Original Article

Knowledge, attitude and practices toward health behavior and cardiovascular disease risk factors among the patients of metabolic syndrome in a teaching hospital in India

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Abstract

Background: Indian subcontinent has highest rates of cardiovascular diseases (CVDs) worldwide. Metabolic syndrome (MS) is a condition which can lead to many complications including CVDs. Most of the studies in India have been done about prevalence of MS; this study intends to study their awareness and perceptions about CVD risk factors, which can help to plan and implement the educational health programs in a better and effective manner to prevent complications in these patients. **Materials and Methods:** It was a cross-sectional study conducted from April 2017 to March 2018 in a teaching hospital of Udaipur, Rajasthan. It involved 402 patients of MS diagnosed using National Cholesterol Education Program – Adult Treatment Panel III criteria with an anthropometric modification of waist circumference (WC) value that is specifically applicable to South Asians. A 43-item questionnaire was used to assess knowledge, attitude, and health-seeking behavior (KAP) toward CVD disease risk factors. KAP scores were characterized into poor, average, and good. Data were analyzed using descriptive statistics, Chi square, and ANOVA. **Results:** Majority (58%) of the MS patients were males and belonged to middle socioeconomic status (63%). The study subjects were found to have average knowledge and good attitude but poor practices. Males, patients with lower WC, and lower fasting blood sugar showed significantly better knowledge scores. Good attitude scores were associated with education and WC. Younger subjects, patients having better sugar control, and lower WC had significantly better practices. **Conclusion:** Despite having good attitude, MS patients were not following good lifestyle practices to prevent CVD. Results in this study call for intensive educational interventions required to prevent complications in these patients.

Keywords: Cardiovascular disease, India, metabolic syndrome

Introduction

The metabolic syndrome (MS) is a cluster of risk factors that predisposes an individual to increased risk of chronic noncommunicable diseases (NCDs). According to the findings of Hu *et al.*, persons with the MS have an increased risk of death from many complications including cardiovascular diseases (CVDs).[1] The Global Status Report on NCDs,[2] published by the World Health Organization (WHO) in 2014, addresses the need for action in the prevention and control of NCDs. In India, one in four Indians has the risk of dying from an NCD before they reach the age of 70, leading to loss of millions of productive individuals and compromising social and economic development.[3] India being the first country

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Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_257_18

How to cite this article: Verma A, Mehta S, Mehta A, Patyal A. Knowledge, attitude and practices toward health behavior and cardiovascular disease risk factors among the patients of metabolic syndrome in a teaching hospitalin India. J Family Med Prim Care 2019;8:178-83.

to adapt the Global Monitoring Framework on NCDs needs more research about preventing and controlling the growing burden of NCDs in our country. In particular, the deaths due to CVDs are on rise in India, as highlighted by WHO and the Indian Council of Medical Research, which predicted that India will be the myocardial infarction capital of the world by 2020. Developing countries like India need the policy to focus on prevention of CVDs, that is, reducing the risk as compared to doing intervention at a later stage of disease.[4]

Under National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke, health promotion through behavior change is mentioned as the main strategy, emphasizing the role of primary care in control of CVDs. Primary care physicians have an important role in CVD prevention, by recognizing and modifying risk factors in the patients. The need for health-promoting systems has long been recognized and this study is a step toward developing and implementing health behavior change support to the patients of MS, who are already at higher risk of developing CVD.

MS is a cluster of medical conditions and is associated with major complications as well as health-care costs. Previous research in India about MS has shown that its incidence is increasing,[5] and there is need for a coordinated educational approach toward improving and reversing the condition and prevent its complications.

According to WHO and International Diabetes Federation, the treatment for MS should comprise lifestyle improvement[6,7] including regular physical activity and balanced dietary habits as they prevent complications.[8] Modification of a lifestyle being an important intervention strategy necessitates consideration of factors such as knowledge, attitude, social support, etc., which can determine adoption of healthy behavior by an individual.[9] Literature search shows that cognitive factors (knowledge)[10] and emotional factors (attitude) toward healthy behaviors[11] positively affect healthy behavior among MS patients. Although the factors influencing healthy behavior for MS are being widely studied,[12] lacunae in the research persist in a developing country like India, which is in urgent need to tackle the growing burden of NCDs. This study will assess factors influencing the lifestyle based on cognitive (knowledge), emotional (attitude), and behavioral skill aspects' (practice) practices toward the risk factors of CVDs among the patients of MS in a teaching hospital.

Materials and Methods

- It was a hospital-based cross-sectional study conducted in a tertiary hospital in an Indian state of Rajasthan over a period of 1 year. Assuming prevalence of MS to be 16%[5] and taking 25% nonresponse rate, with an absolute error of 4%, the total sample size is 402. The sample size was determined using Fisher's formula for estimating single proportions ($n = Z\alpha^2[PQ]/d^2$)
- A questionnaire was designed to assess the knowledge, attitude, and lifestyle practices of the patients of MS toward CVD risk factors. A literature review informed the structure and content of the questionnaire. The questionnaire follows the format from the Behavioral Risk Factor Surveillance System, established in 1984 by the Centers for Disease Control (CDC, Atlanta, USA) as a state-based system of health surveys that collects information on health risk behaviors and preventive health practices regarding CVD risk factors in their population.[13] The questions were framed after taking reference from a survey conducted in Bangladesh among CVD patients regarding their knowledge, attitude, and health-seeking behavior (KAP) toward CVD[14] and a panel of health professionals from the hospital discussed the relevance of each item. The questions were modified according to Indian population after conducting a pilot study at a rural health-training center and also collecting the qualitative data through focused group discussions and in-depth interviews of the study subjects. The final validated questionnaire was a 43-item questionnaire. Knowledge was assessed with a string of 20 questions and responses were recorded in the form of a correct answer (1), incorrect answer, or do not know (0). The attitude was assessed with 13 questions and responses were recorded on a 0–2 Likert scale; disagree (0), agree (1), and strongly agree (2). The lifestyle practice of patients was assessed with 10 questions and response recorded on a 0–3-point Likert scale, never do (0), rarely do (1), sometimes do (2), and always do (3). The questionnaire was tested for internal validity and reliability. Cronbach's alpha for the "knowledge," "attitude," and "practice" was 0.72, 0.8, 0.73, respectively. Higher score was associated with better knowledge, positive attitude, and better practices. Taking maximum knowledge, attitude, and practice scores as 20, 26, and 30, respectively, the scores were divided into tertiles, categorized as "poor," "average," and "good."
- Data were collected from the eligible subjects, who were selected by simple random sampling method, after screening around 2700 patients coming to Biochemistry laboratory. In this hospital, laboratory of biochemistry department performs blood investigations of patients referred from various departments. The patients who were found to be suitable for the study (meeting eligibility criteria) were contacted by the trained researcher. After taking informed consent, the participants were interviewed and their anthropometric measurements and biochemical measurements were done. Anthropometric measurements included weight (measured using electronic weighing machine), height (using stadiometer), and waist and hip circumference (WC and HC measured using measuring tape). Systolic and diastolic blood pressure (SBP and DBP) were measured using electronic measuring machine following standard conditions. Two BP readings were taken and average value was included in the study. Five milliliter of 8-h fasting venous blood sample was collected in a sterile vial under aseptic precautions. Biochemical parameters (fasting blood glucose, high-density lipoprotein [HDL], triglyceride [TG],

glycosylated hemoglobin [HbA1C]) were analyzed using sphectrometry on COBAS (ROCHE).

Inclusion criteria

- Adults of >18 years, giving consent for the study and meeting eligibility criteria for MS according to the National Cholesterol Education Program – Adult Treatment Panel III guidelines with an anthropometric modification of WC value that is specifically applicable to South Asians.[15] Patients were defined as having the MS when they met at least three of five criteria: (1) WC >90 cm in men and >80 cm in women, (2) blood pressure (SBP >130 mmHg and/or DBP >85 mmHg), (3) HDL-C <40 mg/dl in men and <50 mg/dl in women, (4) fasting glucose >110 mg/dl or drug treatment for elevated glucose, and (5) TG ≥150 mg/dl or drug treatment for elevated TG.

Exclusion criteria

- Patients with complications (ischemic heart diseases, stroke, etc.)
- Other chronic diseases
- Hormonal disorders, for example, Cushing's syndrome, thyrotoxicosis, etc
- Pregnant females.

Statistical analysis

SPSS version 21 was used to derive statistical inferences, whereas $P < 0.05$ was considered significant. Data were summarized as proportions and means with standard deviation. Chi square and ANOVA were used as tests of significance for analyzing qualitative and quantitative variables, respectively.

Ethical considerations

The institutional ethical clearance was obtained. The subjects were explained about the purpose of the study and assured for secrecy and confidentiality of the information which they provide after obtaining the written consent.

Results

Table 1 shows the sociodemographic characteristics of the study participants. More than half of the participants were males and educated till high school. Majority of the participants belonged to Hindu religion and were of middle socioeconomic status, according to modified Kuppuswamy scale.[16] In our study, around 63% of the total participants were of middle socioeconomic status, implying that although NCDs (diabetes, obesity, high cholesterol) are considered to be more common in upper socioeconomic status, however in India, the prevalence of cardio-metabolic risk factors is increasing in middle and low-income groups.[17] Similar finding was observed in a study done in India, which reported increasing prevalence of CVDs risk factors among the low SES groups in India.[18] However, data drawn from the National Sample Survey Office (NSSO) 2004 found that prevalence of NCDs was highest among higher income groups when based on self-reported statistics, supported by the data from National Health Survey-3 (NFHS-3) 2005, which concluded positive association between income and the prevalence of diabetes.[19] This can be explained by the heterogeneity of India in terms of demography, ethnicity, and sociocultural practices which impedes the nationwide inferences being drawn from the results of the regional studies as compared to nation-wide survey like NSSO and NFHS.[20]

Only 30% of the participants had good knowledge about risk factors CVD. Most of the participants had good attitude toward the CVD risk reduction but poor practices. Only 9% of the patients were practicing lifestyle measures to reduce the risk of CVD. Table 2 shows the association of various sociodemographic variables and knowledge, attitude, and practice of the study subjects toward CVD risk factors. Good lifestyle practices were found to be significantly higher among the younger participants (under 40 years) as compared to older age patients. Knowledge and attitude were also better among younger patients; however, no significant association was found. Male participants had better knowledge and practices than the females and the difference was statistically significant. Good knowledge as well as good attitude was significantly associated with the higher education; however, the lifestyle practices were low among all the participants with no association with education. Knowledge, attitude, and practices were better among study subjects belonging to middle and upper socioeconomic status as compared to lower socioeconomic status, but the difference was insignificant.

Table 3 shows the association of anthropometric and biochemical measurements with knowledge, attitude, and practices toward CVD risk factors. The subjects with lower BMI had better knowledge, attitude, as well as practices; however, it was not found to be statistically significant. Out of the anthropometric variables under study (BMI, WC, and W: H ratio), only waist circumference was found to be significantly associated with KAP regarding CVD risk factors. Lower the waist circumference, better were the knowledge, attitude, and lifestyle practices among the patients. Blood sugar control among patients measured in the form of fasting blood sugar (FBS) was also found to be associated with knowledge and practices toward CVD risk factors. The patients with better sugar control (lower FBS) were found to be following good lifestyle practices and the difference was found to be statistically significant. However, the long-term control of blood sugar indicated through HbA1C levels was not significantly associated with any of the variables under study.

Discussion

India is going through an epidemiological transition, characterized by dual burden of communicable and NCDs, but the awareness about risk factors of CVD in India still remains low. Moreover, the patients who have already been diagnosed with MS are at increased risk of complications and develop CVD, if their awareness and attitudes are poor, and if they are not adopting the

Table 1: Sociodemographic characteristics of the metabolic syndrome patients

Characteristics	*n** (%)
Age	
18-30	40 (10)
31-40	125 (31)
41-60	165 (41)
>60	72 (18)
Gender	
Male	233 (58)
Female	169 (42)
Education	
Illiterate	28 (7)
Primary	40 (10)
Middle	84 (21)
High	109 (27)
Secondary	93 (23)
Graduate and above	48 (12)
Occupation	
Housewife	84 (21)
Unskilled worker	52 (13)
Semiskilled worker	48 (12)
Skilled worker	149 (37)
Professional	69 (17)
Religion	
Hindu	294 (73)
Muslim	48 (12)
Jain	44 (11)
Sikh	8 (2)
Christian	8 (2)
Socioeconomic status	
Upper lower	44 (11)
Lower middle	125 (31)
Upper middle	129 (32)
Upper	104 (26)

*n: frequency

healthy lifestyle practices. In the current study for the first time, knowledge, attitude, and practices of patients with MS toward various cardiovascular risk factors in a hospital of Rajasthan have been reported. The studies done in India about MS and CVD risk factors include either on the prevalence or risk factors,[21-23] with none of them analyzing the association of KAP with the sociodemographic, anthropometric, and biochemical factors. Our study interprets these factors and also found significant association with various factors.

Overall, the knowledge was found to be average among most of the patients (49%) and was found to be associated with sociodemographic, anthropometric, and biochemical measurements. Most of the patients identified hypertension (54%), diabetes (51%), and high intake of fat (51%) as possible risk factors of CVD, followed by obesity (42%). However, only 10% knew family history as risk factor, and 20% recognized smoking and physical inactivity as potential risk factors. Good knowledge was found to be associated with male gender and higher educational status, which can be explained by the fact that Rajasthan has lower literacy rates among females[24] as well as lower female empowerment index,[25] leading to their decreased awareness about their own health. Association of good knowledge with male gender and higher educational status was also reported in the study done by Mirza *et al*. in Bangladesh.[14] Knowledge was found to be better among patients with lower waist circumference and better sugar control, that is, lower FBS levels. This finding is in accordance with the study done in Sri Lanka by Amarasekara *et al*.[26] which also reported that the patients with lower waist circumference and lower FBS had higher scores of knowledge of CVD risk factors.

Majority of the subjects had good attitude and this finding correlated with studies done in Bangladesh and Sri Lanka.[14,26] However, a study done by Mahajan *et al*. in 2012 found that the patients had poor attitude toward CVD risk factors.[21] This difference can be attributed to the fact that study done by Mahajan *et al*. was done in an urban slum in Mumbai and difference in characteristics of study population is an important factor. About 60% of the smokers (72) believed that they should stop smoking. Younger patients were found to be more convinced toward quitting smoking. Most of the subjects (69%) believed that they should decrease the fat intake in their diet to control their lipid levels. However, only 39% believed that they should include more vegetables and fruits in their diet. About 41% were willing to decrease their sugar consumption as compared to only 18% ready to decrease salt consumption in diet. In our study, good attitude was found to be related to higher educational status and lower WC. This finding is similar to that of study done by Amarasekara *et al*.[26] in which better attitude scores were associated with lower waist circumference; however, difference was not significant.

Regarding lifestyle practices of the MS patients, it was found that only 9% of the patients were following the doctor's advice and adopting good lifestyle practices. This finding is similar to a study done in 2012 in Mumbai, which found that despite known hypertensive status, patients were following poor practices.[21] Majority (72%) of the study subjects were not doing regular exercise/brisk walk as advised by doctors. About 80% of the participants decrease their sugar consumption and salt intake only occasionally, when they experience symptoms/uneasiness or when there is increase in blood sugar levels or blood pressure, but do not comply with this practice. About 49% had routine medical check-up as follow-up. The practices were better among younger subjects (<40 years of age), subjects with lower WC and lower FBS levels. In our study, younger patients were found to be exercising more than older patients and also following the restrictions in salt intake as well as eating fruits and vegetables more frequently than older patients. Many patients of age more than 40 years were of the opinion that it was more difficult for them to change their dietary habits and believed that their decreased physical activity is due to joint pains and other ailments. However, the association of good practices with lower WC and FBS was in accordance with that of study done by Amarasekara *et al*.[26]

Interpretation of this study's results is limited by the cross-sectional design, in which results were based on

Table 2: Association of knowledge, attitude, and practice scores with sociodemographic variables using Chi-square test

	Knowledge *n** (%)				Attitude *n** (%)				Practice *n** (%)			
	Poor (*n*=82)	Average (*n*=198)	Good (*n*=122)	*P*	Poor (*n*=26)	Average (*n*=70)	Good (*n*=306)	*P*	Poor (*n*=149)	Average (*n*=216)	Good (*n*=37)	*P*
Age (in years)												
18-40 (165)	30 (18)	89 (54)	46 (28)		5 (3)	25 (15)	135 (82)		40 (24)	102 (62)	23 (14)	
>40 (237)	52 (22)	109 (46)	76 (32)	0.52	21 (9)	45 (19)	171 (72)	0.12	109 (46)	114 (48)	14 (6)	**<0.01**
Gender												
Male (233)	26 (11)	130 (56)	77 (33)		12 (5)	37 (16)	184 (79)		70 (30)	135 (58)	28 (12)	
Female (169)	56 (33)	68 (41)	45 (26)	**<0.01**	14 (8)	33 (20)	122 (72)	0.48	79 (47)	81 (48)	9 (5)	**0.02**
Education												
Illiterate (28)	14 (49)	13 (48)	1 (3)		3 (10)	8 (30)	17 (60)		11 (39)	16 (56)	1 (5)	
<Middle (124)	23 (19)	55 (44)	46 (37)	**<0.01**	8 (6)	22 (18)	94 (76)	**0.04**	45 (36)	65 (52)	14 (12)	
>Middle (250)	45 (18)	100 (40)	105 (42)		15 (6)	40 (16)	195 (78)		93 (37)	135 (54)	22 (9)	0.53
SE status†												
Lower (44)	11 (24)	24 (55)	9 (21)		3 (8)	9 (20)	32 (72)		19 (43)	22 (50)	3 (7)	
Middle (254)	49 (19)	125 (49)	81 (32)		18 (7)	50 (20)	186 (73)		97 (38)	132 (52)	25 (10)	
Upper (104)	22 (21)	49 (47)	32 (32)	0.53	5 (5)	11 (11)	88 (84)	0.28	33 (32)	62 (60)	9 (8)	0.52

P values in bold have significance <0.05. *n** frequency. SE: Socioeconomic status

Table 3: Association of knowledge, attitude, and practice scores with anthropometric and biochemical variables using ANOVA test

	Knowledge (mean±SD*)				Attitude (mean±SD*)				Practice (mean±SD*)			
	Poor (*n*=82)	Average (*n*=198)	Good (*n*=122)	*P*	Poor (*n*=26)	Average (*n*=70)	Good (*n*=306)	*P*	Poor (*n*=149)	Average (*n*=216)	Good (*n*=37)	*P*
BMI†	31±1.2	32±0.9	31±1.7	0.62	32±0.7	32±1.3	30±2.2	1.1	31±1.6	32±0.8	29±2.4	1.2
WC‡	96±2.5	91±1.4	89±0.6	**0.02**	99±1.9	92±2.1	88±1.4	**<0.01**	98±2.3	90±1.6	87±0.9	**<0.01**
W:H ratio§	1.4±0.9	1.36±0.5	1.34±0.3	0.99	1.5±0.2	1.2±0.7	1.2±0.6	0.74	1.5±0.5	1.2±0.8	1.1±0.1	0.66
HDL‖	40±2.1	42±1.3	42±1.6	0.17	39±1.8	42±0.9	41±0.7	0.09	40±1.8	41±0.9	41±1.1	0.63
TG**	151±0.7	150±0.6	151±1.1	0.42	152±2.1	150±1.2	151±0.8	0.3	152±1.9	150±0.9	151±1.1	0.29
FBS††	132±1.2	118±2.1	112±1.1	**<0.01**	124±1.1	126±2.3	127±1.2	0.09	134±0.9	120±1.4	110±2.1	**<0.01**
HbA1C‡‡	7.5±1.6	7.9±0.1	7.4±0.8	0.78	7.9±0.2	7.8±1.3	7.8±0.1	0.57	7.9±1.1	7.5±0.4	7.6±0.7	0.81

P values in bold have significance <0.05. *SD: Standard deviation; †BMI: Body mass index; ‡WC: Waist circumference; §W:H: Waist:hip ratio; ‖HDL: High-density lipoprotein; **TG: Triglyceride, ††FBS: Fasting blood sugar; ‡‡HbA1C: Glycosylated hemoglobin

observation over the study period, which may vary over different periods of time. Another limitation is the possibility of recall bias due to self-reported data on various factors like smoking, diet, and physical activity, which can lead to potential inaccuracies in the study, since no external validation was done for their responses. The study was conducted in a hospital located in an urban area, which further limits its generalization to other settings.

Conclusion

The obtained results support the need for effective health promotion strategy among MS patients. Due to significant differences in KAP scores between various sociodemographic groups, health promotion interventions should be planned and implemented accordingly. The results also demonstrate the challenges for health department to persuade patients to change lifestyle, which can only be achieved with intensive counseling sessions and health promotion policies. Taking into consideration all these aspects, apart from diagnosing the MS, there is need to identify individuals at increased risk of CVD, to identify and treat additional risk factors in patients who have just one or two risk factors.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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