Iran J Public Health, Vol. 52, No. 10, Oct 2023, pp.2169-2178

Original Article

The Prevalence of Hypertension and Obesity in Iranian Professional Drivers

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(Received 18 Jul 2022; accepted 15 Sep 2022)

Abstract

Background: Professional driving is associated with overworking, lack of physical activity, and high stress, which are susceptible to cardiovascular diseases (CVDs). We aimed to determine the prevalence of hypertension and obesity in Iranian professional drivers.

Methods: Overall, 132,452 drivers were included by census sampling methods and those who did not pass periodic examinations were excluded. Demographics and anthropometric data, including height and weight and the driver's blood pressure, were recorded. The criteria for hypertension assumed as the systolic blood pressure ≥ 130 mm and/or diastolic blood pressure ≥ 80 mm, and the criteria for prehypertension assumed as 120–129 systolic and < 80 mm Hg. In addition, body mass index (BMI) ≥ 25 is assumed as overweight, and BMI ≥ 30 is assumed as obesity.

Results: Overall, 113,856 male drivers were included in the final analysis. The prevalence of HTN, pre-HTN, and abnormal blood pressure (HTN + pre-HTN) was calculated to be 14.2%, 57.4%, and 71.6%, respectively. Khuzestan, West Azerbaijan, and Yazd had the most prevalence of abnormal blood pressure. The prevalence of overweight, obesity, and abnormal weight (overweight + obesity) was calculated to be 50.9%, 22.6%, and 73.5%, respectively, and the northwest provinces had the highest prevalence of abnormal weight.

Conclusion: Professional Iranian drivers have a high prevalence of abnormal blood pressure and weight associated with job-related risk factors. Preventive measures should be taken to confront a possible outbreak of CVDs in this population.

Keywords: Occupational health; Preventive medicine; Hypertension; Overweight; Obesity; Iran

Introduction

Cardiovascular disease (CVD) is one of the major causes of global mortality, which has imposed a heavy burden on global health systems annually (1, 2). Hypertension (HTN) is an important risk factor for CVD and its mortality, especially in the epidemiologic regions (3). In addition, some other risk factors, including smoking, alcohol consumption, and obesity, can be attributed to CVD (4). Furthermore, the rate of HTN in Iran was about 25%, which has raised during recent years (5); moreover, the rate of obesity in Iran is about 22% in adults based on the previous study (6). These issues indicate that HTN and obesity are increasing in Iran, significantly increasing the importance of screening and prevention of these disorders in this country.

Obesity and hypertension, which are two major issues in public health, can result from changing from high activity occupations to low activity occupations; from another point of view, obesity is correlated with limited physical activity, which can be another risk factor for CVD (7). Besides, some work-related risk factors, including extreme overwork and stressful jobs, may develop CVD for an extended period (8). Professional drivers, those whose job is driving and spent most of their time behind the wheel (9), experienced a psychological distress due to their stressful life style, which make them vulnerable to coronary artery disease (10). Considering the above, professional drivers, are more susceptible to CVD due to their sedentary lifestyle, which was discussed in previous studies (11).

In Iran, more than 613,000 professional drivers were existed in 2019 (12). Drivers in Iran experienced a high amount of job-related stress and burnout (13, 14). So far, some studies (11) have been published about professional drivers' cardiovascular health of professional drivers, but they have limited or incomplete information. In Iran, the health data of drivers have been recorded in a particular governmental system. We aimed to evaluate the prevalence of hypertension and obesity among professional drivers of Iran in 2019.

Materials and Methods

Study design

This national secondary analysis was conducted on professional men drivers who register in a particular governmental site for professional drivers (https://smartcard.rmto.ir/). All drivers registered in this system were examined annually by an occupational medicine specialist based on a national guideline (15) and a health card with an expiration date of one year was dedicated to each driver. We included drivers who aged between 18-70 yr and conducted their routine follow-up examination in two years. In addition, drivers who had incomplete data were excluded from the study. The data were collected in December 2020 through the registry website.

Data and variables

The demographics and anthropometric data, including height and weight and drivers' blood pressure who received health cards in 2019, were recorded. The blood pressure of drivers was recorded, and the hypertension was diagnosed as the blood pressure ≥ 130 mm and/or ≥ 80 mm, and prehypertension was diagnosed as 120–129 systolic and < 80 mm Hg diastolic pressure based on the last criteria of American Heart Association (AHA) (16). In addition, overweight assume as body mass index (BMI) ≥ 25 and obesity assume as BMI ≥ 30 (17). The data were collected by complete enumeration sampling. Furthermore, drivers who had incomplete information were excluded from the study.

Statistical analysis

The data were extracted in an Excel file directly from the website (https://smartcard.rmto.ir/). The extracted data was imported to version 25 of SPSS software (IBM Corp., Armonk, NY, USA) for further analysis. The results were presented as numerical data by number and percentage. For geographical analysis, the analyzed data was im-

ported to the desktop version of ArcGIS® software.

Ethical consideration

This study was conducted after getting permission from the Iran road maintenance and transportation organization. A specific code was used in this study instead of the person number or driver name for statistical analysis. In addition, the data was kept with the researchers during the period of the study. This research work has been recorded in the Iranian Research Institute for Information Science and Technology (IranDoc) with the registration number of: 1169845.

Results

After extracting the data and excluding incomplete data, 113,856 male drivers include in the final analysis. The mean age of drivers was 44.3 ± 10.5 yr. The number and percentage of drivers in each province are presented in Table 1. As seen, Isfahan, Fars, Razavi Khorasan, and East Azerbaijan provinces have the most drivers among Iran provinces, and Ilam has the minor drivers.

Table 1: The prevalence of hypertension, overweight and obesity in professional drivers of Iran's

Province	*Frequency n (%)*	*Hypertension n (%)*			*BMI n (%)*		
		Pre HTN and HTN	HTN	Pre HTN	Over Weight and Obesity	Obesity	Over Weight
Semnan	1241 (1.1)	854 (68.8)	167 (13.5)	687 (55.4)	945 (76.1)	361 (29)	584 (47)
Ardabil	2630 (2.3)	1667 (63.4)	204 (7.8)	1463 (55.6)	2259 (85.9)	1014 (38.6)	1245 (47.3)
Chaharmahal and Bakhtiari	2309 (2)	1733 (75)	354 (15.3)	1379 (59.7)	1618 (70)	273 (11.8)	1345 (58.3)
Qazvin	1897 (1.7)	1152 (60.7)	204 (10.8)	948 (50)	1443 (76)	502 (26.5)	941 (49.6)
Tehran	7208 (6.3)	5512 (76.5)	1034 (14.3)	4478 (62.1)	5493 (76.2)	1989 (27.6)	3504 (48.6)
Razavi Khorasan	9300 (8.2)	7451 (80.1)	1758 (18.9)	5693 (61.2)	6603 (71)	2083 (22.4)	4520 (48.6)
Kermanshah	3730 (3.3)	2297 (61.6)	736 (19.7)	1561 (41.9)	2705 (72.5)	746 (20)	1959 (52.5)
Golestan	2508 (2.2)	1453 (58)	203 (8.1)	1250 (49.9)	1935 (77.2)	688 (27.4)	1247 (49.7)
East Azerbaijan	9193 (8.1)	6776 (73.7)	1789 (19.5)	4987 (54.2)	7670 (83.5)	2968 (32.3)	4702 (51.2)
West Azerbaijan	4555 (4)	3691 (81)	756 (16.6)	2935 (64.4)	3758 (82.5)	1512 (33.2)	2246 (49.3)
Alborz	1725 (1.5)	1350 (78.3)	273 (15.8)	1077 (62.5)	1210 (70.2)	401 (23.2)	809 (46.9)
Qom	1649 (1.4)	1167 (70.8)	345 (20.9)	822 (49.9)	1263 (76.6)	475 (28.8)	788 (47.8)
Lorestan	2364 (2.1)	1633 (69.1)	144 (6.1)	1489 (63)	1696 (71.7)	466 (19.7)	1230 (52)
Hamadan	3848 (3.4)	1584 (41.2)	436 (11.3)	1148 (29.8)	2644 (68.7)	604 (15.7)	2040 (53)
Gilan	2873 (2.5)	2113 (73.5)	839 (29.2)	1274 (44.3)	2334 (81.2)	763 (26.6)	1571 (54.7)

Isfahan	14712 (12.9)	9885 (67.2)	1762 (12)	8123 (55.2)	10328 (70.2)	2798 (19)	7530 (51.2)
Mazandaran	5400 (4.7)	3922 (72.6)	487 (9)	3435 (63.6)	4130 (76.5)	1448 (26.8)	2682 (49.7)
Hormozgan	2697 (2.4)	2047 (75.9)	154 (5.7)	1893 (70.2)	1819 (67.5)	546 (20.3)	1273 (47.2)
Kerman	3640 (3.2)	2544 (69.9)	645 (17.7)	1899 (52.2)	2207 (60.6)	579 (15.9)	1628 (44.7)
North Khorasan	1678 (1.5)	1241 (74)	131 (7.8)	1110 (66.2)	1264 (75.3)	417 (24.9)	847 (50.5)
Kurdistan	2016 (1.8)	1580 (78.4)	351 (17.4)	1229 (61)	1525 (75.6)	333 (16.5)	1192 (59.2)
South Khorasan	1206 (1.1)	944 (78.3)	134 (11.1)	810 (67.2)	752 (62.3)	210 (17.4)	542 (45)
Yazd	2601 (2.3)	2107 (81)	604 (23.2)	1503 (57.8)	1991 (76.5)	515 (19.8)	1476 (56.7)
Markazi	2377 (2.1)	1459 (61.4)	475 (20)	984 (41.4)	1473 (62)	332 (14)	1141 (48)
Zanjan	1481 (1.3)	889 (60)	60 (4)	829 (56)	1011 (68.3)	235 (16)	776 (52.4)
Khuzestan	4232 (3.7)	3556 (84)	317 (7.5)	3239 (76.5)	3514 (83)	634 (15)	2880 (68)
Kohgiluyeh and Boyer-Ahmad	627 (0.6)	487 (77.7)	42 (6.7)	445 (71)	424 (67.6)	125 (20)	299 (47.7)
Fars	10308 (9.1)	7642 (74.2)	1448 (14)	6194 (60)	7037 (68.3)	2090 (20.3)	4947 (48)
Bushehr	1394 (1.2)	1057 (75.9)	139 (10)	918 (66)	1028 (73.8)	287 (20.6)	741 (53.2)
Sistan and Baluchestan	1910 (1.7)	1355 (71)	108 (5.7)	1247 (65.3)	1129 (59.1)	197 (10.3)	932 (48.8)
Ilam	547 (0.5)	337 (61.7)	83 (15.2)	254 (46.5)	418 (76.4)	130 (23.7)	288 (52.6)
Total	113856 (100)	81485 (71.6)	16182 (14.2)	65303 (57.4)	83626 (73.5)	25721 (22.6)	57905 (50.9)

Pre-HTN and HTN

The prevalence of pre-HTN and HTN in each province is presented in Table 1. The overall prevalence of pre-HTN and HTN was calculated at 57.4% and 14.2%, respectively. In the assessment of pre-HTN, Khuzestan, Kohgiluyeh and Buyer-Ahmad, and Hormozgan had the highest prevalence, and in the context of HTN, Gilan, Yazd, and Qom had the highest prevalence (Fig. 1).

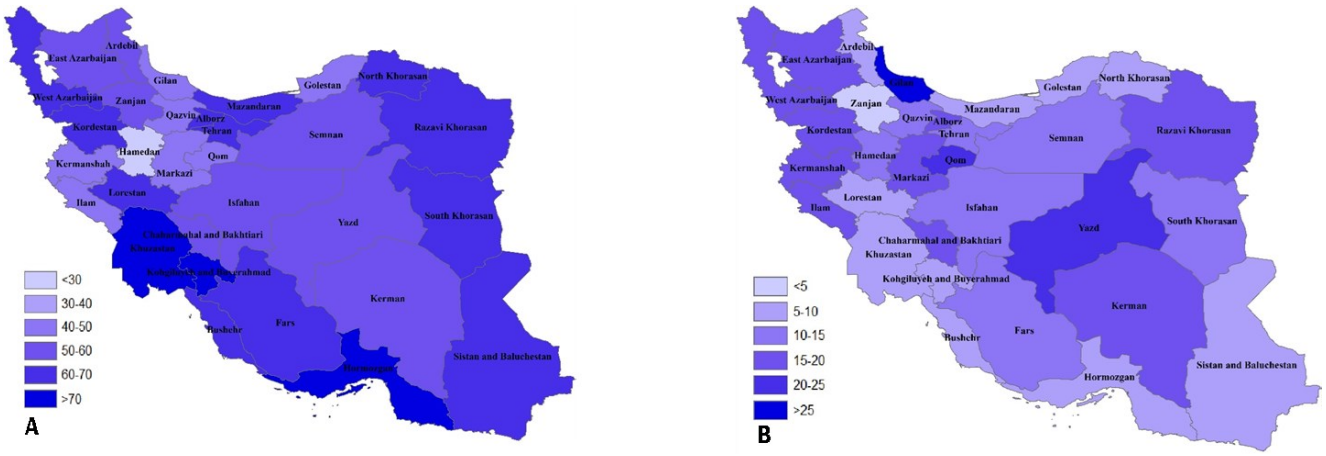

Fig. 1: The prevalence of pre-HTN (A) and HTN (B) in professional drivers in each province of Iran

Due to heterogeneity in the prevalence of pre-HTN and HTN in different provinces of Iran, we assessed the prevalence of abnormal blood pressure as the total prevalence of pre-HTN and HTN to have a better sight view of the drivers' population. The overall prevalence of abnormal blood pressure was 71.6% among Iranian professional drivers. In addition, Khuzestan, West Azerbaijan, and Yazd had the most drivers with abnormal blood pressure, respectively (Fig. 2).

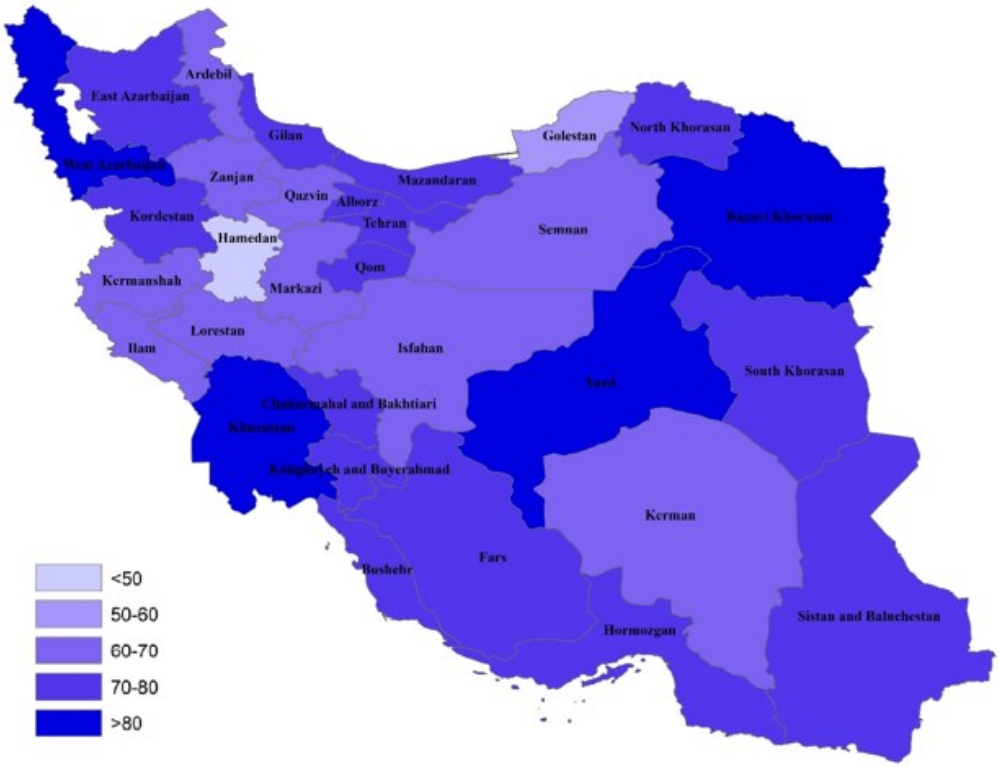

Fig. 2: The prevalence of abnormal blood pressure in professional drivers in each province of Iran

Overweight and Obesity

The prevalence of overweight and obesity in each province is presented in Table 1. The prevalence of overweight and obesity in drivers was 50.9% and 22.6% respectively. In the assessment of over-weight, Khuzestan, Kurdistan and Chahar-mahal and Bakhtiari had the highest prevalence and in the context of obesity, Ardabil had the highest prevalence (Fig. 3).

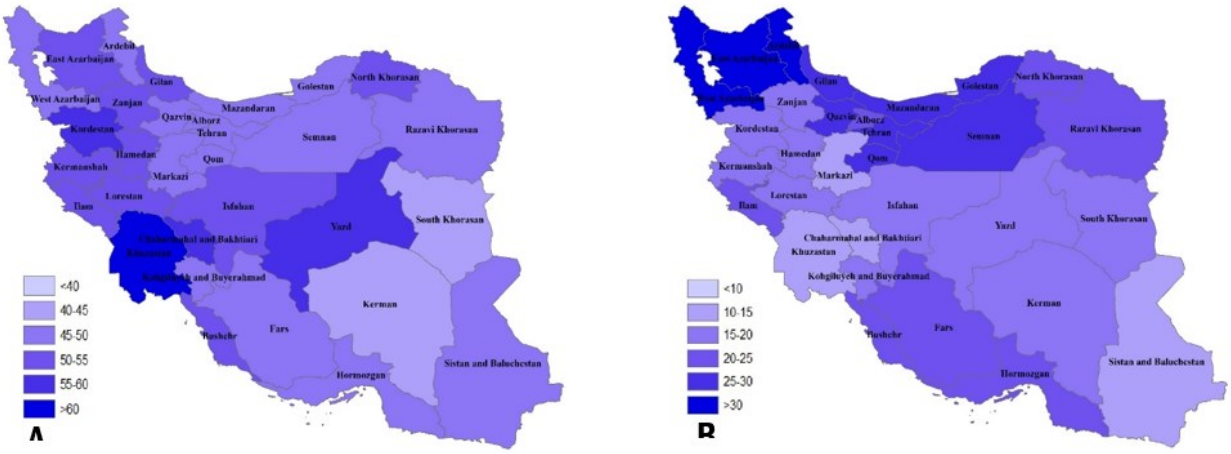

Fig. 3: The prevalence of overweight (A) and obesity (B) in professional drivers in each province of Iran

To have a better point of view, we evaluate the prevalence of abnormal weight (overweight + obesity) among professional drivers. The overall prevalence of abnormal weight was 73.5% among Iranian professional drivers. Northwest provinces, including Ardabil, East Azerbaijan and West Azerbaijan have the highest prevalence of abnormal weight for professional drivers (Fig. 4).

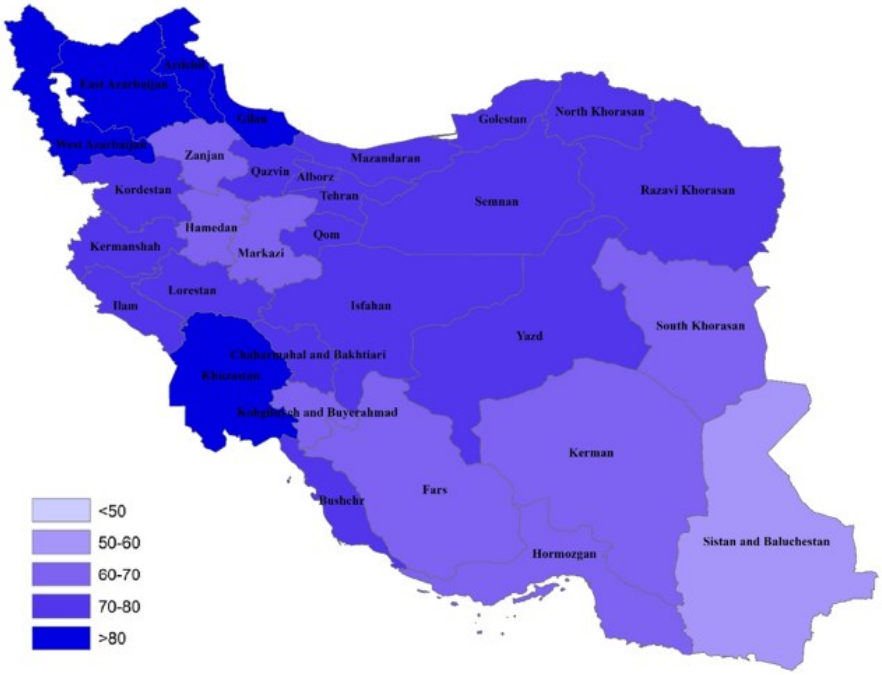

Fig. 4: The prevalence of abnormal weight in professional drivers in each province of Iran

Discussion

The current study evaluated the prevalence of abnormal blood pressure and abnormal weight among professional Iranian drivers during 2019. More than 70% of Iranian drivers have abnormal blood pressure or abnormal weight. Almost 14% of drivers suffered from HTN, and more than 22% were obese. However, the larger population had pre-HTN (almost 58%) and were at the risk of HTN development; moreover, almost 51% of drivers were at risk of obesity. To the best of our knowledge, this is the largest epidemiologic study on drivers' population in the world.

Job-related stress is a crucial predictor of health-related outcomes, including anxiety, depression, cardiovascular diseases, diabetes mellitus, and metabolic disorders such as obesity (18). Job-related activities of professional drivers, including being in high traffics for long time and overworking in different shift patterns, are factors that affect their health outcomes which cause medical disability and may cause road accidents (19). Furthermore, lack of physical activity, high stress, and long duration of work are some health-related risk factors that drivers face them during their occupations (20). These conditions make drivers susceptible to chronic diseases such as diabetes, hypertension, and metabolic syndrome (21). Therefore, scheduled health assessments for drivers should be conducted to avoid health problems and subsequent road accidents. In Iran, documented health cards for all drivers have become a necessity and an online registry system for the medical assessment of drivers has been established in 2011._This registry has recorded the health data of all bus drivers in addition to heavy vehicle drivers and urban drivers. Several medical assessments, including ophthalmologic, otolaryngologic, cardiovascular, respiratory, neurologic, renal, endocrine system, and sleep assessments, are recorded in this registry and refreshed annually (15).

Shreds of evidence showed that stressful jobs, such as professional driving, are associated with metabolic disorders due to stress-related dysfunctions of the hypothalamic-pituitary axis (HPA) and sympathetic nervous system overactivity, which may lead to HTN (22-24). Several studies reported different rates for hypertension among professional drivers. In Poland, more than 73% of the professional drivers suffered from HTN (blood pressure more than 130/80) (25). In India, 41.3% of bus drivers had HTN (blood pressure more than 140/90) (26). In Nigeria, the prevalence of HTN in professional drivers was 39.7% (27). However, geographical and rational factors may be affected HTN and the data might be different in Iran (28). In two studies in Iran (in Mazandaran and Kermanshah provinces), the prevalence of HTN in drivers was calculated to be 20% and 59%, respectively (based on the cut-off of 140/90) (29, 30). However, in the current study, we observed HTN in 14.2% of drivers, different from previous studies. This issue can justify by rational differences and the different cut-offs for HTN. In fact, some studies reported HTN as former criteria (more than 140/90); however, we conducted this research based on the last criteria of AHA. Furthermore, some of our drivers were aware of their disease and consumed medications, putting them into the pre-HTN group. The pre-HTN prevalence in this study was almost 57% which is a warning for a possible outbreak of HTN in professional drivers. This issue is different from a previous study by Lakshman et al., in which pre-HTN was reported to be almost 41% (26). Preventive measures should be taken to overcome possible outbreaks of HTN in Iranian drivers in the future.

In assessing HTN and pre-HTN based on the Iranian provinces, Khuzestan had the highest prevalence of abnormal blood pressure among Iranian provinces, followed by West Azerbaijan. In fact, Gilan had the highest prevalence of HTN, and Khuzestan had the highest prevalence of pre-HTN. This issue is relatively consistent with the systematic review conducted in Iran, which observed a high prevalence of HTN in East Azerbaijan, West Azerbaijan, Ardabil, Zanjan, Gilan, and Kurdistan (5). This issue can justi-

fy by the nutritional habits of these provinces. In Iran West Azerbaijan, Ardabil, Kurdistan, and Zanjan have the highest salt consumption among Iranian provinces (31). It seems that more attention should be paid to HTN control in the northwest provinces of Iran.

Regarding overweight and obesity, professional drivers are susceptible to weight gain more than the general population due to low physical activity related to their fixed position, unsuitable nutritional habits, and long-lasting work shifts (32). In the current study, more than 73% of drivers had BMI > 25, with a prevalence of more than 22% for BMI > 30. This issue reflects the high likelihood of cardiovascular events for drivers in the near future. In similar studies, the rate of abnormal weight in professional drivers was reported to be almost 50% (33), 61% (34), and 56.5% (35). This difference can be associated with high prevalence of obesity in Iran (36). Based on recent investigations, the rate of overweight/obesity in Iran was calculated to be almost 60% which is in line with the current study, although our statistics are higher due to specific samples (37).

In assessing abnormal weight prevalence in different provinces, northeast provinces had the highest prevalence of abnormal weight, followed by Khuzestan, which is in association with a previous study (37). This issue can be justified by the western diet predominancy in Iran (38), and low level of physical activity, especially in the northwest provinces of Iran, as described by Mohebi et al. in 2019 (39). It seems that preventive measures include educating people about different diets and encouraging them to have more physical activity.

This study showed a clear sight of HTN and obesity epidemiology in Iranian professional drivers. Alongside promising results, this study associated with some limitations, including lack of habitual history or underlying disease evaluations. In addition, our study was a retrospective study, and there were plenty of data missing in the registry. It should be better for future studies to have these factors among professional drivers to design the best preventive measures for this population.

Conclusion

The prevalence of abnormal blood pressure and abnormal weight is substantially high in Iranian professional drivers, associated with job-related risk factors. In addition, the prevalence of HTN and obesity among Iranian drivers is relatively higher than other countries, suggesting possible outbreaks of HTN and obesity in the near future. Substantial preventive measures are needed to confront this phenomenon.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

The authors would like to express their special thanks of gratitude to Cardiovascular Intervention Research Center, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran, for their guidance and cooperation through the study period.

Conflict of interest

The authors declare that there is no conflict of interests.

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