Original article

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Prevalence and Comparision of Conventional Risk Factors of Cardiovascular Disease Between Clinical and Nonclinical Staff

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ABSTRACT

Background: Cardiovascular disease is the leading cause of death around the globe. A number of studies have shown that hospital staff are vulnerable to cardiovascular disease due to a certain risk of shift duty. It is important to identify cardiovascular risk factors among hospital staff. The aim of this study is, to assess the prevalence of conventional risk factors of cardiovascular disease among hospital staff.

Methods: A quantitative cross-sectional study was conducted among staff working at a Shahid Gangalal National Heart Center, a tertiary cardiac center in Nepal. Simple and multiple linear regression analyses were used to examine the association between independent variables and cardiovascular diseases. Statistical analysis was done using SPSS software version 20.

Results: A total of 250 hospital staff participated in this study. Among them, 137 were clinical staff and 113 were non-clinical staff. The mean age of clinical staff and the non-clinical staff was 33.69 ± 7.02 years and 38.7 ± 10.58 years respectively with a total of 66.8% females. Prevalence of hypertension, diabetes mellitus, and dyslipidaemia was less in clinical staff compared to non-clinical staff. The mean systolic, diastolic BP was high in non-clinical staff (P-value 0.001), moreover mean HDL-C was low (1.2 ± 0.2 mmol). BMI was significantly low in clinical staff. [standardized ß= -0.24; 95% CI: -2.90, -0.88].

Conclusions: The prevalence of cardiovascular risk factors were high in non-clinical staff compared to clinical staff.

Keywords: Cardiovascular disease; conventional risk factors; hospital staff

INTRODUCTION

Cardiovascular diseases (CVDs) are the leading cause of death among non-communicable diseases. Approximately 17.9 million deaths were caused by CVDs globally in 2019.[1] It caused death of 43%, 41% and 23% of deaths in low-income, middle-income, and high-income countries respectively.[2] Conventional risk factors like hypertension, diabetes, dyslipidaemia, overweight/ obesity, physical inactivity, dietary habits were responsible for CVDs. [3]

Shift work impacts the pattern of regular exercise compared to non-shift work. Many studies have revealed that working in shifts is associated with lifestyle challenges that can impact exercise and dietary choices which contribute to weight-related problems.[4]

Hospital staff (clinical and non-clinical) are often so occupied with their responsibilities that they don›t prioritize their own health. This lack of attention to their health, combined with shift work and certain lifestyle habits, could expose hospital staff to risk of CVDs.[4-6]

This study aims to assess the prevalence of conventional risk factors of CVDs among hospital staff.

METHODS

This is a quantitative cross-sectional study. The study was conducted at Shahid Gangalal National Heart Centre (SGNHC), a tertiary cardiac referral centre located in Kathmandu, Nepal, among hospital staff. This hospital offers a wide range of services to cardiac patients. Data

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was collected on 14th, 15th, 16th September 2021 for three days at the Out Patient Department (OPD).

All the staff working in Shahid Gangalal National Heart Center (SGNHC) were considered eligible. Those who were on leave and resigned in one month were excluded from study.

The study participants were recruited for this study through simple random sampling. A sampling frame was created based on the total staff and each staff was given a unique identification number. Random numbers for the required sample size were generated from the total list of staff. The participants corresponding to the random numbers generated were invited to participate in the study. Those who refused to participate were excluded. A new random number was generated for each staff who refused to participate. At the time of the study, a total of 683 staff were working at the hospital. The minimum sample size for a finite population was calculated to be 247 with a 5% margin of error and 95% confidence level considering a sample proportion of 50%. Considering incomplete responses, a sample size of 250 was accepted for the study.

A semi-structured questionnaire was developed after an extensive literature review and consultation with a subject expert (consultant cardiologist). The tool was pretested with 10% of the population at the same centre and they were excluded from the study. Questionnaire includes socio-demography, food and behavioral habits, physical activities and exercise. Anthropometric, blood pressure measurements and laboratory blood analysis of lipid profile and fasting sugar were done. Data were collected through face to face interviews using Kobotool box via mobile phones and computers.[7]

Clinical parameters like height, weight, and blood pressure were measured by calling the randomly selected participant in the OPD. Blood sample {blood sugar, lipid profile; total cholesterol, triglyceride, High-Density Lipoprotein (HDL), Low-Density Lipoprotein(LDL)} was drawn and dispatched to the Laborotory at Shahid Gangalal National Heart Center.

We divided our respondents into two groups clinical and non-clinical staff. We categorized administrative staff, housekeeping staff, drivers, and security personnel as non-clinical staff, and doctors, nurses, and paramedics as clinical staff.

Those who consumed less than five servings (400g) of fruit and vegetable per day were considered to have insufficient intake of fruits and vegetables .[8,9] Those who smoked cigarettes and those who quit less than 1 month before data collection were considered current smokers.[9] A brisk walk for 30 minutes is defined as Moderate physical exercise (at least 5 days a week or 150 minutes/week) besides their work, while no exercise was defined as less than 150 minutes/week of brisk walk besides work.[10]

The same height and weight scale was used to collect data from all the participants. A height scale was used to measure height and weight was taken by using a digital weight machine. Body Mass Index (BMI) was calculated via the formula of weight in kilograms divided by the square of height in meters (kg/m2) and classified as underweight <18.5 kg/m2, healthy weight (18.5- 22.9) kg/m2, Overweight (23-24.9.9)kg/m2, and Obesity ≥ 25.0kg/m2.[11]

Dr Morepen fully automatic BP monitor was used to measure BP. BP was taken on the left hand after rested in chair for 5 minutes, feets on the floor and hand on the table at heart level. Three BP measurements were taken, average measurement was recorded, and classified according to JNC-7 guideline.[12]

A fasting blood sample of 3ml was drawn via vacuum drainer tube from a brachial vein to test serum blood sugar and lipid profile (total cholesterol, LDL-C, TG, and HDL-C). The glucose oxidase –perioxidase (GOD-POD) method was used for blood sugar analysis and classified according to the American Diabetic Association.[13] The enzymatic method was used to analyse lipid profile.[14,15]

The data collected in Kobotool box was exported to excel sheet for data cleaning. The data was then imported to IBM SPSS version 20 software for data analysis. The Pearson Chi-square test and independent t-test were used to compare CVDs risk factor prevalence between groups. An associated risk factor of CVDs was analysed by multivariable linear regression of the study population. A p-value of <0.05 was considered statistically significant.

Ethical approval was obtained from the Institutional Review Committee of Shahid Gangalal National Heart Centre. The objective of the study was clarified, and informed consent was taken from participants before data collection. The confidentiality of all the participants was maintained.

The financial arrangement was done by the Department of Preventive Cardiology and Cardiac Rehabilitation.

RESULTS

Table 1 reveals socio-demograhpy of the respondents. A total of 250 participants were included in our study. The response rate of the questionnaire was 100% with no missing data. Out of the 250 participants, 54.8% were clinical staff and 45.2% were non-clinical staff. Females comprised more than half (66.8%) of the study population. The mean age of clinical staff and the non-clinical staff was 33.69 ± 7.02 and 38.7 ±10.58 years respectively.

Table 1. Socio-demographic characteristics of participants.

Variables	Total participants (N = 250)	Clinical (n = 137)	Non-clinical (n = 113)
	N (%)	n (%)	n (%)
Gender			
Female	167 (66.8)	108 (78.8)	59 (52.2)
Male	83 (33.2)	29 (21.2)	54 (47.8)
Age in year, mean ± SD	35.96 ± 9.1	33.69 ± 7.0	38.7 ± 10.5
Education			
Illiterate	15 (13.3)	0 (0.0)	15 (6.0)
Primary education	16 (6.4)	0 (0.0)	16 (14.2)
Secondary education	44 (38.9)	0 (0.0)	44 (17.6)
Higher secondary education	35 (14.0)	12 (8.8)	23 (20.4)
University education	140 (56.0)	125 (91.2)	15 (13.3)
Ethnicity			
Brahmin	66 (26.4)	41 (29.9)	25 (22.1)
Chhetri	85 (34.0)	36 (26.3)	49(43.4)
Adibasi	80 (32.0)	56 (40.9)	24 (21.2)
Others	19 (7.6)	4 (2.9)	15 (13.3)

Table 2 displays dietary and behavioural risk factors of respondents. The majority of respondents in both clinical and non-clinical groups were non-vegetarian, among them non-clinical staff were 91.2% and clinical staffs were 89.8%. Very few clinical (0.7%) and non-clinical (0.9%) staff were taking recommended amount of fruits per day. More non-clinical staff (42.5%) were not taking a single serving of fruit in a day compared to clinical staff (15.3%). Similarly less number of respondents were taking recommended servings of vegetables per day in both groups (4.4%), Current smoking was 14.2% in non-clinical staff and 0.7% in clinical staff which was low compared with non-clinical staff.

Table 2. Dietary and behavioral risk factors of cardiovascular disease.

	Total participants	Clinical (n = 137)	Non-clinical (n = 113)	
Behavioural factor	N (%)	n (%)	n (%)	p-value
Vegetarian	24 (9.6)	14 (10.2)	10 (8.8)	
Non-vegetarian	226 (90.4)	123 (89.8)	103 (91.2)	
Fruit consumption				
None in a day	69 (27.6)	21 (15.3)	48 (42.5)	<0.001
1 time in a day	151 (60.4)	90 (65.7)	61 (54.0)	
≥2 in a day	28 (11.2)	25 (18.2)	3 (2.7)	
≥4 in a day	2 (0.8)	1 (0.7)	1 (0.9)	
Veg-consumption				
None in a day	4 (1.6)	1 (0.7)	3 (2.7)	0.245
1 time in a day	32 (12.8)	22 (16.1)	10 (8.8)	
≥2 in a day	203 (81.2)	108 (78.8)	95 (84.1)	
≥4 in a day	11 (4.4)	6 (4.4)	5 (4.4)	
Physical exercise				
Yes	103 (41.2)	63 (46.0)	40 (35.4)	0.001
No	147 (58.8)	74 (54.0)	70 (64.6)	
Currently smoking				
Yes	17 (6.8)	1 (0.7)	16 (14.2)	>0.001
No	233 (93.2)	136 (99.3)	97 (85.8)	

Table 3 shows the prevalence of cardiovascular risk factors in the study population. Prevalence of obesity, prediabetes, diabetes, stage I SBP and DBP, was high among non-clinical staff (69.0%, 14.2%, 2.7%, 33.6% and 21.2% respectively).

Table 3. Prevalence of conventional cardiovascular risk factors.

Variables	Total participants (N = 250)	Clinical staff (n=137)	Non-clinical staff (n = 113)	p-value
	N (%)	n (%)	n (%)	
BMI				
Underweight	4 (1.6)	3 (2.2)	1 (0.9)	0.010

Normal	55 (22.0)	39 (28.5)	16 (14.2)	
Over weight	46 (18.4)	28 (20.4)	18 (15.9)	
Obesity	145 (58.0)	67 (48.9)	78 (69.0)	
Blood sugar				
Normal	221 (88.4)	127 (92.7)	94 (83.2)	0.060
Pre-diabetes	25 (10.0)	9 (6.6)	16 (14.2)	
Diabetes	4 (1.6)	1 (0.7)	3 (2.7)	
Currently smoking				
Yes	17 (6.8)	1 (0.7)	16 (14.2)	<0.001
No	233 (93.2)	136 (99.3)	97 (85.8)	
Total cholesterol				
Normal	205 (82.0)	111 (82.0)	94 (83.2)	0.868
Borderline	37 (14.8)	21 (15.3)	16 (14.2)	
High	8 (3.2)	5 (3.6)	3 (2.7)	
Systolic BP				
Normal	148 (59.2)	94 (68.6)	54 (47.8)	0.001
Pre-hypertension	74 (29.6)	36 (26.3)	38 (33.6)	
Stage I	22 (8.8)	5 (3.6)	17 (15.0)	
Stage II	6 (2.4)	2 (1.5)	4 (3.5)	
Diastolic BP				
Normal	149 (59.6)	98 (71.5)	51 (45.1)	<0.001
Pre-hypertension	49 (19.6)	20 (14.6)	29 (25.7)	
Stage I	40 (16.0)	16 (11.7)	24 (21.2)	
Stage II	12 (4.8)	3 (2.2)	9 (8.0)	

Table 4 shows the mean differences in cardiovascular risk factors of clinical and non-clinical staff. The age, systolic BP, diastolic BP, and HDL-C were high in non-clinical staff (38.7 ± 10.58 years, 124.23 ± 15.45 mm of Hg, 83.78 ± 10.4 mm of Hg, and 1.2 ± 0.2 mmol/dl respectively).

Table 4. Distribution of cardiovascular risk factors between clinical and non-clinical staff.

	Clinical		Non-clinical		
	Mean	SD	Mean	SD	p-value
Age	33.69	7.02	38.7	10.58	0.001
BMI	25.1	3.5	26.96	4.1	0.53
Systolic BP	115.6	16.03	124.23	15.452	0.001
Diastolic BP	77.53	10.2	83.78	10.4	0.001
LDL-C	2.7	0.9	2.7	0.9	0.871
HDL-C	1.1	0.22	1.2	0.25	0.001
Total Cholesterol	4.4	0.92	4.3	0.87	0.389
Triglyceride	1.3	0.84	1.4	0.82	0.554
Blood Sugar	4.8	1.09	4.6	0.77	0.077

Table 5 shows the multivariable linear regression models of conventional risk factors of CVDs among the hospital staff of the tertiary cardiac centre. Compared to non-clinical staff, clinical staff were less likely to have hypertension, diabetes mellitus, and dyslipidaemia. BMI was significantly low among clinical staff in comparison to non-clinical staff. [Standardized beta co-efficient (β)= -0.24; 95% CI: -2.90, -0.88].

In comparison with males, females were less likely to have systolic hypertension (β= -0.34; 95% CI: -16.32, -7.26) and diastolic hypertension (β= -0.30; 95% CI: -9.90, -3.92). Similarly, participants with high BMI were more likely to have systolic hypertension (β= 0.29; 95% CI: 0.68, 1.73), diastolic hypertension (β=0.32; 95% CI: 0.53, 1.12), high total cholesterol (β= 0.29; 95% CI: 0.03, 0.09) and diabetes mellitus (β= 0.20; 95% CI: 0.01, 0.08). Furthermore, participants with higher age were more

Table 5. Association of cardiovascular risk factors in study population.

Cardiovascular risk factors					
Variables	**Systolic BP**	**Diastolic BP**	**Blood sugar level**	**BMI**	**Total cholesterol**
	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)
Age	0.10 (-0.03,0.41)	0.06(-0.07,0.22)	0.24 (0.01, 0.03)***	0.16 (0.01, 0.12)	0.19 (0.005,0.03)
Sex					
Male	reference				
Female	-0.34 (-16.32,-7.26)***	-0.30 (-9.90,-3.92)***	-0.06 (-0.41,0.14)	0.18 (0.45,2.61)	-0.10 (-0.47,0.67)
Exercise beyond work					
Yes	0.08(-1.17,6.53)	0.11(-0.05,5.00	0.01(-0.20,0.27)	0.008(-0.87,0.99)	0.04(-0.30,0.15)
No	reference				
Currently smoking					
Yes	-0.06 (12.04,4.08)	0.007(-5.60,5.04)	0.13(0.01,0.98)	-0.07(-3.13,0.76)	0.05 (0.68,0.27)

No	reference				
Fruits serving/day					
1 serving/day	reference				
> 2 serving/ day	-0.04(-5.85,2.96)	0.008(-2.71,3.10)	-0.09(-0.47,0.07)	0.01(-0.94,1.19)	-0.03(-0.34,0.18)
Vegetable serving/day					
1 serving/day	reference				
> 2 serving/ day	0.01(-4.62,5.97)	-0.06(-5.43,1.57)	-0.03(-0.42,0.24)	0.14(0.31,2.85)	0.02(-0.25,0.38)
Staff categories					
Non-clinical staff	reference				
Clinical staff	0.06(-6.37,2.17)	0.11(-5.29,-0.35)	0.08(-0.10,0.42)	-0.24(-2.90,-0.88)***	0.19(0.09,0.59)
Blood sugar	0.04 (1.27,2.80)	0.11(-1.14,1.54)	-	0.17(0.26,1.23)*	-0.05(-0.17,0.06)
Total cholesterol	0.06 (-0.99,3.26)	0.09 (-0.28,2.52)	-0.05(-0.18,0.07)	0.25(0.59,1.59)***	-
BMI	0.29(0.68,1.73)***	0.32(0.53,1.12)***	0.20(0.01,0.08)*	-	0.29(0.03,0.09)***

*Standardized beta co-efficient= β, *<0.05, **<0.01, ***<0.001*

likely to develop diabetes mellitus (= 0.24; 95% CI: 0.01, 0.03).

DISCUSSION

Our study assessed the prevalence of conventional risk factors of CVDs among hospital staff working in a tertiary cardiac centre. In this study, the prevalence of conventional risk factors of CVDs was high among non-clinical staff compared to clinical staff. Prevalence of systolic and diastolic hypertension, high BMI, and high blood sugar was found high among non-clinical staff. Also, dietary, and behavioural risk factors for CVDs (i.e, smoking, no physical exercise, and not taking a single fruit in a day) were high among non-clinical staff.

Tobacco use is a modifiable risk factor for CVDs. In our study, the prevalence of current smoking was lower than the study conducted among medical students (30.1%) at a tertiary teaching hospital in Kathmandu.[16] Current smoking among clinical staff was significantly less than among non-clinical staff (0.7% and 14.2% respectively). This finding was similar to a survey conducted in the UK among hospital staff (7.6% clinical and 12.1% non-clinical).[6] Current smoking was low in clinical staff, which may be due to knowledge of consequences of smoking to health.

Hypertension is a common CVDs and is prevalent in developing countries like Nepal.[17] The study conducted in southern Nigeria showed the prevalence of prehypertension, stage I hypertension, and stage II hypertension was 48.2%, 18.5%, and 3.6% respectively among medical doctors.[18] Another study conducted in a suburban area in central Nepal revealed prehypertension and hypertension were 35.4% and 20.4% respectively in the general population.[19] The prevalence of hypertension was lower in our study in comparison with previous studies. Prehypertension, stage I, and stage II hypertension was 26.3%, 3.6%, and 1.5% in clinical staff and 33.6%, 15.0%, and 3.5% in non-clinical staff in our study. The findings of hypertension in non-clinical staff were similar to other studies conducted on the general population. The reason could be inadequate knowledge of hypertension and its effect on cardiovascular health among non-clinical staff.

Moderate to severe intensity exercise is essential to maintain a healthy weight. It is obtained by walking 30 minutes every day and eating a healthy diet.[10,20] The study conducted in Jeddah showed that about 56.0% of respondents from both clinical and non-clinical staff were not performed any physical exercise beyond work.[21] In our study, compared with clinical staff (54.0%), non-clinical staff (64.3%) had not done moderate physical exercise beyond their work.

Fruits and vegetables are essential nutrients that are very important to reducing the risk of stroke and heart disease.[20,22] The study conducted in Jeddah found that 18.3% of clinical and 23.9% of non-clinical staff had not consumed a single serving of fruit in a day.[21] In our study, most of the clinical and non-clinical staff were not taking the recommended amount of fruits and vegetables in a day. However, compared to clinical staff (15.3%), the majority of non-clinical staff (42.5%) were not taking a single serving of fruit in a day in our study. That could be lack of knowledge of a healthy diet on sound health.

The prevalence of overweight and obesity is alarmingly increasing in Asian countries in recent years. Particularly, those with central obesity have an increased risk of diabetes mellitus, dyslipidemia, and CVDs.[23] A study conducted in Saudi Arabia found the prevalence of overweight was 35.0%, and obesity was 16.0% among health care workers.[24] Prevalence of obesity was higher in our study population compared to the previous studies which was 48.9% in clinical staff and 69.0% in non-clinical staff. That could be lack of exercise and unhealthy diet among hospital staff.

This was a quantitative cross-sectional and single centre study. The findings of this study cannot be generalized to the general population, as it was conducted among hospital staff. Further large scale and qualitative studies should be carried out to form stronger conclusions regarding the risk factors of CVDs among hospital staffs and have to explore difficulties in maintaining a healthy diet and lifestyle

CONCLUSIONS

The prevalence of conventional risk factors (systolic/diastolic hypertension, raised BMI, and blood sugar), dietary, and behavioural risk factors (smoking, no physical exercise, and not taking a single fruit in a day) of CVDs were found high among non-clinical staff compared to clinical staff.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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