Original Article

Associations of Opium Use with Metabolic Syndrome in Fasa PERSIAN Cohort Study: A Population-Based Study

Rafat Shadmehr[1], Mehdi Sharafi[2], Mohammadhossien Shahabzadeh[3], Mostafa Bijani[4], Rahim Sharafkhani[5], Babak Pezeshki[4], Abdolmajid Ghasemian[4], Azizallah Dehghan[4]

[1]Larestan Health Center, Larestan University of Medical Sciences, Larestan, Iran, [2]Department of Community Medicine, School of Medicine, Hormozgan University of Medical Sciences, Bandar Abbas, Iran, [3]Student Research Committee, Fasa University of Medical Sciences, Fasa, Iran, [4]Noncommunicable Diseases Research Center, Fasa University of Medical Sciences, Fasa, Iran, [5]Department of Public Health, School of Health, Khoy University of Medical Sciences, Khoy, Iran

Abstract

Background: This study aimed to determine the relationships between opium use and metabolic syndrome in Fasa PERSIAN cohort data. **Methods:** This was an analytical cross-sectional study conducted among participants of the first phase of the Fasa PERSIAN cohort study. A total of 10,074 participants (aged 35–70 years) were studied. The MetS was defined as per the National Cholesterol Education Program ATP III (NCEP-ATP III) criteria. Independent sample *t*-test and Chi-square test were used for univariate analysis, and multivariate logistic regression was used to control for potential confounders and calculate odds ratios (ORs). **Results:** The MetS prevalence was 24.6% in the whole population (28.42% in women vs. 19.94% in men, $P < 0.001$). The prevalence of opium use was 23.2%. The odds of metabolic syndrome in smokers was lower than in non-smokers (OR = 1.17%, 95% CI 1.001–1.37). **Conclusions:** The results of this study showed that opium consumption has an inverse relationship with metabolic syndrome. However, this study was cross-sectional, and longitudinal studies are needed for more accurate conclusions. Opium is also a carcinogen. Therefore, its use is not recommended.

Keywords: *Metabolic syndrome, opium, waist circumference Fasa*

Introduction

Metabolic syndrome (MetS), also familiar as syndrome X or Insulin resistance, is indeed not a single disease but a collection of clustering cardiovascular risk factors which are defined by the World Health Organization (WHO) criteria as a pathologic condition distinguished by central obesity, insulin resistance, hyperlipidemia, and hypertension.[1-4] MetS is related to increased healthcare costs worldwide and the whole world has faced a growing epidemic of MetS recently.[5]

Nearly one-quarter of the world's adult population suffers from the MetS.[4] However, some estimates suggest variations in the worldwide prevalence of MetS, ranging from <10% to 84%, depending on the defining criteria used, age, sex, region, and ethnicity.[6,7]

The causes of this syndrome are unknown; most individuals with MetS are elderly, obese, hypertensive, and physically inactive.[2] Recent studies have shown that various factors affect MetS. Some of them are genetic and environmental factors: obesity, unhealthy lifestyle, stress, insulin resistance, hypertension, and smoking.[8,9] Drug use (alcohol consumption, cigarette smoking, opium use, etc.) as a part of an unhealthy lifestyle habit among the Iranian adult population can lead to concerning health problems.[10,11] The relationship between opium use and metabolic syndrome is still unclear and controversial.[12] Many studies have yielded different results. Several studies have reported that opium use increased the risk of developing components of the MetS,[9,13] such as obesity, hypertension,[14] high triglycerides (TG),[15] high fasting glucose,[16] and so on. These findings differ from other published studies that found an inverse relationship between opium use and MetS.[17] To address these research gaps, this paper aims to evaluate the associations of opium use and MetS in Fasa cohort study.

Material and Methods

Study design and population

Fasa PERSIAN cohort study is a branch of the Prospective Epidemiological Research Study in Iran (PERSIAN) cohort.[18] The PERSIAN cohort was designed to evaluate

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Address for correspondence:
Dr. Azizallah Dehghan, Noncommunicable Disease Research Center, Fasa University of Medical Sciences, Ave Sina Squer, Fasa City, Fars Province, Iran.
E-mail: dehghanaz@gmail.com

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independent risk factors of non-communicable diseases (NCDs) among Iranian adults (aged ≥35 years).

The participants in the Fasa PERSIAN cohort are from Sheshda and Qarabalag districts which were used in this study. In this cross-sectional study, the data from the first phase of the Fasa PERSIAN cohort were used.

Sheshdeh and Qarah Bulaq districts: an urban and rural area consisting of Sheshdeh District and its 24 surrounding villages located in Fasa County, Fars Province, Iran (2014–2019). Geographically, Sheshdeh is situated at 53.9944 east longitude and 28.9486 north latitude, with an altitude of 1,396 meters above sea level. Detailed information on the Fasa Cohort Study is published elsewhere.[19]

Data collection

A total of 10,074 participants (aged 35–70 years) of this region consisting of a variety of Fars, Turk, and Arab ethnicities entered the study, of which 4543 were male and 5531 were female. Data with high accuracy was collected by trained nurses. The study inclusion criteria were being 35 years and over, having Iranian nationality, being a permanent resident in Sheshdeh District ≥1 year, and having provided consent to participate. People who were reluctant to participate in this study were excluded. All the required variables, such as weight, height, BMI, waist circumference, physical activity (Met index), history of diabetes, high blood pressure, and history of drug use (smoking, opium, and alcohol consumption) were taken from Fasa Non-Communicable Diseases Research Center.

Definition of the metabolic syndrome

In this study, the NCEP-ATP III definition was used to identify the MetS. According to the NCEP-ATP III criteria, the MetS was defined as the presence of three out of five clinical features: (1) abdominal obesity (waist circumference ≥102 cm in men and ≥88 cm in women), (2) hypertriglyceridemia (≥150mg/dL), (3) hypertension (systolic blood pressure ≥130 mmHg or diastolic blood pressure ≥85 mmHg), (4) low high-density lipoprotein (HDL) cholesterol (≤40 mg/dL in men and ≤50 mg/dL in women), and (5) high fasting glucose level ≥110 mg/dL.[20]

Ethical consideration

The study protocol was approved by the Institutional Research Ethics Committee of Fasa University of Medical Sciences, Fasa, Iran (Code: IR.FUMS.REC. 1399.150).

Data analysis

To describe quantitative variables, mean and standard deviation and to describe qualitative variables frequencies and percentages were reported. The *t*-test was used to compare quantitative variables between the MetS and non-MetS groups. The Chi-squared test was used to assess the statistically significant relationship between qualitative variables. The multivariable logistic regression was used to control for potential confounders and calculate odds ratios[10] and 95% confidence intervals (95% CI) for the odds ratio. SPSS 25.0 software was used for statistical analysis, and P value < 0.05 was considered as a statistically significant level.

Results

A total of 10074 people (male n = 4543 (45.1%); female n = 5531 (54.9%)) participated in this survey. The MetS prevalence was 24.6% in the whole population (28.42% in women vs. 19.94% in men, $P < 0.001$). The prevalence of opium, cigarette, alcohol, and alcohol use was 23.2%, 27%, 6%, and 2.1%, respectively, and men were significantly more likely to use all of them than women ($P < 0.001$). The characteristics of these participants are summarized in Table 1 by sex.

Table 2 shows the comparison of quantitative studied variables between people with and without metabolic syndrome. The variables of age, weight, waist circumference, hip circumference, wrist circumference, body mass index, systolic blood pressure, diastolic blood pressure, fasting blood sugar (FBS), triglyceride (TG), total cholesterol,[19] and low-density lipoprotein (LDL) were significantly higher in MetS patients compared to non-MetS individuals. In contrast, HDL cholesterol and

Table 1: Basic characteristics of the study population categorized by gender

Variables	Total		Men		Women		*P*-Value*
	Yes, *n* (%)	No, *n* (%)	Yes, *n* (%)	No, *n* (%)	Yes, *n* (%)	No, *n* (%)	
Metabolic syndrome	2478 (24.6)	7596 (75.4)	906 (19.94)	3637 (80.05)	1572 (28.42)	3959 (71.57)	<0.001
Alcohol consumption	482 (4.8)	9592 (95.2)	478 (10.5)	4071 (89.5)	4 (0.7)	5521 (99.93)	<0.001
Opium use	2340 (23.2)	7734 (76.8)	2054 (45.2)	3516 (54.8)	44 (0.8)	54.87 (99.2)	<0.001
Cigarettes smoking	2720 (27)	7354 (73)	2468 (54.3)	2081 (45.7)	278 (5)	5247 (95)	<0.001
Hookah smoking	600 (6)	9472 (94)	536 (11.8)	4012 (88.2)	64 (1.2)	5460 (98.8)	<0.001
Ischemic heart disease	1095 (10.9)	8979 (89.1)	400 (8.8)	4143 (91.2)	695 (12.6)	4836 (87.4)	<0.001
Stroke	124 (1.2)	9950 (98.8)	54 (1.2)	4498 (98.8)	70 (1.3)	5461 (98.7)	<0.001
Diabetes mellitus (5)	1234 (12.2)	8840 (87.8)	350 (7.7)	4193 (93.2)	884 (16)	4647 (84)	<0.001
Hypertension	2015 (20)	8059 (80)	515 (11.3)	4028 (88.7)	1500 (27.1)	4031 (72.9)	<0.001

Data source: Fasa PERSIAN cohort study, Fars Province, Iran (2014-2019). **P*-value is significant at <0.05

Table 2: Comparison of the quantitative variables between the MetS and non-MetS groups

Variables	Non-MetS group	MetS group	*P*-Value
Age in years	47.70±9.47	51.45±9.30	<0.001
Height (cm)	161.67±8.95	161.91±8.92	0.24
Weight (kg)	64.21±12.24	75.61±12.69	<0.001
Waist circumference (cm)	90.29±10.90	101.85±9.93	<0.001
Hip circumference (cm)	97.99±8.37	104.42±8.48	<0.001
Wrist circumference (cm)	16.51±1.26	17.39±1.35	<0.001
Body mass index (BMI)(kg/m2)	24.60±4.44	28.86±4.64	<0.001
Systolic blood pressure (mmHg)	108.07±16.59	124.10±20.82	<0.001
Diastolic blood pressure (mmHg)	72.73±11.20	80.47±12.24	<0.001
Fasting blood sugar (mg/dL)	87.65±20.34	107.62±44.16	<0.001
Triglycerides (TG) (mg/dL)	11053±53.18	195.00±105.16	<0.001
Total cholesterol (19) (mg/dL)	182.29±37.23	193.39±42.95	<0.001
Low-density lipoprotein (LDL)(mg/dL)	106.86±31.39	111.02±35.51	<0.001
High-density lipoprotein (HDL) (mg/dL)	51.31±16.19	43.49±12.34	<0.001
Physical activity (Met Index)	42.23±1.66	39.30±9.07	<0.001
Energy consumed (kcal per day)	2387.63±1133.70	2545.32±9.37	0.15

Table 3: Prevalence of anthropometric measurements and drug use by the presence of MetS

Variables	Non-MetS group *n* (%)	MetS group *n* (%)	**P* <0.001
Diabetes mellitus (5)	435 (5.7)	799 (32.2)	<0.001
Hypertension	904 (11.9)	1110 (44.8)	<0.001
Ischemic heart disease	97 (1.3)	71 (2.9)	<0.001
Alcohol consumption	159 (2.1)	48 (1.9)	0.629
Opium use	1829 (24.1)	506 (21.7)	<0.001
Cigarettes smoking	2126 (28)	589 (23.8)	<0.001
Hookah smoking	451 (5.9)	147 (5.9)	0.982

Data source: Fasa PERSIAN cohort study, Fars Province, Iran (2014–2019). **P*-value is significant at <0.05. Results are based on Chi-square test

Table 4: Multivariate logistic regression analysis of variables associated with metabolic syndrome (MetS)

Predictors	Adjusted OR	(95%CI)*	*P*
Sex (Female vs male)	2.01	1.76-2.31	<0.001
Age	1.06	1.05-1.06	<0.001
Body mass index (BMI)	1.03	1.24-1.28	<0.001
Physical activity	0.98	0.98-0.99	<0.001
Energy consumed	1	1.00-1.00	0.858
Cigarettes smoking	0.86	0.74-0.96	0.043
Opium use (No ver yes)	1.17	1.00-1.37	0.049

Data source: Fasa PERSIAN cohort study, Fars Province, Iran (2014-2019). **P*-value is significant at <0.05. 95% (3) *95% Confidence Intervals

physical activity levels in the MetS groups were lower than those in the non-MetS group ($P < 0.001$) [Table 2].

According to Table 3, the prevalence of hypertension, diabetes mellitus,[5] and ischemic heart disease (IHD) was significantly higher in the MetS group as compared to individuals without MetS. Furthermore, the prevalence of cigarette smoking was significantly lower among subjects with the MetS than in the rest of the population. Even so, an inverse association was observed between opium use and the MetS prevalence. Opium use was significantly less frequent among the MetS group than the non-MetS group (21.7% vs. 24.1%; $P < 0.001$). In this study, no significant difference in alcohol consumption and hookah smoking was observed between subjects with and without MetS.

Table 4 summarizes the results of the logistic regression analyses. In this study, we identified some of the most important predictors of the MetS including sex, age, high BMI, smoking, and opium use. Thus, men (OR = 2.01; 95% CI = 1.76-2.31; $P < 0.001$) are around two times more likely than women to develop the MetS. A one-year increase in age raised the odds of the MetS by 6%. The odds ratio of the MetS increased by 3% in patients per unit increase of BMI. Smokers were less likely to develop the MetS; cigarette smoking status (either current or former smokers) (OR = 0.86, 95% CI 0.74–0.96; $P = 0.043$), opium non-user (OR = 1.17, 95%CI 1.00-1.37), and high physical activity (OR = 0.98, 95% CI 0.98–0.99; $P < 0.001$) were significantly associated with a low risk of MetS. However, no significant relationships were found between alcohol consumption, energy consumed, and hookah smoking with the risk of MetS.

Discussion

In this large population-based Fasa PERSIAN cohort study, data from 10,074 adults (aged 35-70 years) living in the Sheshdeh District located in Fasa county, associations of opium use with MetS were studied. Our main findings showed that the overall prevalence of MetS was 24.6% (exceeding 20%), which was consistent with reports of other studies from the US,[21] Europe,[22] and Iran[23] population reported 34.7%, 24.3%, and 38.3%, respectively.

In this study, opium consumption showed an inverse relationship with metabolic syndrome. which was consistent with the study of Bagheri-Hosseinabadi *et al*.[17] in Rafsanjan. On the other hand, in the study of Yousefzadeh *et al*.[13] in Kerman, opium use showed a relationship with increased risk of metabolic syndrome. However, opium did not show a relationship with the components of metabolic syndrome in Enhesari *et al*.'s[24] study in Kerman. This discrepancy could be attributed to differences in the definition of metabolic syndrome, methodology of study, and various sample sizes in different studies.

Iran has the highest rate of opium abusers in the world according to the WHO statistics. Opium use in Iran is 3 times the global average.[25] It seems that more studies in this field are necessary in Iran so that the relationship between opium consumption and metabolic syndrome and its components can be investigated to understand the possible relationship mechanism and use it.

Our study has a few strengths and limitations. This survey was population-based research performed with a large sample size of participants in the first phase of the Fasa PERSIAN Cohort. Our results can be analyzed as a cohort study if follow-up data were available. The limitations of this study are as follows: Firstly, this study did not include all age groups, only including the participants aged 35–70 years. Secondly, the data used on opium, alcohol, and cigarettes are qualitative and the exact amount and manner of their consumption has not been evaluated. The amount of consumption of these variables can be used in future studies. Also, due to the cross-sectional method of the study, the results can be influenced by temporality and recall bias.

Conclusions

The results of this study showed that healthy people had a higher consumption of opium compared to people with metabolic syndrome. In other words, taking opium can prevent metabolic syndrome. However, it should be noted that this was a cross-sectional study and the results cannot be relied upon, and longitudinal studies and meta-analysis are necessary. Also, opium is known as a carcinogen and its use is usually combined with other carcinogens such as cigarettes and opium, which can make people susceptible to cancer.

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Data availability

Data can be inquired from the corresponding author.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Hajian-Tilaki K. Metabolic syndrome and its associated risk factors in Iranian adults: A systematic review. Caspian J Internal Med 2015;6:51-61.
2. Lim S, Kim J-W, Targher G. Links between metabolic syndrome and metabolic dysfunction-associated fatty liver disease. Trends Endocrinol Metab 2021;32:500-14.
3. Melguizo-Rodríguez L, Costela-Ruiz VJ, García-Recio E, De Luna-Bertos E, Ruiz C, Illescas-Montes R. Role of vitamin D in the metabolic syndrome. Nutrients 2021;13:830. doi: 10.3390/nu13030830.
4. Saklayen MG. The global epidemic of the metabolic syndrome. Curr Hypertens Rep 2018;20:1-8. doi: 10.1007/s11906-018-0812-z.
5. Boudreau D, Malone D, Raebel M, Fishman P, Nichols G, Feldstein A, *et al*. Health care utilization and costs by metabolic syndrome risk factors. Metab Syndr Relat Disord 2009;7:305-14.
6. Belete R, Ataro Z, Abdu A, Sheleme M. Global prevalence of metabolic syndrome among patients with type I diabetes mellitus: A systematic review and meta-analysis. Diabetol Metab Syndr 2021;13:1-13. doi: 10.1186/s13098-021-00641-8.
7. Kolovou GD, Anagnostopoulou KK, Salpea KD, Mikhailidis DP. The prevalence of metabolic syndrome in various populations. Am J Med Sci 2007;333:362-71.
8. Rochlani Y, Pothineni NV, Kovelamudi S, Mehta JL. Metabolic syndrome: Pathophysiology, management, and modulation by natural compounds. Ther Adv Cardiovasc Dis 2017;11:215-25.
9. Yu M, Xu CX, Zhu HH, Hu RY, Zhang J, Wang H, *et al*. Associations of cigarette smoking and alcohol consumption with metabolic syndrome in a male Chinese population: A cross-sectional study. J Epidemiol 2014;24:361-9.
10. Moradinazar M, Najafi F, Jalilian F, Pasdar Y, Hamzeh B, Shakiba E, *et al*. Prevalence of drug use, alcohol consumption, cigarette smoking and measure of socioeconomic-related inequalities of drug use among Iranian people: Findings from a national survey. Subst Abuse Treat Prev Policy 2020;15:1-11. doi: 10.1186/s13011-020-00279-1.
11. Sharifi H, Shokoohi M, Ahmad RafieiRad A, Sargolzaie Moghadam M, Haghdoost A-A, Mirzazadeh A, *et al*. Methamphetamine use among Iranian youth: A population-based knowledge, attitude, and practice study. Subst Use Misuse 2017;52:1214-21.
12. Wakabayashi I. Cross-sectional relationship between alcohol consumption and prevalence of metabolic syndrome in Japanese men and women. J Atheroscler Thromb 2010;17:695-704.
13. Yousefzadeh G, Shokoohi M, Najafipour H, Eslami M, Salehi F. Association between opium use and metabolic syndrome among an urban population in Southern Iran: Results of the Kerman coronary artery disease risk factor study (KERCADRS). ARYA Atheroscler 2015;11:14-20.
14. Alkerwi Aa, Boutsen M, Vaillant M, Barre J, Lair M-L, Albert A, *et al*. Alcohol consumption and the prevalence of metabolic syndrome: A meta-analysis of observational studies. Atherosclerosis 2009;204:624-35.
15. Zhang M, Zhao J, Tong W, Wang A, Huang G, Zhang Y. Associations between metabolic syndrome and its components and alcohol drinking. Exp Clin Endocrinol Diabetes 2011;119:509-12.

16. Chen C-C, Lin W-Y, Li C-I, Liu C-S, Li T-C, Chen Y-T, *et al*. The association of alcohol consumption with metabolic syndrome and its individual components: The Taichung community health study. Nutr Res 2012;32:24-9.
17. Bagheri-Hosseinabadi Z, Khalili P, Hakimi H, Jalali N, Abbasifard M. Evaluation of the relationship between opioid addiction and metabolic syndrome and its components in the adult population from Rafsanjan city; A cohort study. Inflammopharmacology 2022;30:2107-16.
18. Poustchi H, Eghtesad S, Kamangar F, Etemadi A, Keshtkar A-A, Hekmatdoost A, *et al*. Prospective epidemiological research studies in Iran (the PERSIAN Cohort Study): Rationale, objectives, and design. Am J Epidemiol 2018;187:647-55.
19. Homayounfar R, Farjam M, Bahramali E, Sharafi M, Poustchi H, Malekzadeh R, *et al*. Cohort profile: The Fasa Adults Cohort Study (FACS): A prospective study of non-communicable diseases risks. Int J Epidemiol 2023;52:e172-8.
20. Ramli AS, Daher AM, Noor Khan Nor-Ashikin M, Mat-Nasir N, Keat Ng K, Miskan M, *et al*. JIS definition identified more Malaysian adults with metabolic syndrome compared to the NCEP-ATP III and IDF criteria. BioMed Res Int 2013;2013:760963. doi: 10.1155/2013/760963.
21. Hirode G, Wong RJ. Trends in the prevalence of metabolic syndrome in the United States, 2011-2016. Jama 2020;323:2526-8.
22. Scuteri A, Laurent S, Cucca F, Cockcroft J, Cunha PG, Mañas LR, *et al*. Metabolic syndrome across Europe: Different clusters of risk factors. Eur J Prev Cardiol 2015;22:486-91.
23. Tabatabaei-Malazy O, Saeedi Moghaddam S, Rezaei N, Sheidaei A, Hajipour MJ, Mahmoudi N, *et al*. A nationwide study of metabolic syndrome prevalence in Iran; A comparative analysis of six definitions. PloS One 2021;16:e0241926. doi: 10.1371/journal.pone. 0241926.
24. Enhesari A, Abasnia R, Baniasad A, Nosrati SN, Najafipour H, Najafzadeh MJ, *et al*. Investigating the relationship between carotid intima-media thickness (cimt), opium addiction, and components of the metabolic syndrome. Addict Health 2023;15:93-9.
25. Soroosh D, Neamatshahi M, Zarmehri B, Nakhaee S, Mehrpour O. Drug-induced prolonged corrected QT interval in patients with methadone and opium overdose. Subst Abuse Treat Prev Policy 2019;14:1-5. doi: 10.1186/s13011-019-0196-3.