Metabolic syndrome awareness and attitudes among family medicine residents in Riyadh 2019–2020

Abeer S. Alshuniefi[1], Nasser K. Aljuhani[2], Abrar H. Allafi[1], Mashael S. Alruwayshid[1], Enas F. Alaraik[3], Fatmah Alreshidi[4], Ebtehaj S. Almughais[4]

[1]Family Medicine Resident, Department of Family and Community Medicine, King Fahad Medical City, [2]Family Medicine Consultant, Department of Family and Community Medicine, College of Medicine, King Saud University, [3]Family Medicine Resident, Department of Family and Community Medicine, College of Medicine, King Saud University Medical City, Riyadh, [4]Family Medicine Specialist, Department of Family and Community Medicine, College of Medicine, University of Hail, Hail, Saudi Arabia

ABSTRACT

Context: Metabolic syndrome (MS) is a group of metabolism diseases which includes over increase of the body weight, high insulin levels, elevated blood pressure, and abnormal level of cholesterol; these disorders may increase the risk of evolving coronary heart diseases. Primary health care physicians are responsible for caring for general patients and thus must have sufficient knowledge about MS, positive attitudes, and good medical practices. **Aims:** To evaluate the knowledge, attitudes, and practices of family medicine residents in Riyadh regarding the diagnosis, management, and preventive measures of MS. **Methods and Material:** This study is a cross-sectional; it was conducted on family medicine residents in Riyadh using a survey to investigate the demographics, knowledge, attitudes, and practices of the residents regarding MS. **Results:** This study included 224 physicians, of whom 35.3% had a high level of knowledge, 63.8% had positive attitudes, and 50% had good practices. No factors were associated with knowledge level; conversely, male gender and training at the KFMC were significantly associated with attitude (*P* = 0.009 and 0.004, respectively), and training level R1 and R2 were significantly related to the level of practice (*P* = 0.013 and 0.015, respectively). **Conclusions:** The family medicine residents reported a low knowledge level; however, more than half of them had positive attitudes and half had good practices.

Keywords: Attitude, family medicine residents, knowledge, metabolic syndrome, practice, Riyadh

Introduction

Metabolic syndrome (MS) is a group of metabolism disorders that includes excess body weight, high insulin levels, high blood pressure, and abnormal cholesterol levels, all of which increase the risk of developing coronary artery disease.[1]

Address for correspondence: Dr. Abeer S. Alshuniefi, Family Medicine Resident, Department of Family and Community Medicine, King Fahad Medical City, Riyadh, Saudi Arabia. E-mail: abeer-s-92@hotmail.com

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Resistance syndrome and syndrome X are other names of this disorder.[1] An estimated 20%–25% of the world's adult population has MS, and the complications of this disorder are not rare. Patients with MS have a five-fold greater risk of developing type 2 diabetes,[2] and consequently, they are twice as likely to die from and three times as likely to have a heart attack or stroke compared with individuals without MS.[2]

The International Diabetes Foundation (IDF) and the World Health Organisation (WHO) have provided useful guidelines for identifying people at an increased risk for the development

of atherosclerotic cardiovascular disease, type 2 diabetes, and cardiovascular death.[1]

Other metabolic abnormalities have been related to this syndrome, including microalbuminuria and abnormalities in fibrinolysis and coagulation.[3]

Al-Nozha *et al.* (1995 to 2000) reported that the overall age-adjusted prevalence of MS in Saudi Arabia is 39.3%. Low levels of high-density lipoprotein (HDL) cholesterol play a significant role in contributing to MS in Saudi Arabia.[4] Dyslipidemia (lower HDL and high triglycerides), elevated fasting blood glucose, hypertension, and central obesity are the risk factors of this syndrome.[5]

Insulin resistance syndrome is a commonly used synonym of MS, which indicates the importance of insulin resistance in developing this disorder.[6]

The WHO established criteria to define and diagnose MS in 1998 due to the disease's heterogeneity.[7] However, there have been challenges in applying these criteria in clinical practice; additionally, in 2001, epidemiological studies urged the National Cholesterol Education Programme Adult Treatment Panel (ATP) III to develop practical criteria that could be applied in clinical practice without the need to perform an oral glucose tolerance test or measure urinary micro-albumin levels.[8]

For the clinical diagnosis of MS according to the ATP III guidelines is based on the presence of any three of the following factors:
- Abdominal obesity defined as waist circumference >102 cm (40 inches) in males and >88 cm (35 inches) in females
- Triglyceride levels ≥150 mg/dl (1.69 mmol/L)
- HDL cholesterol <40 mg/dl (1.03 mmol/L) in males and <50 mg/dl (1.29 mmol/L) in females
- Blood pressure ≥130/85 mmHg
- Fasting glucose ≥110 mg/dl (6.1 mmol/L)[9]

Alharbi *et al.* (2014) performed a cross-sectional study to assess the MS knowledge of primary health care physicians in Makkah. The study included 106 primary health care (PHC) physicians. More than one-third of the physicians (38.7%) were over 40 years old. The participants had various degrees of education, with 56.60% having an MBBS degree, 8.49% having a diploma degree in family medicine, 13.21% having a Master's degree in different specialties, 17.92% being board-certified family medicine practitioners, and 3.77% having an international MRCGP. The definition of MS was known by 74.5% of the participants. Conversely, 74.5% were unaware of the age-adjusted prevalence of MS in Saudi Arabia, and 77.4% were unaware of the diagnosis of MS according to the IDF criteria. A minority of the physicians (16.1%) agreed that it was difficult to make an MS diagnosis at the PHC Corporation at Makkah, and 55.6% of the physicians agreed that patients with MS should be managed by specialists. When surveyed regarding the diagnosis and management of MS, 78.3% and 63.2% of the physicians stated that they could confidently diagnose and manage MS, respectively.

Additionally, 89.6% and 87.7% of the participants stated that they should know more about MS and that they should attend training courses about MS, respectively. A history of attending training courses about MS was reported in only 12.3% of the physicians.[10]

Abeer Alshuniefi *et al.* (2019) performed a cross-sectional descriptive study and concluded that 94.1% of the participants knew what constitutes MS whereas only 28% knew the serum LDL cutoff value for the diagnosis of MS according to the IDF criteria. Additionally, 78% of the participants were aware of the aim of lipid-lowering treatment, and two-thirds knew the target of antihypertensive therapy. Moreover, 69.5% were aware that waist circumference is one of the criteria for the diagnosis of MS.[11]

Havakuk *et al.* (2017) performed a study that included 126 participants, 71% of whom were physicians and 29% were nurses. Among the physicians, 68.5% were residents and 45.5% were interns. Almost all the participants (98%) were aware of MS and regularly managed patients with MS. Additionally, 84% and 90% of the participants were aware of the criteria included in the definition of MS and the number of measures necessary for a diagnosis of MS, respectively. Conversely, only a minority of participants (12%) were able to distinguish the MS cases from other conditions. Physicians were found to be better than nurses (15.6% and 3.1%, respectively, *P* = 0.003). Neither field of practice nor seniority was found to have a significant influence on the results.[12]

Alam *et al.* (2011) performed a cross-sectional study to investigate the frequency of MS and to evaluate the level of awareness of this condition in the medical community of Bahawalpur, Pakistan. The study evaluated 194 participants including doctors and paramedics. Twenty-nine participants (14.95%) were found to have MS, and there was no statistically significant difference between men and women in this respect. Thirty-six participants (18.56%) listed a minimum of three of the criteria of MS, with physicians showing significantly higher awareness levels (*P* < 0.001). Abdominal obesity was present in 22.68% of participants and was more common in males than in females (29.29% vs. 14.74%; *P* < 0.001).[13]

There is a lack of sufficient data in Saudi Arabia on MS awareness and attitudes among PHC physicians in Riyadh. The current study aims to assess the knowledge, attitudes, and practices of family medicine residents in Riyadh regarding the diagnosis, management, and preventive measures of MS.

Subjects and Methods

- **Study design:** A cross-sectional study.
- **Study population:** The survey was performed among all family medicine residents in Riyadh.
- **Participant's Participants' age:** Between 25 and 45 years old.
- **Study groups:** One group of family medicine residents.
- **Sample size:** The sample size was calculated using the

following formula:

= 280

Where n = sample size

Z = level of confidence (two-sided 95% confidence interval, Z = 1.96 for 95% CI)

P = expected true proportion (0.5)

= desired precision (5%)

- In this cross-sectional study including all family medicine residents (males and females) working in Riyadh, a self-administered questionnaire that included the following four sections was utilised for data collection:
  - o **Section 1**: Socio-demographic data of the participants (age, gender, nationality, training centre, and educational level).
  - o **Section 2**: Six questions evaluating the physicians' knowledge about MS.
  - o **Section 3**: Nine questions assessing their attitudes toward MS.
  - o **Section 4**: Five questions exploring physicians' practices regarding MS.

According to Alharbi *et al.* (2014).[10]

Ethical considerations

Confidentiality was assured to all participants who agreed to participate in the study. The respondents were given a brief description of the study and its objectives. The study was approved from the IRB department of family medicine. The approval obtained from my hospital on 25/12/2019.

Statistical analysis

The data were analysed using the SPSS programme, version 22.0. Descriptive statistics were performed. A value of $P = 0.05$ or less was considered significant.

Results

This study included 224 family medicine residents and had a response rate of 80%. The age ranged from 24 to 40 years old with a mean ± SD age of 27.6 ± 2.3 years. The majority (n = 195, 87.1%) were less than 30 years old. Females represented more than half of the population (n = 118, 52.7%), and almost all participants were Saudi (n = 222, 99.1%). The most frequently reported training centre was the KFMC (n = 95, 42.4%), and the most reported training level was R1 (n = 67, 29.9%) [Table 1].

MS knowledge of the participants was investigated through six questions with answer choices of yes, no, and I do not know. The details of the participant answers for each question are shown in Table 2. The participants' attitudes were investigated through nine questions with five answers of strongly agree, agree, neutral, disagree, and strongly agree; the number and percentages of participants' answers for each questions are shown in Table 3. Practices of the family medicine residents were investigated through five questions with a variety of answers, as shown in Table 4. A total of 115 (51.3%) participants reported that they

sometimes screen for MS after diagnosing essential HTN, more than half (n = 144, 64.3%) reported managing patients with MS, and the most commonly reported type of management was all reported management strategies (education, diet and exercise advice, medications) (n = 196, 87.5%). Only 34 (15.2%) physicians reported attending training courses on MS. The most common barrier for applying the clinical criteria of MS was busy clinic (n = 160, 71.4%).

Level of knowledge among family medicine resident physicians was high in 79 participants (35.3%) and low in
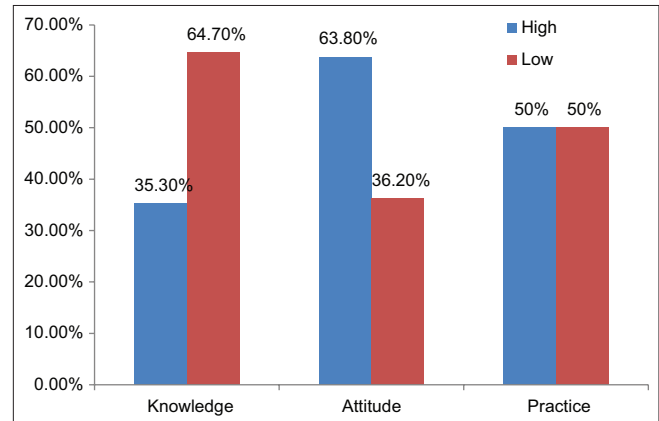

Figure 1: Overall knowledge, attitudes, and practices of family medicine residents regarding MS

Table 1: Characteristics of the family medicine residents	
Variables	**Description (*n*=224)**
Age (years)	
Range	24-40
Mean±SD	27.6±2.3
Age Group	
<30	195 (87.1)
≥30	29 (12.9)
Sex	
Male	106 (47.3)
Female	118 (52.7)
Nationality	
Saudi	222 (99.1)
Non-Saudi	2 (0.9)
Training Centre	
KFMC	95 (42.4)
KSMC	53 (23.7)
KSUMC	25 (11.2)
SFH	14 (6.3)
PSMMC	25 (11.2)
NGHA	3 (1.3)
PMAH	9 (4)
Training Level	
R1	67 (29.9)
R2	55 (24.6)
R3	62 (27.7)
R4	40 (17.9)

KFMC: King Fahad Medical city, KSMC: King Saud Medical City, KSUMC: King Saud University medical City, SFH: Security Force Hospital, PSMMC: Prince Sultan Military Medical City, NGHA: National Guard Health Affairs, PMAH: Prince Mohammed bin abdulaziz Hospital

Table 2: Questions and responses of family medicine residents regarding MS knowledge

Knowledge questions	Yes (%)	No (%)	I do not know (%)
Metabolic syndrome (MS) is related to central obesity, dyslipidemia, increased blood pressure, and impaired glucose tolerance	217 (96.9)	4 (1.8)	3 (1.3)
Overall-The overall age-adjusted prevalence of MS in the KSA according to the study of Al-Nozha *et al.* is 40%	44 (19.6)	7 (3.1)	173 (77.2)
FBS >100 mg/dl, which includes diabetic patients, is consistent with the diagnosis of MS according to the International Diabetic Foundation	74 (33)	75 (33.5)	75 (33.5)
Increased waist circumference is a necessary criterion for MS diagnosis	155 (69.2)	37 (16.5)	32 (14.3)
The primary aim for MS management with lipid-lowering agents is to decrease LDL, increase HDL, and decrease TG	162 (72.3)	28 (12.5)	34 (15.2)
In patients with established diabetes, the goal of antihypertensive therapy is to maintain blood pressure below 130/80 mmHg	170 (75.9)	38 (17)	16 (7.1)

Table 3: Questions and responses of family medicine residents regarding attitude toward MS

Attitude	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Metabolic syndrome (MS) is common worldwide, particularly in the KSA	102 (45.5)	92 (41.1)	28 (12.5)	2 (0.9)	0 (0)
MS diagnosis is difficult to diagnose MS at PHCCs in Riyadh	15 (6.7)	28 (12.5)	61 (27.2)	83 (37.1)	37 (16.5)
MS patients must be seen on a regular basis to screen for diabetes, hypertension, and dyslipidemia even if these conditions have not developed yet	80 (35.7)	98 (43.8)	39 (17.4)	7 (3.1)	0 (0)
Management of MS generally is effective	85 (37.9)	105 (46.9)	31 (13.8)	3 (1.3)	0 (0)
Patients with MS should be managed by specialists	16 (7.1)	46 (20.5)	86 (38.4)	56 (25)	20 (8.9)
I am confident diagnosing patients with MS	47 (21)	87 (38.8)	75 (33.5)	14 (6.3)	1 (0.4)
I am confident managing patients with MS	41 (18.3)	99 (44.2)	62 (27.7)	20 (8.9)	2 (0.9)
I feel that I should know more about MS	88 (39.3)	98 (43.8)	35 (15.6)	3 (1.3)	0 (0)
I need to attend trainings about MS	65 (29)	83 (37.1)	67 (29.9)	6 (2.7)	3 (1.3)

Table 4: Questions and responses of family medicine residents regarding MS practices

Questions and responses	Description (*n*=224)
Do you screen for MS after a diagnosis of essential HTN?	
Always	53 (23.7)
Sometimes	115 (51.3)
Never	56 (25)
Do you manage patients with MS?	
Yes	144 (64.3)
No	80 (35.7)
Types of management used for MS	
Education	14 (6.3)
Diet advice	14 (6.3)
Exercise advice	8 (3.6)
Medications	0 (0)
All of above	196 (87.5)
None of above	8 (3.6)
Have you attended a training course on MS.	
Yes	34 (15.2)
No	190 (84.8)
Barriers to applying the clinical criteria of MS	
Busy clinic	160 (71.4)
Not enough knowledge	85 (37.9)
Complicated cases	66 (29.5)
Not from family medicine core	5 (2.2)
Others	16 (7.1)

145 participants (64.7%). A positive attitude was reported in 143 participants (63.8%) whereas a negative attitude was reported in 81 (36.2%) participants. Half of the participants (n = 112, 50%) reported good practices [Figure 1].

Figure 1 No factors were identified to be associated with the level of knowledge [Table 5]. However, both gender and training centres significantly affected the attitudes of physicians; male gender and training at the KFMC were significantly associated with a positive attitude (P = 0.009 and 0.004, respectively) [Table 6]. Only training level significantly affected the practice level of physicians, with the R1 training level significantly related to low practice (P = 0.013) and the R4 training level significantly correlated with high practice (P = 0.015) [Table 7].

Discussion

Few previous studies have assessed the knowledge, attitudes, and practices of physicians regarding MS; thus, we explored these avenues in the current study. The present study was conducted on family medicine residents and included 224 participants. After investigating the knowledge, attitudes, and practices of physicians regarding MS, a low level of knowledge was found among more than half of the physicians (64.7%). However, positive attitudes were reported among more than half of the

Table 5: Comparison of participants based on level of MS knowledge

Variables	Knowledge		P
	High (>75%)	Low (<75%)	
Age (years)	27.6±2.1	27.7±2.4	0.758@
Age groups			
<30	71 (89.9)	124 (85.5)	0.353*
≥30	8 (10.1)	21 (14.5)	
Sex			
Male	32 (40.5)	74 (51)	0.132*
Female	47 (59.5)	71 (49)	
Nationality			
Saudi	79 (100)	143 (98.6)	0.541*
Non-Saudi	0 (0)	2 (1.4)	
Training Centre			
KFMC	30 (38)	65 (44.8)	0.321*
KSMC	23 (29.1)	30 (20.7)	0.156*
KSUMC	8 (10.1)	17 (11.7)	0.717*
SFH	6 (7.6)	8 (5.5)	0.571*
PSMNC	6 (7.6)	19 (13.1)	0.211*
NGHA	2 (2.5)	1 (0.7)	0.285*
PMAH	4 (5.1)	5 (3.4)	0.724*
Training Level			
R1	19 (24.1)	48 (33.1)	0.157*
R2	19 (24.1)	36 (24.8)	0.897*
R3	26 (32.9)	36 (24.8)	0.196*
R4	15 (19)	25 (17.2)	0.744*

*Chi square test, @independent sample *t*-test

Table 6: Comparison of participants based on attitudes toward MS

Variables	Attitude		P
	Positive (>75%)	Low (<75%)	
Age (years)	27.7±2.3	27.5±2.2	0.418@
Age group			
<30	122 (85.3)	73 (90.1)	0.303*
≥30	21 (14.7)	8 (9.9)	
Sex			
Male	77 (53.8)	29 (35.8)	0.009*
Female	66 (46.2)	52 (64.2)	
Nationality			
Saudi	142 (99.3)	80 (98.8)	1.000*
Non-Saudi	1 (0.7)	1 (1.2)	
Training Centre			
KFMC	71 (49.7)	24 (29.6)	0.004*
KSMC	28 (19.6)	25 (30.9)	0.056*
KSUMC	12 (8.4)	13 (16)	0.080*
SFH	11 (7.7)	3 (3.7)	0.236*
PSMNC	13 (9.1)	12 (14.8)	0.191*
NGHA	2 (1.4)	1 (1.2)	1.000*
PMAH	6 (4.2)	3 (3.7)	1.000*
Training Level			
R1	46 (32.2)	21 (25.9)	0.327*
R2	36 (25.2)	19 (23.5)	0.774*
R3	39 (27.3)	23 (28.4)	0.857*
R4	22 (15.4)	18 (22.2)	0.199*

*Chi square test, @independent sample *t*-test

Table 7: Comparison of participants regarding MS practices

Variables	Practice		P
	High (>50%)	Low (<50%)	
Age (years)	27.7±1.8	27.6±2.6	0.747@
Age group			
<30	98 (87.5)	97 (86.6)	0.842*
≥30	14 (12.5)	15 (13.4)	
Sex			
Male	60 (53.6)	46 (41.1)	0.061*
Female	52 (46.4)	66 (58.9)	
Nationality			
Saudi	111 (99.1)	111 (99.1)	1.000*
Non-Saudi	1 (0.9)	1 (0.9)	
Training Centre			
KFMC	41 (36.6)	54 (48.2)	0.079*
KSMC	29 (25.9)	24 (21.4)	0.432*
KSUMC	14 (12.5)	11 (9.8)	0.524*
SFH	5 (4.5)	9 (8)	0.270*
PSMNC	17 (15.2)	8 (7.1)	0.056*
NGHA	1 (0.9)	2 (1.8)	1.000*
PMAH	5 (4.5)	4 (3.6)	1.000*
Training Level			
R1	25 (22.3)	42 (37.5)	0.013*
R2	29 (25.9)	26 (23.2)	0.641*
R3	31 (27.7)	31 (27.7)	1.000*
R4	27 (24.1)	13 (11.6)	0.015*

*Chi square test, @independent sample *t*-test

of the conditions related to MS, but the majority of physicians did not know the total age-adjusted prevalence of MS in the KSA. A positive attitude among physicians can play an important role in increasing their knowledge and practice.

A study from Makkah reported that 74.5% of participants were aware of the definition of MS but 74.5% did not know the age-adjusted prevalence of MS in the KSA. The study reported that most physicians were aware of MS, but their knowledge about diagnosis and management was inadequate; conversely, their attitude was adequate.[14] A study from Pakistan investigated the awareness of healthcare workers regarding MS and found that the minority of medical staff were aware of MS.[13]

In the current study, we did not identify any factors affecting or associated with the level of knowledge; conversely, a positive attitude was associated with male gender and training at the KFMC. Moreover, a high level of practice was significantly associated with training level R4 whereas a low level of practice was associated with training level R1. This finding indicates the importance of training because the level of practice increased as the training level increased.

In that they did not identify any factors affecting the MS knowledge of physicians; however, in contrast to our finding, they also did not identify any factors affecting the attitude of participants.[14]

physicians (63.8%), and a high level of practice was found among half of all physicians. Most of the physicians (96.9%) were aware

Conclusion and Recommendations

This study reported low levels of knowledge but positive attitudes and good practices among physicians regarding MS; however, we could not identify any factors affecting the level of knowledge. Further studies are recommended to investigate factors that may affect the level of knowledge because there were limited studies conducted on the current subject that reported similar results to ours. Training programmes should be established to increase the practice of physicians because a high level of training was associated with a high level of practice.

Key Messages

Providing the best care for the patient is the main goal for the family doctors. We are searching for the possible factors that can effect that especially regarding diagnosis and management of patient with metabolic syndrome.

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Conflicts of interest

There are no conflicts of interest.

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