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Evaluation of Anthropometric and Cardio Metabolic Indices in Professional Drivers

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Abstract

Background: *Professional drivers are populations that are exposed to a sedentary lifestyle. A sedentary lifestyle can cause anthropometric, metabolic, and cardiological disorders in individuals. Accordingly, the present study aimed to investigate the anthropometric and cardiometabolic disorders in professional drivers in Shahroud.*

Methods: *This cross-sectional study was performed on 984 professional drivers (who drove more than 8 hours a day) in Shahroud in 2020. Required information includes metabolic factors (LDL, HDL, cholesterol, fasting blood sugar, and blood pressure) and anthropometric factors (BMI, waist circumference, hip circumference, and wrist circumference) extracted from their health records.*

Results: *In professional drivers, the prevalence of overweight and obesity was 41.6% and 18.9%, respectively. 77.8% had abnormal waist circumference, 3.8% had FBS more than126 mg/dl, 32.8% had LDL more than 130 mg/dl, 31.7% had cholesterol more than 200 mg/dl, and 81.8% drivers had HDL less than 45 mg/dl. The mean level of cardiometabolic factors such as SBP, DBP, FBS, and cholesterol was 132.20, 80.56, 97.13, and 190.35, respectively. Also, from view point of anthropometric indices, the average weight, waist circumference, hip circumference, wrist circumference, and BMI was 80.22, 98.59, 103.30, 18.21, and 27.02, respectively.*

Conclusions: *According to the findings, professional drivers are exposed to cardiometabolic risk factors including FBS, cholesterol, LDL, and blood pressure, as well as anthropometric disorders including increased body mass index, weight, waist circumference, and hip circumference.*

Keywords: Anthropometric indices, Cardio metabolic, Risk factors, Professional drivers.
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Introduction

One of the problems of developing societies is the sedentary lifestyle and the increasing prevalence of cardio metabolic risk factors, which is reported to be the cause of half of global mortality and disability.[1] Reports from cross-sectional and population-wide studies estimated that 60.9% of the population had sufficient physical activity in 2010, 73.8% in 2013, and approximately 80% in 2017 and 2019.[2] In Iran the prevalence of physical activity, physical inactivity, and sedentary behavior by WHO was estimated at 27.8%, 72.2%, and 71.4%, respectively.[3]

Professional drivers are one of the occupations that are affected by the habit of inactivity, because of long hours sitting and inactivity, which causes the group at higher risk.[4] In addition to the genetic role of high-fat diets, low-grain cereals, high-sodium, and low-potassium foods, and smoking and alcohol while driving play an important role in obesity.[5] Professional drivers who work on suburban roads for more than 8 hours due to long hours of inactivity, lack of access to healthy food, road traffic and contact with environmental pollutants, irregular shifts, and rhythm sleep disturbances are associated with increased cortisol secretion, which increases the risk of cardiometabolic factors.[6] A sedentary lifestyle significantly increases mortality and morbidity due to obesity and cardiometabolic factors.[7] Nevertheless, one-third of Iranians had cardiometabolic risk factors.[8]

Obesity, diabetes, hyperlipidemia, hypertension, and excessive waist circumference are all cardiometabolic risk factors (CMRFs), and their consequences include myocardial infarction, stroke, heart failure, vascular disease, and even cancer.[9] Inactivity and obesity increase visceral fat; additionally, abnormal fat leads to insulin resistance and dysglycemia, increased artery atherosclerosis, and the production of inflammatory factors in the body, resulting in a vicious cycle and an increase in cardiometabolic risk factors.[10] Tools for measuring cardiometabolic risk factors, such as waist circumference (WC) and body mass index (BMI) are inexpensive and simple to use. Some studies have found a strong correlation between weight, height, and waist circumference measurements and cardiometabolic risk factors.[11,12] Because of the dangers that drivers face and the importance of their health, the present study will be conducted to investigate the relationship between the anthropometric index and cardiometabolic risk factors in the population of professional drivers in Shahroud city (Northeast of Iran) in 2020.

Materials and Methods

This study was a cross-sectional one involving male professional drivers in Shahroud city (Northeast of Iran, Semnan Province) in 2020. Our target population in this study was all professional drivers who drove more than 8 hours a day on suburban roads. They were 948 professional drivers who had a health information record in the Kasra Occupational clinic. Health research Ethics Committee of Shahroud

university of medical sciences ethics granted ethical permission for the project (IR.SHMU.REC.1396.108).

Age, FBS (Fasting Blood Sugar), BMI (Body Mass Index), waist circumference, LDL (Low- Density Lipoprotein), HDL (High-Density Lipoprotein), cholesterol, and blood pressure are among the data that were collected based on the checklist. The researcher also referred to Kasra occupational medicine clinic and extracted and collected the necessary data through health records in which anthropometric indices and laboratory data were recorded. Every professional driver who has enrolled with their health information clinic is screened.

Being a professional driver is an inclusion criterion. Anthropometric indices have been assessed and documented. Cardiometabolic factors are assessed and recorded in the individual's file. Exclusion criteria were being non-professional vehicle drivers, Failure to conduct a test or file a defect, drug abuse, and a lack of inclusion criteria. Under control after 12 hours of fasting, blood samples will be taken from all participants, and serum for LDL (mg/dl), HDL (mg/dl), cholesterol (mg/dl), triglyceride (mg/dl), and FBS (mg/dl) tests will be sent.

Plasma glucose will be measured by the enzymatic colorimetric method using kits (Pars Azmoun Iran). All blood pressure measurements will be taken from the right arm with a mercury sphygmomanometer. Blood pressure samples will be taken at least twice in a sitting position, at least five minutes apart, with the right hand after at least five minutes of rest. The American heart association guidelines were used to correctly measure blood pressure.[13] Waist circumference with a tape measure in the upper part of the iliac crest (the narrowest area is assessed when the person is at the end of a normal exhalation, and the most prominent part is determined to determine hip circumference). The hip circumference is measured with an inelastic tape meter that applies no pressure to the body and has a one-centimeter accuracy. Hip circumference was measured at the widest point around the buttocks. BMI was calculated by dividing body weight by height squared (kg/m2). All measurements are done by one person to eliminate measurement error caused by different people.[14]

Results

The sample size was 948 professional drivers in Shahroud city. The subjects' average age was 46.789.91 years. 41.6% were overweight and 18.9% were obese. 77.8% had abnormal waist circumference, 3.8% had FBS more than 126 mg/dl, 67.2% had LDL more than100 mg/dl, 31.7% had Cholesterol more than 200 mg/dl, and 81.8% had HDL more than 50mg/dl. (Table 1).

Table1. Frequency distribution of cardiometabolic and anthropometric factors among professional drivers

Variable		N (%)
BMI	<18 (Underweight)	16(1.7)
	18-24.9 (Normal)	316(33.3)
	25-29.9 (Over weight)	393(41.6)
	30-34.9 (Obesity)	179(18.9)
	35≤ (Severe obesity)	45(4.7)
Waist circumference (cm)	<90 (Normal)	210(22.2)
	90≤ (Abnormal)	736(77.8)
Hip circumference (cm)	<100 (Normal)	235 (24.8)
	100≤ (Abnormal)	713 (75.2)
Wrist circumference (cm)	<18 (Normal)	189 (19.8)
	18≤ (Abnormal)	760 (80.2)
FBS (mg/dl)	<99 (Normal)	847(89.7)
	99-125 (Impaired fasting glucose)	61(6.5)
	126≤ (Diabetes)	36(3.8)
Total cholesterol (mg/dl)	<180 (Normal)	429(45.5)
	180-200 (Intermediate)	214(22.7)
	200≤ (Abnormal)	299(31.7)
LDL (mg/dl)	<130 (Normal)	629(67.2)
	130≤ (Abnormal)	307(32.8)
HDL (mg/dl)	45< (Normal)	170(18.2)
	≤45 (Abnormal)	765(81.8)
SBP (mm)	<120 (Normal)	679(71.5)
	120≤ (Abnormal)	270(28.5)
DBP (mm)	<80 (Normal)	751 (79.2)
	80≤ (Abnormal)	197 (20.8)

According to the findings of the investigation of cardiometabolic factors in professional drivers, the mean SBP was 132.20, DBP was 80.56, FBS was 97.13, and cholesterol was 190.35. In terms of anthropometric indices, the average weight was 80.22, the waist circumference was 98.59, the hip circumference was 103.30, the wrist circumference was 18.21, and the BMI was 27.02. (Table 2). The mean SBP increased with increasing BMI in a study of cardiometabolic indices based on BMI. As a result, the maximum mean SBP in BMI was 35.

The highest levels of cholesterol and LDL were in drivers with a BMI between 30 and 9.34. But mean FBS was inversely related to BMI so that drivers with lower BMI had higher mean blood sugar. These differences were statistically significant (Table 3).

The study of the relationship between FBS and anthropometric indices showed that with increasing FBS (pre-diabetic and diabetic), the mean of the anthropometric indices (weight, waist circumference, hip circumference, and wrist circumference) increases but there is no statistically significant difference. On the other hand, with the increase of cholesterol, the mean of the anthropometric index has increased which was statistically significant (Pvalue ≤ 0.05).

The relationship between SBP, DBP, and anthropometric indices was observed; the mean of the anthropometric indices increased with SBP and DBP, but only with waist circumference had a statistically significant difference (Table 4).

Table 2. The mean cardiometabolic and anthropometric factors among professional drivers

Variable		Mean±SD
Cardiometabolic factors	SBP (mm)	130.58±17.61
	DBP (mm)	79.82±21.61
	FBS (mg/dl)	95.86±35.95
	Cholesterol (mg/dl)	186.43±41.50
	HDL (mg/dl)	37.70±7.59
	LDL (mg/dl)	115.94±34.24
Anthropometric factors	Weight (kg)	80.22±14.87
	Waist circumference (cm)	98.59±10.99
	Hip circumference (cm)	103.30±7.96
	Wrist circumference (cm)	18.21±1.20
	BMI	27.02±5.07

Table 3. Association between cardiometabolic factors and BMI by using one-way analysis of variance

Variable	BMI					Pvalue
	≤18	18-24.9	25-29.9	30-34.9	35≤	
SBP (Mean±SD)	121±23.4	125.5±16.2	132.9±17.7	133.2±16.9	137.7±16.5	0.00
DBP (Mean±SD)	72.7±11.6	77.1±33.8	80.7±10.6	81.7±11	84.9±12.2	0.04
FBS (Mean±SD)	103.1±50.2	94.7±48.9	96.7±29.9	95.9±19.7	92.4±12.7	0.04
Cholesterol (Mean±SD)	155.5±27.8	179.9±42.5	190±39.7	192.2±41.8	186.9±43.2	0.00
HDL (Mean±SD)	36.6±4.9	37.3±6.6	38±8.5	37.6±7.1	38.6±10.7	0.1
LDL (Mean±SD)	95.3±27.6	114.9±34.9	116.6±33.4	117.3±34.5	116.2±35.9	0.00

Table 4. Association between anthropometric index and cardiometabolic factors by using one-way analysis of variance

Variable		Weight (mean±SD)	Pvalue	Waist circumference (mean±SD)	Pvalue	Hip circumference (mean±SD)	Pvalue	Wrist circumference (mean±SD)	Pvalue
FBS	Normal	80.01±14.90	0.57	98.34±11.09	0.10	103.15±7.96	0.15	18.18±1.20	0.10
	Pre diabetic	81.39±15.68		101.24±10.56		105.20±8.49		18.39±1.19	
	Diabetic	82.11±11.89		100±7.79		103.66±6.45		18.54±1.18	
Cholesterol (mg/dl)	<180	78.50±15.02	0.00	96.93±11.01	0.00	102.58±8.05	0.01	18.12±1.18	0.06
	180-200	80.74±14.29		99.49±11.67		103.43±8.20		18.18±1.28	
	>200	82.32±14.65		100.41±10.03		104.29±7.53		18.37±1.14	
LDL (mg/dl)	<130	76.45±12.11	0.00	97.12±10.60	0.00	101.98±9.22	0.02	17.72±1.14	0.02
	130≤	84.28±15.26		100.21±9.21		103.89±6.78		18.87±1.26	
HDL (mg/dl)	45<	85.26±14.36	0.00	101.22±8.21	0.00	102.99±7.85	0.02	18.38±1.19	0.08
	≤45	74.55±11.13		96.28±9.58		100.42±8.26		17.89±1.24	
SBP	<120	79.00±14.32	0.24	97.32±10.66	0.02	102.49±7.78	0.25	18.12±1.18	0.55
	120≤	83.18±15.78		101.85±11.05		105.40±7.99		18.46±1.24	
DBP	<80	78.80±11.45	0.31	96.9±9.87	0.01	103.21±8.28	0.41	18.28±1.36	0.68
	80≤	82.21±14.84		102.76±11.40		105.89±8.56		18.39±1.17	

Discussion

According to the current study's findings, 41.6% of professional drivers were overweight, with 77.8% having an abnormal waist circumference (90 cm). Montazerifar et al. (2019) study showed that 64.4% of drivers were obese, and 64.4% of taxi drivers and 75% of bus drivers had an abnormal waist circumference.[15]

Rezaei et al. (2017) discovered a link between the cardiometabolic risk factors overweight and obesity are more prevalent.[16] Thao Minh et al. (2021) demonstrated that exposure to environmental risk factors such as pollution and inactivity causes obesity and increased cardiometabolic risk factors.[17]

In this study, it was observed that 3.8% of drivers had high blood sugar and diabetes, 67.2% had LDL disorder and 81.81% had HDL disorder. Also, a statistically significant relationship was observed between body mass index and cardiometabolic risk factors. Angel et al. (2021) showed that the lipid profile of professional drivers is 1.3 times higher than that of other individuals.[18] In addition, Rahimpour et al (2016) declared that occupational stress was found to have a significant relationship with increased FBS and lipid disturbance.[19]

Adam et al (2018) study showed that the cardiometabolic risk factors among drivers were more prevalent than other occupational, sedentary habits more prevalent among drivers than the cause of obesity and lower HDL between this group.[20]

According to Brenden et al. (2016) study, 63.6% of drivers were obese or overweight, and thus more than one-third of drivers (38.9%) had a cardiometabolic risk factor. Furthermore, drivers were the most likely to have cardiometabolic factors.[21]

However, an intriguing finding in this study is that waist circumference is significantly related to blood pressure. Also, Aanuoluwa Odunayo et al., clarify that only age, driving duration, obesity, and diabetes were significant predictors of hypertension. Drivers were also evaluated as a group whose health is important to them as well as to those who use their services.[22]

In contrast, Ross et al. (2020) discovered in a study that waist circumference was a new vital sign (an applicable sign used for behavioral change such as sedentary lifestyle). According to Valera et al. (2017), drivers who drive for long periods of time are at a higher risk of obesity, hypertension, and heart disease.[23]

Because of the presence of metabolic heart risk factors in professional drivers, as well as the fact that these drivers transport freight and passengers over long distances, maintaining their health is critical for both themselves and the people who use their services. As a result, preventive measures such as periodic medical examinations, performing and evaluating laboratory tests, and conducting related training workshops should be implemented to identify and treat cardiac metabolic risk factors. Future interventional studies are recommended to control and prevent cardiac metabolic risk factors in professional drivers. Inactivity and obesity are the most common issues among drivers; daily exercise is recommended to reduce the risk factors for cardiometabolic.

Cardiometabolic risk factors were assessed as a disorder with high prevalence, mortality, and complications. Drivers were also evaluated as a group whose health is important to them as well as those who use their services. This study compared the relationship between cardiac metabolic risk factors and anthropometric index in a large group of professional drivers and a statistically significant difference was observed between them.

According to the findings, professional drivers are exposed to cardiometabolic risk factors including FBS, cholesterol, LDL, and blood pressure, as well as anthropometric disorders including increased body mass index, weight, waist circumference, and hip circumference. As a result, it is recommended to improve health and identify drivers at risk on a regular basis, as well as to implement intervention measures to correct these risk factors, such as increased physical activity and healthy nutrition.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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