Prevalence of metabolic syndrome among Iranian occupational drivers

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ABSTRACT

Aims: Compared with other members of a society, drivers are under more periodic and constant surveillance due mainly to this fact that their type of work requires them to spend most of their times in a sedentarily position. The recent survey had done to evaluate the prevalence of Met Syn among professional drivers in northeast area of Iran.

Materials and methods: To evaluate the prevalence of Met Syn among long-haul drivers, 1018 male drivers were studied. Definition of Met Syn was based on ATP III, IDF and AHA. The statistical tests were composed of chi-square and independent *t* tests.

Results and conclusion: The participants' mean age was 42.17 ± 10.65 years. The prevalence of Met Syn according to ATP III, IDF and AHA criteria was 26.1%, 35.2% and 31.6% respectively. 6.6% of drivers were impaired fasting glucose. The drivers with the bus, minibus, taxi formed the greatest number of smokers (82.9%) among all drivers ($p = 0.023$). The average of body mass index (BMI) was 26.2 ± 4.06. The most prevalence of Mets according to IDF criteria were observed in drivers of heavy vehicles and also the ones of passenger vehicles, with 36.7% and 43.9% respectively. Based on high prevalence of Met Syn and other risk factors in this study, and considering these factors, should be more careful about this point. It is recommended to control risk factors such as, control of high BMI and TG, LDL, waist circumfernce, education.

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1. Aims

Metabolic Syndrome, known also as Met Syn or Syndrome X, is a combination of disorders usually included with abdominal obesity, hypertension, dyslipidemia, impaired fasting glucose (IFG) and most probably insulin resistance [1,2]. From a holistic point of view, the society's health could be threaten by this syndrome; in other words, this syndrome could increase the probability of coronary heart diseases (CHD), Type II diabetes and also the mortality rate of such diseases among people who are suffering from it. Over the past several years, the prevalence of this syndrome has dramatically increased which also raised the mortality rate relating to it. Met Syn can be found in almost 50% of those with type II diabetes. In fact, this syndrome can be considered as a bridge between cardiovascular diseases (CVD) and diabetes [3–6].

Age-adjusted prevalence of this syndrome among adults in the United States has been reported between 24 and 25% [1]. Based on the reports of previously conducted studies, the prevalence of this syndrome ranges from 12.8% to 41.7% [7]. In addition, the corresponding amount in Iran has been reported between 22% and 31% [8–10]. Furthermore, various factors, including stress, sedentary behavior, poor diet and socioeconomic status of a society's members affect the prevalence of this syndrome [11,12]. Met Syn is a cluster of certain cardiovascular risk factors. However, the self-care behaviors required for chronic diseases do not meet the satisfactory states in Asian countries. On the other hand, a number of conducted studies have shown that these required behaviors for chronic diseases could considerably lower the expenses of Health Care System [13]. It should be taken into account that drivers, in comparison with other groups in a society, require to be under more periodic and constant surveillance; it is mainly due to this fact that their type of work requires them to spend most of their times in a sedentarily position. Furthermore, most of the drivers do not have enough information about self-care behaviors; in fact, this could increase the prevalence of this syndrome among them. The prevalence of this syndrome among truck drivers in Iran in 2007 and 2011 were respectively 35.9% and 30.5% [14,15].

Considering the fact that Iran has a vast geographical surface and also the limited studies in this issue in Iran, we aimed this study to evaluate the prevalence of this syndrome among the drivers of the northeastern regions of Iran with a focus on the type of their vehicles and licenses.

2. Materials and methods

The present work is a cross-sectional study in which 1018 male drivers from Shahroud, Iran, are studied on. It is noteworthy that this study was approved by the Ethics Committee and Human Studies review board of Shahroud University of Medical Sciences.

At first, the participants were informed about the purpose of this study, and then their consents to be part of this work were taken and documented. It is noteworthy that they were asked to continue their diet and sedentary behavior without any changes during this intervention. At the second stage of this work, the demographic information of the participants, including age, marital and educational status, work experience, type of their licenses and vehicles along with their anthropometric measurements (i.e. weight, height, waist and hip circumference, and smoking) were collected. In addition, the para-clinic information, including the results of their LDL-C (low-density lipoprotein cholestrol), HDL-C (high-density lipoprotein cholestrol), cholesterol, triglycerides (TG), fasting blood sugar (FBS) tests, and blood pressure (BP) were collected.

2.1. Anthropometric and clinical measurements

The participants' BP was measured two times with 5 min in between; in other words, we used their right hand and then a mercury barometer to measure BP of the participants. In addition, the weight and height of the participants were measured with ± 0.1 kg and ± 0.1 cm, respectively; it is noteworthy that the participants were wearing light-weight clothes without shoes. Using a non-elastic tape, waist circumference (WC) was measured with ± 0.1 cm precision from the umbilicus while the participants were asked to stand at the end of normal expiration. BMI was calculated as the weight in kilograms divided by the square root of the height in meters. In addition, the hip circumference was recorded over non-restrictive underwear or light-weight shorts at the level of the maximum extension of the buttocks posterior in a horizontal plane and without compressing the skin.

In addition, we categorized the BMI into the following parts:

- Underweight (BMI < 18),
- Normal weight ($18 \leq$ BMI < 25),
- Overweight ($25 \leq$ BMI < 30), and
- Obese (BMI $\geq$ 30).

It is noteworthy that all the measurements were conducted by a single individual with the purpose of removing the probable errors could have been occurred.

2.2. Laboratory measurements

After 12 h of fasting, we took blood samples from the participants and the serums were sent to the laboratory to be analyzed for LDL-C, HDL-C, cholesterol, TG and FBS. The blood samples were collected between 30 and 45 min after collecting the centrifuges and measurements were obtained on the same day. The plasma glucose and TG were measured using glucose-peroxidase colorimetric enzymatic method. HDL-C and LDL-C were measured using acid after lipoprotein which contained apo-protein settled.

Table 1
The specified symptoms applied in the three main definitions.

Names	The main symptoms applied in each definition
ATP III	- Abdominal obesity (WC $\geq$ 102/88 cm in men/women) - TG $\geq$ 150 mg/dl or drug use for treating hypertriglycerides - HDL-C $\leq$ 40/50 mg/dl in men/women or drug use for low HDL-C - BP $\geq$ 130/85 mmHg or drug use for hypertension - FBS $\geq$ 110 mg/dl
IDF	- TG $\geq$ 150 mg/dl or drug use for treating hypertriglycerides - HDL-C $\leq$ 40 mg/dl in men/women or drug use for low HDL-C - BP $\geq$ 130/85 mmHg or drug use for hypertension - FBS $\geq$ 100 mg/dl or drug use in the case of having diabetes type II
AHA	- Excessive WC (i.e. WC $\geq$ 102/88 cm in men/women) - TG $\geq$ 150 mg/dl - HDL-C $\leq$ 40 mg/dl in men/women - BP $\geq$ 130/85 mmHg - FBS $\geq$ 100 mg/dl

2.3. Definitions of the metabolic syndrome

This syndrome was first delineated in 1988, and its defining criteria were specified [16]. Since then, its definition has changed widely and now it has many definitions. In the present study, we applied three accredited definitions, namely, ATP III, IDF and AHA. Table 1 indicates the specified criteria applied in each definition. The most applicable clinical method for diagnosing this syndrome is the ATP III definition; in other words, the sufferer of this syndrome should have at least three threatening cardiovascular symptoms all at once. The other two used definitions in this study are IDF and AHA. Based on the given IDF definition, the person who is suffering from Met Syn should have abdominal obesity (with WC $\geq$ 94/80 cm in men/women) and two or more of shown symptoms in Table 1. According to given AHA definition, the person who is suffering from Met Syn is the one who has at least three of the symptoms indicated in Table 1 [17–19].

It should also be mentioned that license type 2 refers to those who are driving vehicles limited to carry loads less than 3.5 tons (e.g. pick-up) or carry less than 26 passengers (e.g. taxi, minibus or van). License type 1 refers to those who drive vehicles allowed to carry loads more than 3.5 tons (e.g. juggernaut, lorry and dumper) or carry more than 26 passengers (e.g. bus).

2.4. Statistical analysis

Three standard definitions, as mentioned above, were applied to evaluate the prevalence of Met Syn. The prevalence rates were also obtained by analyzing the collected data regarding age groups (20–29, 30–39, 40–49, 50–59, and 60+), license type (type 1 or type 2) and vehicle type (load or passenger). In addition, independent t-test was used to test the differences between continuous variables; and also, to compare the percentages in categorical variables, we used chi-square test. In this study, we applied SPSS V. 17 to analyze the data. Furthermore, we set 0.05 as the degree at which the results could be tagged as either significant or insignificant.

3. Results and conclusion

1018 male drivers were participated in this survey, among which 27 individuals due to the lack of enough information were removed. Based on the results, the average age of the participants was 42.17 ± 10.65 years. It is noteworthy that the drivers with the license type 1 were older, in comparison with the other drivers with the license type 2. Also, most of the drivers had only attended elementary school. Demographic specifications and elements of the Met Syn, including the type of vehicle (e.g. passenger or load vehicles) and the types of license are shown in Table 2.