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Research Article

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Risk Evaluation of Cardiovascular Diseases among Nurses Aged more than 40 Years: Report from a Tertiary Care Center in North India

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Abstract

Background: The nurses are in the frontline of health services in any country and their contribution to healthcare is immense. Nurses undergo moderate to a high level of stress and burn out due to their hectic work schedule, shift duties, workload and sleep deficit. Hence, nurses are at risk of being the victims of various risk factors of Cardiovascular Disease (CVD).

Objectives: To investigate the risk factors of cardiovascular disease and risk prediction of CVD in the next ten years among nurses aged more than 40 years working in a tertiary care center, North India.

Methods: Using a convenient sampling technique, a cross-sectional study was conducted among 154 Nursing Officers working in a tertiary care center, North India. The nurses were enrolled after obtaining informed written consent. Ethical permission was taken from the Institute Ethics Committee. World Health Organisation/ International Society of Hypertension (WHO/ISH) prediction chart was used to predict the 10-year risk of a CVD.

Results: The prevalent risk factors of CVD seen in nurses were obesity, high waist-hip ratio, stress, and abnormal lipid profile. The risk of developing CVD in the next ten years was less than 10% in 83% of nurses. More than 40% risk of developing CVD in the next ten years was found only in 3%, and risk between 10 and 30% was found in approximately 14% of the nurses. It was found that a significantly higher number of nurses who had a higher risk of developing CVD in the next ten years had abnormally lower High-Density Lipoprotein (HDL) cholesterol, higher Low-Density Lipoprotein (LDL) cholesterol levels and high triglyceride levels.

Conclusion: The prevalent risk factors of CVD identified among nurses were obesity, increased waist-hip ratio, and abnormal lipid profile. High risk of developing CVD among nurses in the next ten years was found to be low. But, considering the moderate risk of developing CVD and high prevalence of risk factors, nurses need to take passable measures to control their risk factors targeting for long-term prevention of CVD.

Keywords

Cardiovascular diseases; Nurses; Cardiovascular risk factors; Prevalence.

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Introduction

CVD are the foremost cause of mortality and mortality worldwide. Developed countries report 50%, and developing countries report 25% of the deaths due to CVDs [1]. Lifestyle plays a key role in the development of risk factors linked to CVDs [1,2]. There is a vast transformation in the Indian lifestyle over many decades due to numerous factors. Furthermore, nurses in India experience some amount of strain instigated due to hectic workload, deficient workforce, limited resources at the workplace and limited career growth [3,4].

Current shreds of evidence show that healthcare providers, particularly nurses, have a high prevalence of CVD risk factors such as dyslipidemia, hypertension and diabetes mellitus [5-10]. Obesity, specifically abdominal obesity and impaired waist-hip ratio, are additional risk factors of CVD in healthcare providers across the globe. Obesity and higher waist-hip ratio are more reported among females [10,11]. Nurses undergo moderate to the high levels of stress and burn out due to their multiple job tasks at the workplace, shift duties, workload, work-family imbalance and sleep deficit and can lead to irregular eating pattern, inadequate physical activity and hence, obesity. It is reported by Indian authors that the prevalent cardiovascular risk factors among healthcare providers in India are central obesity, Body Mass Index (BMI)>23 kg/m^2, physical inactivity and hypertriglyceridemia. Other risk factors identified were hypercholesterolemia, hypertension, stress, smoking, family history of coronary artery disease, diabetes mellitus, tobacco consumption, sleep deficit and heavy drinking [8,11,12].

The higher prevalence of obesity and higher waist to hip ratio as risk factors of CVD and other non-communicable diseases among health care workers, specifically in nurses, is of major alarm [3-5,13]. However, the reason for its higher prevalence among health care workers and its extent of the impact on the prediction of CVD among this population is not yet clear. The high prevalence of CVD risk can intensify the cardiovascular and cerebrovascular morbidity and mortality among nurses. Along with pain and sufferings, the direct and indirect cost burden associated with CVDs can deleteriously affect the individual and family members to a very great extent with a societal impact. Similarly, it also has bearing on the work includes changing or leaving the job and excessive absenteeism by the nurses [2].

The nurses are in the frontline of health services in any country and their contribution to healthcare is immense. Other than the personal impact, CVDs and other chronic illnesses can reduce the quality and quantity of their contribution and service to humanity [1]. Considering this fact, their health and well-being should be one of the priority goals. Effective strategies should be premeditated to eliminate the modifiable risk factors, especially in countries with restricted resources. As nurses spend significant time in the workplace, it is necessary to explore the connection between risk factors and work pattern. Identification, classification and quantification of risk factors will help to predict the risk of developing CVD in the future [14,15]. Risk prediction of CVD will throw light on the impact of prevalent risk factors existing among nurses so that they can adopt appropriate health promotion behaviour and lifestyle changes [3].

Hence, the present study aimed to examine the prevalent risk factors of cardiovascular disease and risk prediction of CVD in the next ten years among nurses aged more than 40 years working in a tertiary care center, North India.

Methods

Using convenient sampling, a total of 154 nurses who are above 40 years of age was enrolled in the present study from a tertiary care center in North India. The nurses who are already known cases of CVD were excluded from the study. Height, waist and hip circumference of the nurses were taken using a standard non-elastic measuring tape. Weight was assessed by using standard weighing scales, and blood pressure was assessed using an aneroid sphygmomanometer. The waist-hip ratio was calculated by dividing waist circumference by hip circumference in centimeters. BMI was calculated using the formula, BMI=weight in kg/ height in m^2. Lipid profile and blood sugar levels of nurses were obtained from the latest investigations done within the previous one year period or during the study. The stress level was assessed using the perceived stress scale which is a standardized scale with ten items. The score of perceived stress scale ranged from 0 to 40, and higher scores indicated higher perceived stress.

WHO/ISH prediction chart [6] was used to predict cardiovascular event next 10-years. The chart includes all the major risk factors of CVD such as age, gender, systolic pressure, blood cholesterol, smoking, and diabetes mellitus. It composes two sets; one set is used for individuals whose blood cholesterol is known, and the other is used when blood cholesterol values are not available. It has color coding based on calculations or presence of risk factors in which green color indicates <10% risk, yellow 10% to <20%, orange 20% to <30%, red 30% to <40%, and deep red indicates ≥ 40% risk (Figure 1,2).

Ethical Considerations

Ethical clearance was obtained from the Institute Ethics Committee. Written permission was obtained from the Medical Superintendent and Chief Nursing Officer of the institute. The confidentiality of the information was maintained. Written consent was obtained from nurses and participant information sheet was provided to them.

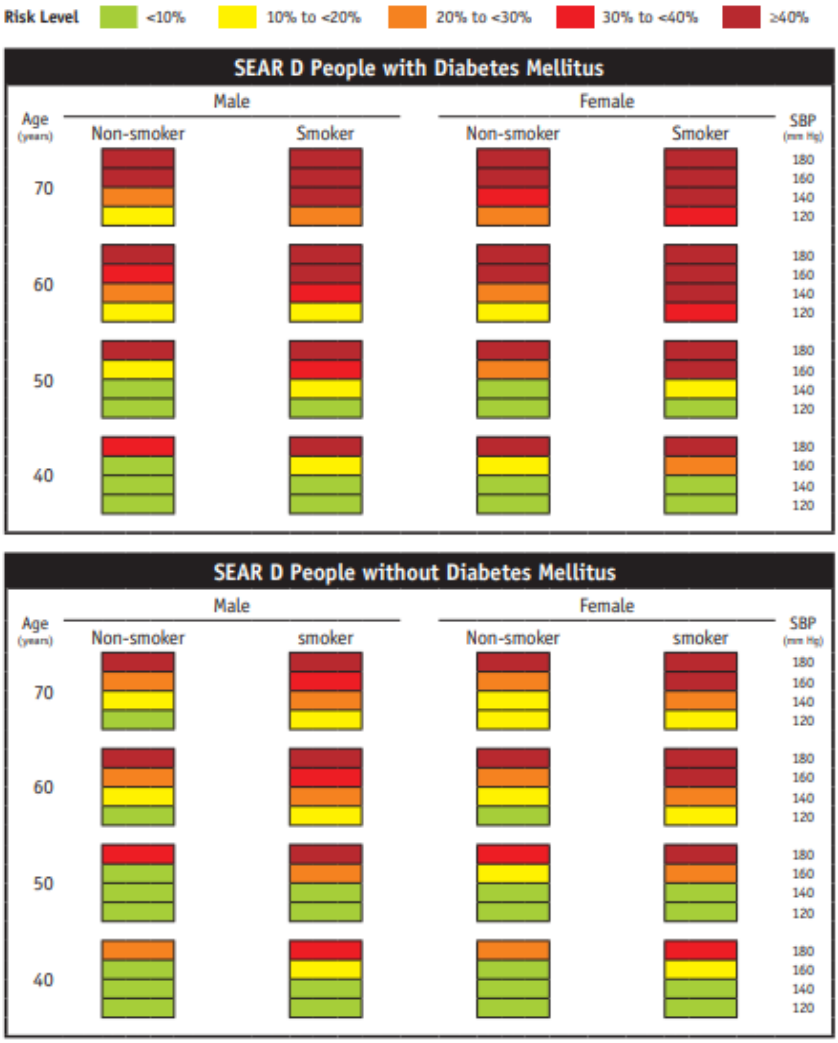

Figure 1: WHO/ISH rsk prediction chart for SEAR D. 10 year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressue, smoking status and presence or absence of diabetes mellitus.

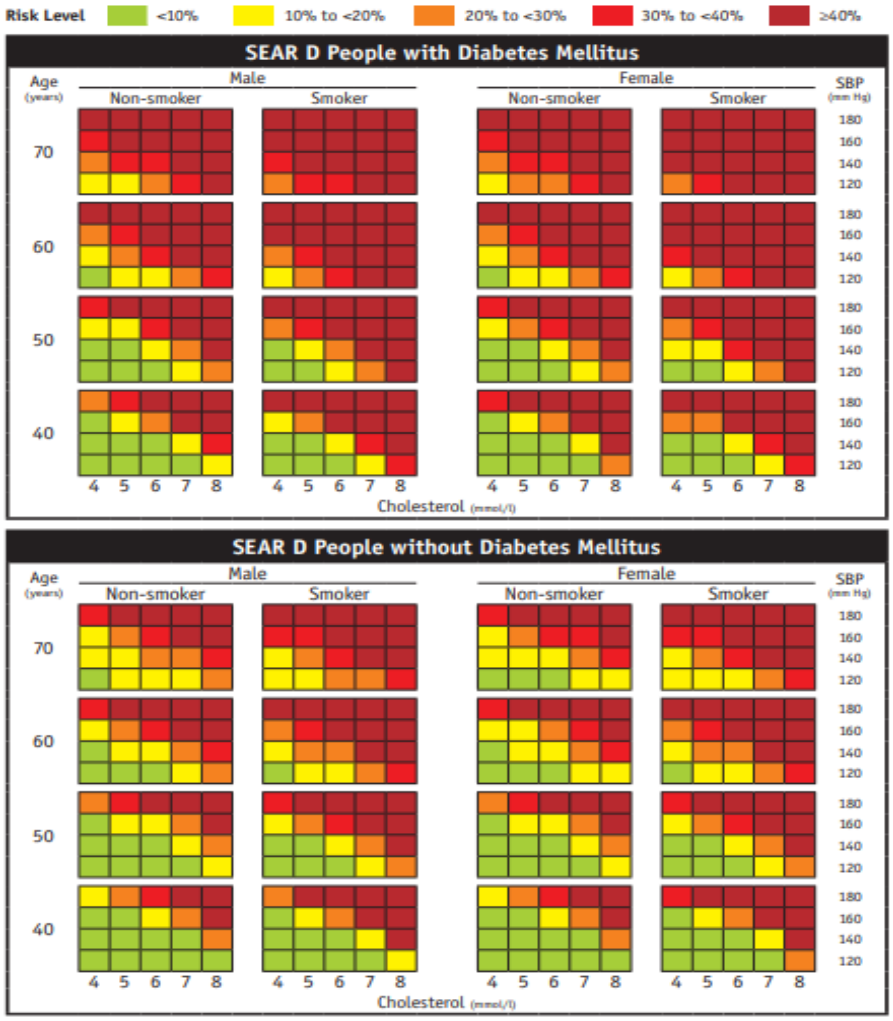

Figure 2: WHO/ISH rsk prediction chart for SEAR D. 10 year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressue, total blood cholesterol, smoking status and presence or absence of diabetes mellitus.

Results

Data analysis was done using appropriate descriptive and inferential statistics. Chi^2 test was used to assess the influence of risk factors on the extent of the risk of developing CVD.

As shown in Table 1, out of 154 nurses, 91 (59%) nurses were in the age group 40 to 49 years with a mean age of 47.86 ± 5.16 years. The majority, i.e., 146 (95%), were female and almost half of the nurses (49%) had clinical experience of 16-25 years. The majority (98.7%) of the nurses were married. The mean family income was rupees 80,174 ± 8326.6 per month. None of the nurses were smokers in our study.

As shown in Table 2, out of 154 nurses, 26 (16.8%) had stage 1 hypertension, out of which only 8% were on medication. Pre-hypertension was found in 29 (18.8%). Diabetes was already diagnosed in 21(13.5%) nurses, out of which 8 (5.2%) were on medication. About 16 (10.3%) nurses had experienced premature menopause. When 53 (34.2%) of the nurses were found to have severe obesity, 41(26.5%) reported mild obesity. Waist hip ratio was abnormally high in 111 nurses (71.6%). An abnormally higher LDL cholesterol was reported in 29 (18.8%) and abnormally lower HDL in 19 (12.3%) nurses. High triglyceride level was documented in 19 (12.3%) nurses. Moderate stress was reported by 76 (49%), and low stress was reported by 62 (40%) nurses.

As shown in Table 3, out of 154 nurses, the majority of the nurses, i.e. 83%, had <10% risk of developing CVD in the next ten years. Sixteen (10.3%) nurses had a risk of 10-20%, and 5 (3.2%) were reported to have a risk of 20-30% and another 5 (3.2%) nurses have a risk of >40%.

As shown in Table 4, when 9% of the nurses with severe obesity had >20% risk, 5% each with normal BMI and mild obesity had the same risk. When 7% of nurses with abnormal waist-hip ratio had >20% risk, 4% with normal waist-hip ratio had the same risk. When only 5% of the nurses with normal LDL cholesterol had >20% risk, 13% of the nurses with a high level of LDL cholesterol had >20% of developing CVD in the next ten years ($p<0.001$). Similarly, when only 5% of the nurses with normal HDL cholesterol had >20% risk, 11% of the nurses with a low level of HDL cholesterol had >20% of developing CVD in the next ten years ($p<0.001$). When only 5% of the nurses with normal triglycerides had >20% risk, 16% of the nurses with a high level of triglycerides had >20% of developing CVD in the next ten years ($p<0.001$).

Table 1: Socio-demographic profile of nurses.

	n=154
Socio-demographic characteristics	**Mean ± SD or f(%)**
Age(years)	47.8 ± 5.2
40-49	91(59)
50-60	63(41)
Gender	
Female	146(95)
Male	8(5)
Experience (years)	22.3 ± 6.1
<15	23(14.8)
16-25	76(49)
26-35	52(33.5)
>35	3(1.9)
Religion	
Hindu	71(46.1)
Sikh	52(33.7)
Muslim	2(1.3)
Christian	29(18.7)
Marital status	
Unmarried	2(1.3)
Married	152(98.7)
Family income (Rs. per month)	80,174 ± 8326.6
70,000-79,999	7(4.5)
80,000-89,999	9(5.8)
90,000-99,999	8(5.1)
>1,00,000	130(84.4)

Table 2: Physiological risk factors of CVD among nurses.

	n=154
Physiological risk factors	**f (%)**
Hypertension	
Pre-hypertension (120-139/80-89)	29 (18.8)
Stage-1 hypertension (140-159/90-99)	26 (16.8)
On medication (n=26)	8 (30.7)
Diabetes mellitus	21(13.5)
On medication (n=21)	8(38.09)
Premature menopause (n=146)	16(10.8)
Body mass index(kg/m²)	
Normal (18.5-24.9)	60(38.7)
Mild obesity (25-29.9)	41(26.5)
Severe obesity (>30)	53(34.2)
Waist hip ratio	
Normal (female ≤ 0.85; males<0.9)	43(27.7)
Abnormal (female>0.85; males >0.9)	111(71.6)
LDL cholesterol (mg/dL)	
Normal (upto 129)	125(81.1)
Abnormal (130 to 159 mg/dL)	29(18.8)
HDL cholesterol (mg/dL)	
Normal (female ≥ 50 mg/dL; males ≥ 40 mg/dL)	136(88.3)
Abnormal (female<50 mg/dL; males<40 mg/dL)	18(11.6)
Triglycerides (mg/dL)	
Normal (<150mg/dL)	135(87.6)
Abnormal (≥ 150mg/dL)	19(12.3)
Perceived Stress Score	
Low stress (0-13)	62(40)
Moderate stress (14-26)	76(49)
High stress (27-40)	16(10.3)

Table3: Risk of cardiovascular disease.

	n=154
Cardiovascular risk	**f (%)**
<10%	128(83)
10 - <20%	16(10.3)
20 - <30%	5(3.2)
30 - <40%	0(0)
>40%	5(3.2)

Table 4: Influence of Risk Factors on Extent of the Risk of Developing CVD.

Variable	CVD risk f (%)				χ2 (p- value)
	<10% (n=128)	10 to <20% (n=16)	20 to<30% (n=5)	>40% (n=5)	
BMI					
Normal	50 (83.3)	7(11.6)	1(1.6%)	2(3.3%)	
Mild obesity	36 (87.8%)	3(7.3%)	0	2(4.8%)	8.53(0.482)
Severe obesity	42(79.2%)	6(11.3%)	4(7.5%)	1(1.8%)	
Waist to Hip Ratio					
Normal	36(83.7%)	5(11.6%)	1(2.3%)	1(2.3%)	0.40(0.940)
Abnormal	92(82.8%)	11(9.9%)	4(3.6%)	4(3.6%)	
LDL Cholesterol					
Normal	112(89.6%)	7(5.6%)	3(2.4%)	3(2.4%)	20.95(<0.001)
Abnormal	16(55.1%)	9(3.4%)	2(6.8%)	2(6.8%)	
HDL Cholesterol					
Normal	119(87.5%)	9(6.6%)	4(2.9%)	4(2.9%)	19.29(<0.001)
Abnormal	9(50%)	7(38.8%)	1(5.5%)	1(5.5%)	
Triglycerides					
Normal	121(89.6%)	7(5.1%)	3(2.2%)	4(2.9%)	37.92(<0.001)
Abnormal	7(36.8%)	9(47.3%)	2(10.5%)	1(5.2%)	
Perceived Stress Scale					
Low Stress	52(83.8%)	9(14.5%)	1(1.6%)	0	
Moderate Stress	62(81.5%)	5(6.5%)	4(5.2%)	5(6.5%)	9.32(0.156)
High Stress	14(87.5%)	2(12.5%)	0	0	

Discussion

The present study was conducted to assess the prevalence of CVD risk factors among nurses aged more than 40 years and their risk of developing CVD in 10 years. Using convenient sampling, 154 nurses were enrolled in this study. The modifiable and non-modifiable risk factors of CVD are well established. In our study, out of 154 nurses enrolled, 94% were female, and the mean age was 47.86 ± 5.16 years. On the calculation of BMI and waist-hip ratio, it was found that a major proportion of the nurses had obesity and abnormal waist-hip ratio as risk factors. Further, approximately 20% of the nurses were found to be known cases of hypertension and diabetes mellitus which is higher as compared to the general population in India [16], but comparable with the global data on the general population [17]. The similar prevalence rate of hypertension and diabetes among healthcare providers was also reported by studies conducted in North India [7,8]. Nevertheless, the prevalence of hypertension and diabetes among nurses varies across the globe [7,8,9]. None of the nurses in our study were smokers, maybe due to a smaller number of male nurses (6%) in the present study. Among the Indian population, smoking is prevalent more among males as compared to females.

Similar to previous reports [3-5,13], a high prevalence of obesity i.e. 61% among nurses in our study is a major worry. Though the prevalence in our study was lesser as compared to similar reports from North India [7,8], it is very high as compared to 35% of the general population [18]. The high prevalence of obesity and waist-hip ratio indicates the need for lifestyle changes, especially with the focus on increasing physical activity. The work pattern of nurses includes shift duties and stressful working conditions. More than half of the nurses in the present study also reported moderate to a high level of stress. It may result in a change in food habits and eating patterns and can act as a risk factor for obesity. Inappropriate dietary habit is a documented risk factor for obesity [19]. We also need to explore further how the work pattern influences the dietary habits of the nurses. The need for increased physical activity by nurses becomes a real highlight based on the finding of our study. Though nursing is not a sedentary job, the limited area within a ward or unit becomes a hindrance to such activities that burn adequate calories. On the other hand, the nurses above 40 years may be more involved in administrative work rather than patient care and can be a factor that limits their activities. It is also necessary to explore the time they spent on active physical activities such as brisk walking or jogging to maintain a healthy life [20].

Though there are reports available on the prevalence of risk factors of CVD among nurses, there is a lack of literature available on the prediction of CVD among nurses. Similar to a previous Iranian report on ten years' prediction of CVD among nurses by Jahromi et al. [4], the risk of CVD in another ten years among nurses in the present study was low as 83% of the nurses had less than 10% risk of developing CVD in next decade. More than 40% risk of CVD in the

next ten years found in 3%, and risk between 10 and 30% found in 14% of the nurses, cannot be overlooked. On analysis of the influence of risk factors on the CVD risk, it was found that a significantly higher number of nurses who had a higher risk of a CVD event in subsequent ten years had abnormally low HDL cholesterol, high LDL cholesterol levels as well as high triglyceride levels. There was a trend of higher prevalence of mild to severe obesity, central obesity and mild to moderate level of stress seen in nurses with >40% risk of occurrence of CVD in the following ten years. This shows the importance of taking measures by nurses to maintain an acceptable range of lipid profile to diminish the risk of CVD.

Our results show that though more than 10% risk of development of cardiovascular diseases is low among nurses (17%), Appropriate measures still need to be taken to decrease the prevalence of risk factors that could later lead to CVD. Awareness of the individual about their risk factors of CVD is the first step to control the modifiable risk factors, hence the prevention of CVD. Many nurses in our study had a serum lipid profile done within the previous year of the data collection. Awareness of nurses about the presence of other risk factors was not explored in the present study but is important [21]. Awareness about own modifiable risk factors of CVD will help the individuals to adopt disciplined strategies to liberate themselves from it.

The primary action must emphasize on controlling total cholesterol, LDL cholesterol, HDL cholesterol, and triglyceride levels. Another important factor that needs to be considered is obesity, hypertension and diabetes. These risk factors are interlinked and its preventive strategies are often the same. The reasons for unexpected obesity among nurses could be the adverse effects of shift duties, stress-related overeating, lack of physical activities and the limited provision of healthy food in healthcare settings [3]. Nurses must be informed and alarmed about the high prevalence of obesity so that they take appropriate measures to monitor and control it. Obesity can be reduced largely by augmenting physical activity and dietary modification. Weight control and right body proportion can be achieved by certain lifestyle modifications like regular exercise, increasing physical activity and dietary modifications to lose weight. Cardio-training exercises can be performed to shed central weight [22]. Any significant cause of obesity needs to be clinically identified and dietary modifications must be initiated after dietary consultation. Replacing saturated fats with monounsaturated and polyunsaturated fats and eliminating Tran's fats from food is one of the approaches in maintaining a normal lipid profile. Consuming foods rich in omega-3 fatty acids and soluble fiber would help to raise HDL cholesterol levels [23-25]. The availability of oily and sugary snacks in the hospital canteens must be limited or restricted. It is sensible to share the joy of their family events with healthy choices of snacks, as it becomes a daily affair with many nurses working in the same unit. Along with individual attention, modification of the hospital environment and culture is also important to maintain the health status of the employees working in this setting [3].

Adequate stress management is also required as trends of high stress were seen in nurses with high cardiovascular risk [26]. Though techniques of stress management can vary for every individual, measures like relaxation therapies and yoga can improve coping with stress [4]. Avoiding caffeine, nicotine, alcohol; getting more sleep; ventilation of feelings, etc can help to calm down the stress. Work-related stress can be managed by a positive work environment, strong peer relationships and effective time management [27,28]. However, timely health check-up and clinical monitoring are compulsory, but nurses often ignore their health amidst their busy family and work schedule.

Nursing Implications

Nurses must be made aware of the risk factors of CVD and how to monitor the presence of various risk factors from time to time. They need to make lifestyle modifications like exercising regularly, following a healthy diet pattern to sustain a healthy weight and regulating their blood pressure and blood cholesterol so that, the prevalence of risk factors of cardiovascular diseases can be further reduced. Nursing personnel can take collective efforts to manage stress by identifying stress in colleagues, forming self -help groups, seeking counseling from each other and forming yoga groups. There should be an instructional module or set guidelines on lifestyle modification for nursing personnel to improve their knowledge, attitude, and practices regarding a healthy lifestyle. This study can draw the administration's attention to make efforts to reduce the prevalence of risk factors of CVD by regular health check-ups and early detection. Addressing high risk group or nurses with risk factors are found to be more effective than open interventions [29]. Administration can take steps to spread awareness among nurses regarding the prevention of CVDs. Measures can be taken to manage the workload by increasing the number of nurses as appropriate nurse-patient ratio will lead to the division of labor. Healthy snacks can be provided to the healthcare providers to consume during their rest time. The provision of oily and sugary food can be minimized in canteen facilities to avoid routine consumption.

Recommendations

Though the overall risk of developing cardiovascular diseases is low among nurses, a high prevalence of risk factors that could later lead to CVD is alarming. Hence, further nationwide surveys are required to assess the prevalence of risk factors of CVD among nurses from different parts of the country. High prevalence of obesity has to be addressed by quantifying the prevalence of obesity among nurses and by assessing their lifestyle practice, knowledge and attitude towards a healthy lifestyle. It is also necessary to quantify their awareness about the associated health risks of obesity. Effectiveness of interventional and motivational strategies to improve awareness, lifestyle modifications and their attitude towards sound health has to be assessed.

Conclusion

The prevalent risk factors of CVD identified among nurses were obesity, increased waist-hip ratio, and abnormal lipid profile. High risk of developing CVD among nurses in the next ten years was found to be low. But, considering the moderate risk of developing CVD and high prevalence of risk factors, nurses need to take adequate measures to control their risk factors aiming for long-term prevention of CVD.

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