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RESEARCH REPORT

Screening for noncommunicable disease risk factors at a workplace in India: A physiotherapy initiative in a healthcare setting☆

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KEYWORDS
chronic disease;
risk factors;
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Abstract *Background:* Noncommunicable diseases (NCDs) account for two-thirds of all deaths globally. Physiotherapists have the requisite expertise to initiate and lead NCD risk factor screening and prevention programmes. The workplace can provide an ideal setting for physiotherapists to screen for risk factors and implement prevention programmes.
Objective: This study was designed to identify the common modifiable risk factors for NCD among employees of a healthcare institution.
Methods: A cross-sectional study of NCD risk factors was conducted in a large healthcare teaching institution. Employees from four of the seven constituent institutes of the healthcare institution were evaluated using the World Health Organisation STEPS Instrument (Steps I and II). Continuous variables were expressed as mean ± standard deviation. Categorical variables and the prevalence of risk factors were expressed as frequencies and percentages.
Results: A total of 247 employees (response rate 68.2%) participated in the study. Poor dietary habits, suboptimal blood pressure, and physical inactivity were identified as the most common modifiable NCD risk factors in this population.
Conclusion: Knowledge of NCD risk factors can be used by physiotherapists to implement health promotion programmes in the workplace as a means of reducing NCD-related economic and social burdens in India.

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Introduction

Noncommunicable diseases (NCDs), as the leading causes of mortality, accounted for two-thirds of all global deaths in 2010 [1]. Among NCDs, cardiovascular disease accounts for the highest number of deaths (17 million), followed by cancer (7.6 million), respiratory diseases (4.2 million), and diabetes (1.3 million) [2]. These NCDs share common behavioural risk factors, namely, tobacco use, harmful use of alcohol, unhealthy diet, and physical inactivity, which, if eliminated, could prevent up to 80% of heart disease, stroke, and type 2 diabetes, and more than one-third of cancers [3]. Hence, primary prevention strategies to control the global epidemic of NCDs are a high priority.

India, a growing, lower—middle-income economy, is in the midst of an economic transition and witnessing a growing burden of NCDs [4,5]. Although India has a national NCD risk factor surveillance programme [6—8], for a country as vast as India, many initiatives at various levels (e.g., schools, workplaces, households, and local communities) are needed to tackle the burden of NCDs [3].

Workplace intervention programmes are considered important for preventing NCD risk factors [9]. They provide an opportunity to reach a large number of the working population and their families in an organised manner [10]. Although workplace interventions are common in Western countries [11], there is a dearth of literature from India, and few reports on screening for NCD risk factors in the workplace using standardised tools are available [12—16]. In order to plan and implement a successful workplace intervention, it is crucial to establish the baseline prevalence for various NCD risk factors through standardised methods.

Physiotherapists (PTs), as exercise specialists having opportunities of long-duration interactions with patients and clients, are uniquely placed to advocate physical activity promotion and prescription for prevention and control of NCDs. In addition, their basic professional training makes them suitable for providing general advice for prevention and control of other behavioural risk factors of NCDs. To augment the profession's cause, the World Confederation of Physical Therapy recently released a draft statement highlighting the role of PTs in the prevention and control of NCDs [17]. India has over 28,000 PTs registered with the national association who are employed in various settings including healthcare institutions [18]. The high burden of NCDs in India provides an opportunity for PTs to expand their scope of practice.

Consistent with the recommendations and action plan of the two physiotherapy summits on global health [19,20], this study was designed and implemented by PTs with an aim to assess the prevalence of NCD risk factors in a large healthcare institution using the World Health Organisation (WHO) STEPS Instrument [6].

Methods

Between January 2012 and February 2013, employees from four of the seven constituent institutes (medical college, school of allied health sciences, college of nursing, and administrative division) of a large tertiary healthcare institution were evaluated using a cross-sectional design. The four institutes were selected based on feasibility. Practical considerations led to the exclusion of physicians, surgeons, and housekeeping staff from selected institutes for this survey. After approval of the study protocol by the institutional ethics committee, a list of employees in the selected institutes was obtained from the institution's administrative office. All employees were informed about the study by the respective heads of institutes, following which they were individually approached by the study investigators to explain about the study and were invited to volunteer to participate in the study. Those willing to participate were given an appointment for administration of the study questionnaire (WHO STEPS Instrument) [6]. Only the core components of Steps I and II of the questionnaire were used for this study, except for questions on physical activity in Step I, where the expanded section on sedentary behaviour was also included. Employees declining consent and those missing three appointment schedules were considered nonrespondents. All participants provided a written informed consent. The study protocol was conducted in accordance with the Declaration of Helsinki.

All study investigators were PTs, and the study questionnaire was administered by ARK under SKV's supervision. Three investigators (SKV, NP, and AGM) were trained and had experience in administering the WHO STEPS Instrument. For the purpose of this study, the primary investigator (ARK) underwent training in administration of the WHO STEPS Instrument under the guidance of researchers experienced in NCD risk factor surveillance in the healthcare institution, prior to commencement of data collection for the study. The equipment used for the study, [portable stadiometer, class I weighing scale, nonelastic measuring tape, and electronic blood pressure monitor (OMRON-7111)] were standardised using reference norms prior to data collection and calibrated periodically.

The WHO STEPS Instrument (Steps I and II) was then administered in accordance with the WHO STEPS manual [21]. Step I consisted of information about demographic data, tobacco use, alcohol consumption, dietary habits, physical activity level, and history of hypertension and diabetes. Step II of the questionnaire involved physical measurements of height, weight, waist circumference, and blood pressure. Body mass index (BMI) was calculated using weight in kilograms and height in meters, using the following formula: BMI = weight (kg)/height $(m)^2$.

Participants were considered as tobacco users if they were currently consuming tobacco products. Men consuming >3 drinks/day and women consuming >2 drinks/day were considered as hazardous drinkers. Participants consuming ≤3 servings/day of fruits and vegetables, and those consuming fruit and vegetable for ≤4 days/week were considered as persons not meeting dietary recommendations. Based on their weekly participation in physical activity, participants were categorised as inactive (<600 MET.minute/week), low active (600—3999 MET.minute/week), moderately active (4000—7999 MET.minute/week), and highly active (>8000 MET.minute/week) [22].

Participants were graded as underweight, normal weight, overweight, and obese using the BMI norms for Asians [23]. Waist circumference cut-points of 80 cm for women and 90 cm for men were used to classify individuals as those having abdominal obesity. Participants'

hypertension status was graded based on each participant's average blood pressure, using the Joint National Committee (JNC 7) classification [24].

Data were analysed using the Statistical Package for the Social Sciences (SPSS) version 15 (South Asia, Bangalore, India). Continuous variables were expressed as mean ± standard deviation. Categorical variables and the prevalence of risk factors were expressed as frequencies and percentages.

Results

A total of 362 employees were included in the sampling frame, of which 247 participated in the study (response rate 68.2%). The sample had a greater proportion of women (61.1%, $n = 151$). There was no significant difference in the proportions of women and men between responders and nonresponders. Among the participants, 110 (44.5%) were clerical staff, 87 (35.2%) were professional staff, and the remaining 50 (20.2%) belonged to the technical category. With regard to educational status, 36 (14.6%) had education up to higher secondary or less, 11 (4.5%) had technical qualification, 82 (33.2%) were graduates, and the remaining 118 (47.8%) were postgraduates. Other demographic characteristics of the participants are described in Table 1.

Behavioural risk factor profile

Twenty-three men (24%) and four women (2.6%) reported consuming alcohol in the past 30 days, but none crossed the cut-off values for hazardous drinking. The average numbers of days per week of fruit and vegetable consumption were 4.1 ± 2.1 and 6.3 ± 1.4, respectively, for men, and 4.9 ± 2.1 and 6.6 ± 1.1, respectively, for women. Regarding the use of oil for cooking, the majority of participants (151, 61.1%) used coconut oil, 81 (32.8%) used sunflower oil, eight (3.2%) used vegetable oil, and seven (2.8%) used other types of oil. Among men, 36 (37.5%) were physically inactive, 53 (55.2%) low active, seven (7.3%) moderately active, and none highly active. Among women, 30 (19.9%) were physically inactive, 85 (56.3%) low active, 32 (21.2%) moderately active, and four (2.6%) highly active. On average, participants spent 9 ± 2.3 hours in sitting position. Fig. 1 shows the proportion of participants having various behavioural risk factors.

Table 1 Demographic characteristics of the participants.

Characteristics	Men ($n = 96$)	Women ($n = 151$)
	Mean ± SD	Mean ± SD
Age (y)	38.6 ± 10.4	35.7 ± 9.6
Height (cm)	170.7 ± 7.2	157.1 ± 5.5
Weight (kg)	66.8 ± 11.2	57.5 ± 10.5
Body mass index (kg/m^2)	22.9 ± 3.4	23.2 ± 3.9
Waist circumference (cm)	87.2 ± 8.7	79.6 ± 9.1

SD = standard deviation.

Biological risk factor profile

Based on BMI categories, 15 (5.2%) men were underweight, 44 (45.8%) normal weight, 21 (21.9%) overweight, and 26 (27.1%) obese. Among women, 13 (8.6%) were underweight, 65 (43.0%) normal weight, 30 (19.9%) overweight, and 43 (28.5%) obese. Eleven (11.5%) men and eight (5.3%) women reported having hypertension, and two (2.1%) men and six (3.9%) women reported having diabetics. Based on standardised blood pressure measures, 59 (61.5%) men and 38 (25.2%) women were in the prehypertension category, and 20 (20.8%) men and 13 (8.6%) women in the hypertension category. The proportion of participants with various biological risk factors is shown in Fig. 2. Most of the participants had one or more risk factors. Fig. 3 shows the proportion of participants with multiple risk factors.

Discussion

The results of this study supported a high prevalence of NCD risk factors in the healthcare institution we studied, similar to those reported from other workplaces in India [25–27], but the profiles of a few risk factors differed from those reported previously. In the present study, tobacco use was much less compared to reports from other studies in India [8,12,25,26]. The success of the institutions' strict "smoke-free campus" policy could have contributed to this result, but under-reporting by participants cannot be ruled out. Although alcohol consumption was prevalent, no participants reported crossing the threshold of hazardous drinking as per the WHO guidelines. The participants consumed fruits and vegetables more frequently (>4 and 6 days/week, respectively) compared with that reported in a national CVD risk factor surveillance study (>2 and 5 days/week, respectively) [8]. Despite having a higher frequency of fruit and vegetable consumption, more than 95% participants did not meet the dietary recommendations of at least five servings of fruits and vegetables per day [28]. A greater proportion of participants (61.1%) used coconut oil for cooking. Coconut oil contains the highest amount of saturated fat among all edible oils (such as sunflower oil, safflower oil, and olive oil) and is considered unhealthy [29]. Physical inactivity was higher (37.5% in men and 19.9% in women) compared with the national average of 14% reported by the WHO [30]. Based on the revised cut-offs for Asians [23], obesity (BMI and waist circumference measures) was prevalent in a high proportion of participants and was similar to that reported in studies conducted in urban settings [8,26,27]. A concern in our study sample was the proportion of participants with suboptimal blood pressure. Nearly 53% of the participants had a blood pressure of >120/80 mmHg (39% and 13% of the participants with prehypertension and hypertension, respectively). This assumes significance because only 7.5% of the participants were known to be hypertensive, and the remaining 45% were unaware of their risk status.

Generally, employees in healthcare institutions have better access to information on healthy behaviour and health-screening facilities. Despite this opportunity, about 60% of the participants (73% men and 53% women) in this study had three or more risk factors. A similar trend was

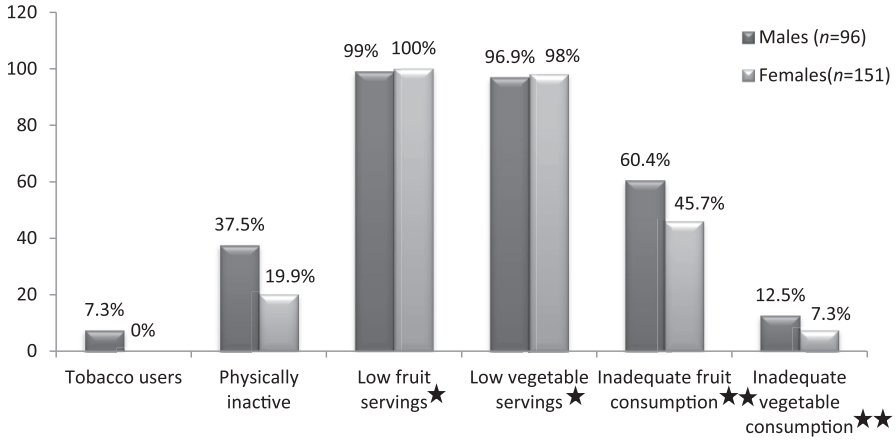

Figure 1. Proportion of participants having behavioural risk factors. Participants were considered to have a specific behavioural risk factor based on the following criteria [6]: Tobacco use—current tobacco users; Physical inactivity—participating in physical activity of <600 MET.minute/week; Fruit and vegetable servings—consuming ≤3 fruit servings/day and consuming ≤3 vegetable servings/day; Fruit and vegetable consumption frequency—consuming fruits on ≤4 days per week and consuming vegetables on ≤4 days per week. The symbol ★ represents the number of servings per day and ★★ the frequency of days per week of consuming fruits or vegetables.

observed in a study among administrative employees of a large tertiary care hospital in India [14]. This highlights the need for having a formal workplace health promotion programme. The workplace serves as an important platform to implement NCD risk reduction programmes. Advantages of a workplace wellness programme over a community programme are that the workplace has a more organised structure and allows a greater level of control over programme implementation. Employees also spend a greater part of their time in a workplace than in the community. This can increase their chance of exposure to NCD risk reduction programmes. Risk factor prevalence data form the basis for prioritising and strategising intervention programmes at various levels of prevention. For example, in a setting similar to that used in this study, effort needs to be targeted towards controlling blood pressure and improving dietary and physical activity profiles, rather than focusing on tobacco and alcohol cessation programmes. PTs are skilled at advising fellow employees about appropriate lifestyle modification for improving physical activity and controlling blood pressure.

The First Physical Therapy Summit on Global Health reported that "contemporary definitions of physical therapy support that the profession has a leading role in preventing, reversing, as well as managing lifestyle-related conditions" [19]. The present study is in accordance with this statement and the draft policy statements of the World Confederation for Physical Therapist on NCDs [17]. The current study helped us realise the scope that PTs have towards initiating a workplace wellness programme and led us towards newer initiatives. The results of this survey served as the basis for organising a workshop on developing a worksite wellness programme for higher-ranking administrative employees at our institution [31]. This workshop played a role in

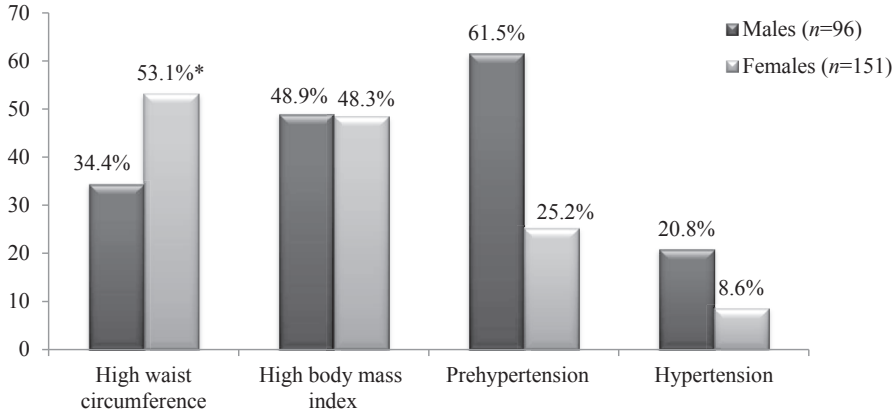

Figure 2. Proportion of participants having biological risk factors. Participants were considered to have a specific biological risk factor based on the following criteria: High waist circumference [23]—male, >90 cm and female, >80 cm; High body mass index [23]—≥23 kg/m^2; Prehypertension [24]—SBP ≥120 mmHg to ≤139 mmHg or DBP ≥80 mmHg to ≤89 mmHg; Hypertension [24]—SBP ≥140 mmHg or DBP ≥90 mmHg. * For women: n = 147 (4 women were excluded from measurement because of pregnancy). DBP = diastolic blood pressure; SBP = systolic blood pressure.

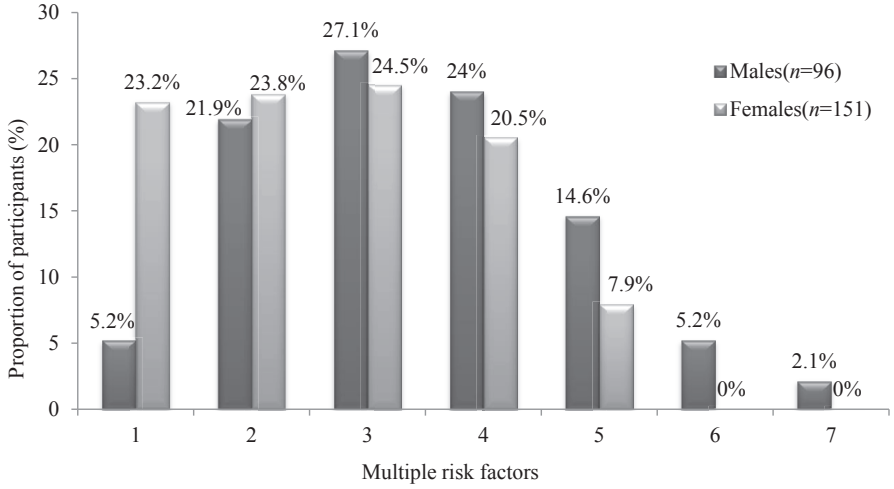

Figure 3. Proportion of participants with multiple risk factors. More than 60% of participants had three or more risk factors. The following risk factors were considered for calculating the number of risk factors harboured by an individual: tobacco use, alcohol consumption, inadequate dietary intake of fruits and vegetables, physical inactivity, abdominal obesity, body mass index $\geq$23 kg/m^2, and hypertension.

sensitising employees of this institution about workplace wellness programmes and the role PTs can play in initiating and executing such programmes. A recent study by our group highlighted low awareness of health benefits of physical activity among residents of this geographical region [32]. This, together with the results of the current study, has aided us in planning programmes that aim to understand the perceived barriers to participation in physical activity among employees at our institution. To our knowledge, no other initiative from PTs has been reported from any other country in the Asia Western Pacific region of the World Confederation for Physical Therapy. We believe that our findings provided a rational basis for PTs to expand their scope of practice in our setting.

Workplace interventions are not common in many lower to middle-income countries like India [33]. As advocated by the World Confederation for Physical Therapy [17], the current scenario provides PTs with an opportunity to expand their scope of practice. PTs working in healthcare and educational institutions, due to their unique skills as exercise specialist, are well placed to initiate such programmes and can take the lead in putting in place a comprehensive workplace wellness programme. In addition to implementing workplace wellness programmes in their place of employment, PTs can attempt to influence institutions and industries within their field practice areas towards initiating such programmes. For PTs willing to take the initiative, multiple resources from various national and international organisations are available for effective implementation of programmes [34—36]. PTs can also engage with their local professional association to strengthen their initiatives.

Strengths

The questionnaire used in our study (WHO STEPS Instrument) has been used extensively in global chronic disease surveillance programmes, which precluded the requirement to test its psychometrics further. Although a few studies assessing NCD risk factors in industrial settings are available, the present study highlights the role PTs can play in screening of NCD risk factors using standardised tools in healthcare institutions. This study also brings to light the high prevalence of NCD risk factors in a setting that is most suited to implement a workplace NCD prevention programme.

Limitations

Due to time and resource constraints, a random process of selecting participants from all institutes and from all strata was not feasible. Evaluation of physicians, surgeons, and housekeeping staff for their risk factor profiles would have made this survey more comprehensive and allowed for comparison of risk factor profiles across occupation types. Reporting bias from the participants, especially with regard to smoking and alcohol consumption due to the institutions policies, cannot be ruled out. Addition of Step III (biochemical analysis—blood glucose and lipid profile) could have allowed for establishing a correlation between behavioural and biochemical risk factors in the population.

Clinical implications

NCDs can take decades to be completely established, and thus there are multiple opportunities at which preventive strategies can be implemented. The workplace provides an ideal setting for PTs to initiate screening for major modifiable risk factors, and designing and targeting intervention programmes for prevention and control of NCDs. Interventions at various levels will help counter the increasing burden of NCDs in India. PTs have a major role in implementing these interventions.

Conclusion

High prevalence of prehypertension, hypertension, obesity, physical inactivity, and a poor dietary profile was observed

among the study participants in a healthcare institution in India. However, the prevalence of tobacco and alcohol consumption was low. The results provided a rational basis for designing and implementing workplace health and wellness programmes within the participating institution.

Conflicts of interest

The authors declare that they have no conflicts of interest relevant to this article.

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