk factors through WHO STEPS-NCD instrument and physical activity using a self-report physical activity questionnaire among physicians.

MATERIALS AND METHODOLOGY

Approval from the Institutional Ethical committee was taken. The survey was conducted among the physicians in tertiary care hospitals. In this study, the minimum levels of education for all the physicians were post-graduation degree. The detail of awareness about physical activity, non-communicable disease risk factors and briefing of survey was displayed over the notice boards in the college and hospitals. Briefing about the study was given to the subjects in groups at lecture halls. 100 physicians volunteered were included in the study. Outcome measures such as physical activity and NCD risk factors were evaluated by using self-report physical activity and STEPS-NCD risk factors surveillance questionnaires. Questionnaires were administered by face-to-face interviews by the investigator. WHO STEPS instrument for NCD risk factors uses different level of risk factor assessment, including collecting demographic information(step1), taking physical measurements(step 2), and taking blood samples from bio-chemical assessment(step 3). Each step contains core, expanded and optional items as needed can be added. [9]

Measurements by STEPS-NCD risk factors questionnaire in STEP 1 consisted of demographic characteristics, socio-economic factors, and four behavioral risk factors (smoking, alcohol consumption, fruit and vegetable consumption and physical activity) were taken. Hours of physical activity of moderate and vigorous intensities were weighted by their metabolic equivalent task (MET) values provided in the WHO guidelines (moderate activity is assigned a MET of 4 and vigorous activity is assigned a MET of 8). [10] Total MET min/week for moderate and vigorous intensity activities were calculated. <600 MET min/wk was considered to be low level, 600-2999 MET min/wk to be moderate and >3000 MET min/wk to be high level physical activity. The information regarding diet (vegetarian – non-vegetarian) food habits, and extra-salt intake, family history of diabetes, hypertension was added to this part of questionnaire.

STEP 2 of this questionnaire included physical measurements such as weight (in bare feet without heavy clothing with standard weighing scale), height (in bare feet without headwear measured using a measure tape against wall), waist circumference in cm (at the narrowest point between the lower costal border and the iliac crest measured using a constant tension tape), hip circumference in cm (at the greatest circumference of the buttocks measured using a constant tension tape), and blood pressure (at the midpoint of the arm with standard sphygmomanometer). BMI was calculated as weight in kilograms divided by height in meters squared.STEP 3 of this questionnaire includes biochemical measures such as fasting total cholesterol (TC), HDL cholesterol and fasting blood glucose (FBS). All the details and measurements were recorded in questionnaires.

Physical activity questionnaire encompassing work, sport, leisure-time and other physical activity during leisure time was administered for all the subjects. The indices of physical activity used in this questionnaire are reliable and valid. [7]

Statistical analysis

Data were analyzed using scientific package for social sciences (SPSS) version 13. An alpha level of $p<0.05$ was used as statistical significance. Work, sports and leisure-time index (physical activity indices) were compared in groups with normal and abnormal BMI, waist circumference and waist-hip ratio using un-paired t test. PA indices were compared in groups with normal and abnormal levels of TC, TG, HDL cholesterol using Mann-Whitney U test.

RESULTS

Survey of 100 physicians with a clinical experience of 5 years was conducted. Analysis was conducted to know prevalence of NCD risk factors which was taken by STEPS-NCD instrument.

Table 1: STEP 1: Core demographic and core behavioral measures

Variables	Percentage
Sex	
Men	52
Women	48
Alcohol use	6
Tobacco use	1
Extra salt intake	61
Type 2 Diabetes Mellitus(DM)	2
Hypertension(HT)	2
Family history of(DM,HT)	47
Yoga/Meditation/Gym	8

Core demographic and core behavioral measures (STEP 1): Mean age found was 37.86±8.856 years. Proportion of females and males in the group was respectively 48% and 52%. Consumption of alcohol and tobacco use was found respectively 6% and 1%. Prevalence of DM and HTN was found 2%. Family history was taken in to account as one of the risk factors and 47% was found to be having a family history of DM and HTN. Fruits and vegetables servings were assessed. 8% physicians were having fruits ≥ 5 servings /day. Extra salt intake was considered as a risk factor. 39% were found to have extra salt intake habit. 8% subjects were involved in yoga, meditation, gym activities during leisure time. All the above measures are shown in (**table 1)**. Physical activity score was calculated as total moderate and vigorous intensity physical activities per week (MET min/wk). Mean physical activity in physicians was 1227.2±767 MET min/wk. 20%, 77% and 3% physicians had low, moderate and high level of physical activity respectively.

Physical measurements (STEP 2) : BMI value ≥ 23 Kg/m^2 was considered as overweight or obese as per WHO recommended value for Asian population.[14] 69% subjects were found to be overweight or obese. Waist-hip ratio for men and women > 0.88 and 0.81 respectively, was considered as high risk, 68% subjects were found to be in this category. Waist circumference in men and women ≥ 85 cm, 80 cm respectively, was considered as high risk, 33% were found to be this category. The above measurements are shown in (table 2).

Table 2: STEP 2: Physical measurements in percentage

Physical Measurements	High Risk in Percentage (%)
BMI (Kg/m^2)	69%
Waist-hip ratio (cm)	68%
Waist circumference (cm)	33%

Biochemical measurements (STEP 3): As per normal reference value, Fasting blood glucose level ≥126 mg/dl was considered to be abnormal. All the subjects found to have normal fasting blood glucose levels. Total cholesterol level >200 mg/dl was considered to be abnormal, 3% subjects had a high total cholesterol level. HDL cholesterol level 40-60 mg/dl was considered to be normal. All subjects had a normal HDL level. Triglyceride level was considered normal up to 150 mg/dl, 9% subjects had a high triglyceride level. The above measurements are shown in (table 3).

Physical activity was evaluated through self-report questionnaire. Work index, leisure-time index, sports index were calculated. Mean work, Leisure-time and Sports index were 2.03±0.32 (CI=95% 1.97-2.09), 2.41±0.72 (CI=95% 2.26-2.55), and 1.59±0.87 (CI=95% 1.41-1.76) respectively.

Table 3: STEP: 3 Biochemical measurements

Biochemical Measurements	Abnormal level in Percentage (%)
Fasting blood glucose	0%
Total cholesterol	3%
Triglyceride	9%
HDL cholesterol	0%

Physical measurements: Mean BMI level in Kg/m^2, waist-Hip ratio and waist circumference in cm were 24.50 ± 2.82 (CI=95% 23.94-25.06), 0.86±0.05 (CI=95% 0.85-0.87), and 79.84±8.52 (CI=95% 78.14-81.53) respectively. Mean systolic and diastolic BP were 121.44±7.34, 80.48±4.45 respectively. 46% physicians had a higher normal range of systolic BP and 43% had a higher normal range of diastolic BP. **Bio-chemical Measurements**: Mean fasting blood glucose level in mg/dl, total cholesterol, triglyceride and HDL cholesterol level in mg/dl were 84.40±6.83 (CI=95% 83.04-85.76), 156.25±27.05 (CI=95% 150.88-161.62), 93.77±27.98 (CI=95% 88.22-99.33), 50.31±6.91 (CI=95% 48.93-51.68) respectively. The above measures are shown in (table 4).

Table 4: Mean (SD) of Physical activity indices, Physical and Bio-chemical measurements

Characteristics	Mean (SD)
Physical activity indices	
Work index	2.03(0.32)
Leisure-time index	2.42(0.71)
Sports index	1.59(0.87)
Physical measurements	
BMI level in Kg/m2	24.50(2.82)
Systolic Blood pressure	121.44(7.34)
Diastolic Blood pressure	80.48(4.45)
Waist-hip ratio	0.86±0.05
Waist circumference	79.84±8.52
Biochemical measurements	
Fast Blood glucose	84.40±6.83
Total cholesterol	156.25±27.05
Triglyceride	93.77±27.98
HDL cholesterol	50.31±6.91

(SD= Standard deviation)

Table 5: Correlation of physical activity indices and Body mass index (BMI), Waist-Hip ratio, Waist circumference

Physical activity indices- Physical measurements		Mean (SD)	P value
Work index	Normal BMI	2.02 (0.35)	0.9
	Overweight/ Obese	2.03 (0.31)	
Leisure-time index	Normal BMI	2.34(0.70)	0.56
	Overweight/ Obese	2.43 (0.73)	
Sports index	Normal BMI	1.91(1.11)	0.013*
	Overweight/ Obese	1.44(0.71)	
Work index	Normal Waist-Hip ratio	2.04(0.27)	0.89
	High risk group	2.03 (0.34)	
Leisure-time index	Normal Waist-Hip ratio	2.10 (0.75)	0.004**
	High risk group	2.55 (0.66)	
Sports index	Normal Waist-Hip ratio	1.41(0.67)	0.16
	High risk group	1.67 (0.95)	
Work index	Normal Waist circumference	1.99 (0.27)	0.10
	High risk group	2.11(0.39)	
Leisure-time index	Normal Waist circumference	2.23 (0.68)	<0.0001**
	High risk group	2.76 (0.67)	
Sports index	Normal Waist circumference	1.55 (0.91)	0.52
	High risk group	1.67 (0.79)	

(* p<0.05 significant, ** p<0.01 highly significant, p>0.05 not significant)

Physical activity indices were correlated with Gender, Physical measurements such as BMI, waist circumference, waist-Hip ratio, and bio-chemical measurements i.e. fasting blood glucose, total cholesterol, triglyceride, and HDL cholesterol levels. Un-paired t test suggested no significant difference between both the female and male groups in work, leisure-time and sports indices (p=0.897, 0.524, 0.97 respectively). Un-paired t test suggested no significant difference in work and leisure-time index in normal BMI and overweight or obese subjects (p =0.90, 0.56), and a significant difference in sports index of normal BMI and overweight or obese

subjects (p=0.013).Un-paired t test suggested no significant difference in work and sports index in normal waist-Hip ratio and high risk groups (p= 0.89, 0.16) and a highly significant difference in leisure-time index in both groups (p= 0.004).Un-paired t test suggested no significant difference in work and sports index in normal and high risk waist circumference groups (p= 0.10, 0.52) and highly significant difference in both the groups in leisure-time index (p <0.0001). The correlation between physical activity indices and physical measurements are shown in (table 5).

Physical activity indices and bio-chemical measurements such as total cholesterol, triglyceride were correlated by Mann-Whitney U test. It suggested no significant difference in sports and leisure time index in the subjects with normal and high total cholesterol (p=0.97, 0.11) and significant difference in work index in both the groups (p=0.034). There was no significant difference Work, leisure-time and sports index in the subjects with normal and high triglyceride levels (p=0.63, 0.6, 0.22). The above measurements are shown in (table 6).

Table 6: Correlation of physical activity indices and Total Cholesterol (TC) and Triglyceride (TG) levels, (SD=Standard deviation), (* p< 0.05 significant)

Physical activity indices	Biochemical measurements		Mean (SD)	P value
Work index	TC (mg/dl)	Normal	2.04(0.32)	0.034*
		Abnormal	1.70(0.14)	
Leisure-time index	TC	Normal	2.40(0.72)	0.97
		Abnormal	2.41(0.72)	
Sports index	TC	Normal	1.61(0.88)	0.117
		Abnormal	1.00(0.25)	
Work index	TG (mg/dl)	Normal	2.04(0.32)	0.63
		Abnormal	1.96(0.27)	
Leisure-time index	TG	Normal	2.39(0.74)	0.60
		Abnormal	2.52(0.52)	
Sports index	TG	Normal	1.62(0.90)	0.22
		Abnormal	1.22(0.40)	

DISCUSSION

This survey aimed to evaluate NCD risk factors and physical activity among the physicians. NCD risk factors were evaluated by using WHO STEPS-NCD questionnaire and Physical activity was measured through a validated self-report physical activity questionnaire. [7] Earlier studies done on physicians in India did not include physical activity assessment which is a great modifiable risk factor for Non-communicable diseases. In personal habits the use of tobacco was found to be within 1% and alcohol consumption was found in 6% of the sample subjects. In diet frequency of fruits, vegetables and extra salt habits were taken. Previous literature has found a protective association of high intake of fruits and vegetables (≥5 servings/day) to cardio-vascular diseases.[15]In this study, we found that 8% physicians had servings of fruits and vegetables ≥5 servings /day. Previous studies have found that increased salt intake is associated with increased risk for hypertension even after adjusting for potential confounders. [16,17]In this study increased salt intake was found in 39% physicians and history of hypertension and diabetes was found in 2% of subjects. It was found lesser as compared to previous study (35.6%, 13.3%) among physicians.[4]

Physical activity scorewas calculated for total moderate and vigorous intensity activities/week (MET min/ week). 20% physicians had a low level of physical activity, whereas 77% and 3% physicians were seen with moderate and high level of physical activity respectively. Previous literature showed low activity levels both at work and during leisure time resulting in sedentary lifestyle, which is associated with a significant increase in cardiovascular disease risk factors and all-cause mortality. [18] In this study, 20% of physicians were found to have low physical activity level that might place them at high risk of cardiovascular diseases.

Physical measurements such as body mass index (BMI) a measure of total body adiposity, waist circumference and waist-hip ratio - measures of central adiposity were recorded.

Cut-off points for normal values were taken as recommended by WHO for Asian population. [10] In this study 69% physicians were found to be in obese or overweight category. Waist circumference and waist-hip ratio were found to be in high risk category in 33% and 68% respectively. Central adiposity would be explained by the high stress level in physicians. High stress level increases the activation of hypothalamic-pituitary-adrenal axis resulting in cortisol secretion which leads to deposition of fat in certain areas like abdomen, buttocks which predisposes to central obesity.[19]

Physicians reported 'Often' sitting time in the self-report physical activity questionnaire during working and leisure hours, which might be a probable reason for higher obesity measures in them. A previous literature has found time spent in sitting to be a potential risk factor for chronic diseases. Even if people meet the current recommendation of 30 minutes of physical activity on most days each week, there may be a significant adverse metabolic and health effects from prolonged sitting. [20] Sitting is a low energy expenditure activity and also limited evidence suggests less muscular contractions during sitting might lead to decreased Lipoprotein lipase activity resulting in poor lipid metabolism and leading to weight gain and obesity.[21,22]

Biochemical measurementssuch as fasting glucose, total cholesterol, and triglyceride and HDL cholesterol levels were taken. All the physicians had normal fasting blood glucose and HDL cholesterol levels. Total cholesterol and triglyceride levels were found to be high in 3% and 9% respectively. Physical activity indices such as work index, leisure-time index and sports index were recorded through a self-report questionnaire and scores were calculated. There was no gender difference in work, sports and leisure-time index.

Correlations of physical activity indices and physical measurements:BMI was correlated with work, leisure-time and sports index. There was no significant difference in work and leisure-time index in overweight and normal BMI physicians. Sports index was significantly different between them. Sports index for normal BMI physicians was higher compared to overweight physicians. In this study, swimming, cricket and tennis were the most common sports in the physicians. Previous literature showed these activities to be beneficial when it is performed regularly. [23]

Waist circumference and waist-hip ratio were correlated with work, leisure-time and sports index. There was no significant difference in work and sports index of physicians with normal and high waist circumference. And no significant difference in work and sports index of normal and high waist-hip ratio groups. But, there was a highly significant difference in leisure-time index of the subjects with normal and high waist circumference and high waist-hip ratio groups. The physicians with high waistcircumference and high waist-hip ratio had a higher leisure-time index, which might be explained by increased awareness of NCD risk factors among physicians. Higher leisure-time index in high waist-hip ratio and waist circumference groups was contradicting to earlier literature which showed increased leisure-time physical activity was associated with more beneficial effects on obesity markers and CHD. [11] The probable reason could be due to lack of sufficient intensities of leisure-time activities to reduce upper body obesity.[7]

Correlations of physical activity with Bio-chemical measurements:Total cholesterol level was correlated with work, leisure-time and sports index. There was no significant difference in leisure-time and sports index of physicians with normal and high total cholesterol level. But, work index of physicians with normal total cholesterol level was higher compared to physicians with higher total cholesterol levels.Triglyceride level was correlated with work, leisure-time and sports index. There was no significant difference found in work, leisure-time and sports index of physicians with normal and higher triglyceride levels. In the present study, the physicians were found to be having higher levels of physical measurements such as BMI, waist circumference, waist-hip ratio, and biochemical measurements such as total cholesterol, triglyceride levels which might predispose them to non-communicable diseases.

30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week is recommended to gain significant health benefits, whereas, to gain benefits for obesity markers, 45-60 min/day physical activity is recommended. [24] But in this study, physical activity level was not enough to maintain their obesity markers in normal levels. 'Too much sitting time' might be a predisposing

factor for the same. Previous literatures demonstrated that associations between physical activities and cardiovascular disease risk were strong, and illustrated the enormous preventive potential, given the high prevalence of a sedentary lifestyle. [19] Physicians should be motivated to increase their physical activity level and 'too much sitting risk factor' might be modified through frequent breaks such as 5 minutes every hour during sitting.

IMPLICATIONS FOR FUTURE RESEARCH

Multicenter surveys to be conduct to address the global level of risk factors among physicians. Physical activity by objective methods such as accelerometry and pedometry should be assessed. Study evaluating effectiveness of structured physical activity program on non-communicable disease risk factors among physicians should be performed.

CONCLUSION

This study provides first data on physical activity, a potential modifiable risk factor for non-communicable disease risk factors among physicians in India. Sitting time was found 'often' in them. 20% of physicians had a low level of physical activity and were at high risk for cardio-vascular diseases.

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