

## POSTER PRESENTATION

### Water-pipe and cigarette smoking, drug abuse and alcohol consumption and the risk of primary progressive multiple sclerosis: A population-based case-control study

Sharareh Eskandarieh\*, Hosein Mortazavi, Abdorreza Naser Moghadasi, Mohammad Ali Sahraian  
Multiple Sclerosis research center, Neuroscience institute, Tehran University of Medical Sciences, Tehran, Iran

#### INTRODUCTION

Multiple sclerosis is a chronic central nervous system disease and primary progressive MS (PPMS) is one of the main type of MS which has undetermined environmental risk factors and can be triggered by smoking, drug substance abuse and drinking alcohol (1).

#### AIM

The aim of the study was to identify possible association of water-pipe and cigarette smoking, substance abuse and alcohol drinking with PPMS development.



Table 1. Characteristics of PPMS and controls

Variables N (%)	PPMS Group (n=146)	Control Group (n=294)	P value
<b>Gender</b>	<b>61 (41.8%)</b>	<b>120 (40.8%)</b>	
Male			<b>0.847</b>
Female	<b>85 (58.2%)</b>	<b>174 (59.2%)</b>	
<b>Age, mean (SD)</b>	<b>47.0 (9.4)</b>	<b>37.7 (6.1)</b>	<b>0.001</b>
<b>Marital status,</b>	<b>26 (17.8%)</b>	<b>78 (26.6%)</b>	
Single	<b>104 (71.2%)</b>	<b>200 (68.3%)</b>	<b>0.008</b>
Married	<b>5 (3.4%)</b>	<b>10 (3.4%)</b>	
Widow			
Divorce	<b>11 (7.5%)</b>	<b>5 (1.7%)</b>	
<b>Education,</b>			
Illiterate/primary	<b>13 (8.0%)</b>	<b>11 (3.7%)</b>	<b>0.227</b>
Guidance school	<b>12 (8.2%)</b>	<b>31 (10.5%)</b>	
High school	<b>55 (37.7%)</b>	<b>109 (37.1%)</b>	
Bachelor's	<b>55 (37.7%)</b>	<b>114 (38.8%)</b>	
Master or higher	<b>11 (7.5%)</b>	<b>29 (9.9%)</b>	
<b>SES Level</b>			
Low	<b>59 (40.4)</b>	<b>133 (45.3)</b>	<b>0.157</b>
Moderate	<b>30 (20.6)</b>	<b>73 (24.8)</b>	
High	<b>57 (39.0)</b>	<b>88 (29.9)</b>	
<b>Self-rated health Status; mean (SD)</b>	<b>2.84 (1.04)</b>	<b>3.67 (0.84)</b>	<b>0.001</b>

SD: standard deviation, SES: Socio-economic status, PPMS: Primary-Progressive Multiple Sclerosis, The score for self-rated health ranged from 1-5.

Table 2: Association between types of smoking and PPMS

Variables	Control N (%)	PPMS N (%)	Adjusted OR* (95%CI)	Adjusted OR** (95%CI)	
Waterpipe smoking, duration (years)	Never	233 (79.8)	126 (86.3)	1	1
	<10	40 (13.7)	14 (9.6)	1.76 (0.83-3.73)	1.55 (0.72-3.32)
	>10	19 (6.5)	6 (4.1)	0.92 (0.32-2.66)	0.95 (0.33-2.74)
Cigarette smoking	Never	241 (82.0)	97 (66.4)	1	1
	Ever	53 (18.0)	49 (33.6)	<b>2.54 (1.48-4.37)</b>	<b>2.48 (1.44-4.27)</b>
	Current	35 (11.9)	24 (16.4)	<b>2.03 (1.02-4.06)</b>	1.98 (0.98-3.97)
Past	18 (6.1)	25 (17.1)	<b>3.33 (1.58-7.03)</b>	<b>3.23 (1.54-6.79)</b>	
Cigarette smoking, duration (years)	Never	241 (82.0)	97 (67.4)	1	1
	<15	35 (11.9)	20 (13.9)	<b>2.43 (1.21-4.87)</b>	<b>2.43 (1.21-4.86)</b>
	>15	18 (6.1)	27 (18.7)	<b>2.48 (1.16-5.28)</b>	<b>2.36 (1.11-5.03)</b>
Cigarette smoking, cumulative amount (total pack-years)	Never	241 (82.0)	97 (69.3)	1	1
	<120	38 (13.0)	21 (15.0)	1.36 (0.67-2.75)	1.35 (0.66-2.72)
	>120	14 (4.8)	22 (15.7)	<b>4.86 (2.12-11.2)</b>	<b>4.81 (2.09-11.07)</b>
Passive smoking	Never	143 (48.6)	43 (29.4)	1	1
	Ever	151 (51.4)	103 (70.6)	<b>2.03 (1.25-3.31)</b>	<b>2.20 (1.34-3.62)</b>
	Never	143 (55.9)	43 (34.7)	1	1
Passive smoking, duration (years)	<10	22 (8.6)	6 (4.8)	0.74 (0.25-2.15)	0.75 (0.25-2.22)
	11-20	38 (14.8)	26 (21.0)	<b>2.22 (1.10-4.49)</b>	<b>2.50 (1.22-5.10)</b>
	>20	53 (20.7)	49 (39.5)	<b>2.73 (1.49-5.01)</b>	<b>2.87 (1.56-5.30)</b>

OR: odds ratio; CI: confidence interval; PPMS: primary progressive multiple sclerosis. \*Adjusted for age, \*\*Adjusted for age and SES

#### METHODS

This population-based case-control study was conducted from 2019-2020 in Tehran, Iran at Sina Hospital, a tertiary care referral center (2).

Clinical records from all prevalent patients in this referral center were included (3-4).

The standard random digit dialing was used to select sex matched healthy control participants from the same source population of cases. Logistic regression analysis was used to estimate unadjusted and adjusted ORs (odds ratio) (CI) IBM SPSS 23.

Table 3: Association between different types of drug substances and alcohol and PPMS

Variables	PPMS N (%)	Control N (%)	Adjusted OR* (95%CI)	Adjusted OR** (95%CI)	
Opioid	No	135 (92.5)	278 (94.5)	1	1
	Yes	11 (7.5)	16 (5.44)	0.98 (0.37-2.32)	0.90 (0.35-2.29)
Cannabis	No	141 (96.6)	285 (96.9)	1	1
	Yes	5 (3.4)	9 (3.1)	1.59 (0.47-5.38)	1.58 (0.47-5.24)
Stimulants	No	144 (98.6)	286 (97.3)	1	1
	Yes	2 (1.4)	8 (2.7)	0.88 (0.14-5.21)	0.85 (0.14-4.87)
Hallucinogen	No	146 (100)	292 (99.3)	1	1
	Yes	0	2 (0.7)	-	-
Beer intake	No	132 (90.4)	239 (81.3)	1	1
	Yes	14 (9.6)	55 (18.7)	0.64 (0.31-1.32)	0.61 (0.29-1.26)
Whisky/vodka	No	133 (91.1)	239 (81.3)	1	1
	Yes	13 (8.9)	55 (18.7)	0.74 (0.35-1.53)	0.71 (0.34-1.49)
Wine intake	No	132 (90.4)	246 (83.7)	1	1
	Yes	14 (9.6)	48 (16.3)	0.75 (0.36-1.57)	0.73 (0.35-1.53)

OR: odds ratio; CI: confidence interval; PPMS: primary progressive multiple sclerosis. \*Adjusted for age, \*\*Adjusted for age and SES

Table 4. Analysis of the joint effects of different types of smoking on PPMS risk

Variables	PPMS N (%)	Control N (%)	Adjusted OR* (95%CI)	Adjusted OR** (95%CI)	
Never tobacco or waterpipe	91 (62.3)	193 (65.6)	1	1	
Tobacco and waterpipe	Just tobacco	35 (24.0)	40 (13.6)	1.63 (0.88-3.02)	1.60 (0.86-2.97)
	Just waterpipe	6 (4.1)	48 (16.3)	0.52 (0.20-1.34)	0.47 (0.18-1.23)
	Both tobacco and waterpipe	14 (9.6)	13 (4.4)	<b>6.78 (2.16-17.49)</b>	<b>5.94 (2.3-15.34)</b>
Tobacco and passive	Never tobacco or passive	38 (26.0)	125 (42.5)	1	1
	Just tobacco	5 (3.4)	18 (6.1)	0.66 (0.19-2.24)	0.71 (0.21-2.39)
	Both tobacco and passive	44 (30.1)	35 (11.9)	<b>4.49 (2.28-8.86)</b>	<b>4.54 (2.29-8.98)</b>
Waterpipe and passive	Never waterpipe or passive	41 (28.1)	118 (40.1)	1	1
	Just waterpipe	2 (1.4)	25 (8.5)	0.39 (0.08-1.86)	0.35 (0.07-1.66)
	Both waterpipe and passive	85 (58.2)	115 (39.1)	<b>1.68 (0.99-2.84)</b>	<b>1.82 (1.06-3.12)</b>
All three types of smoking	Never waterpipe, tobacco or passive	37 (25.3)	105 (35.7)	1	1
	Just tobacco smoking	4 (2.7)	13 (4.4)	0.47 (0.12-1.87)	0.53 (0.13-2.09)
	Just waterpipe smoking	1 (0.68)	20 (6.8)	0.21 (0.02-1.74)	0.20 (0.02-1.64)
Just passive smoking	54 (37.0)	88 (29.9)	1.21 (0.66-2.20)	1.34 (0.72-2.49)	
Waterpipe and tobacco	1 (0.68)	5 (1.7)	1.43 (0.12-16.0)	1.18 (0.10-13.81)	
Waterpipe and passive	5 (3.4)	28 (9.5)	0.88 (0.29-2.68)	0.85 (0.27-2.64)	
Passive and tobacco	31 (21.2)	27 (9.2)	<b>2.68 (1.25-5.73)</b>	<b>2.71 (1.27-5.83)</b>	
All three types of smoking	13 (8.9)	8 (2.7)	<b>11.36 (3.77-34.2)</b>	<b>10.45 (3.5-31.2)</b>	

OR: odds ratio; CI: confidence interval; PPMS: primary progressive multiple sclerosis. \*Adjusted for age, \*\*Adjusted for age and SES

#### RESULTS

There was no significant difference between the two groups in terms of gender (p=0.847), education level (p=0.227) and SES (p=0.157).

The distribution of marital status was significantly different between the two groups (p=0.008) and in the case group the mean age was significantly higher (p=0.001) and the mean of self-rated health was lower (p=0.001) (Table 1).

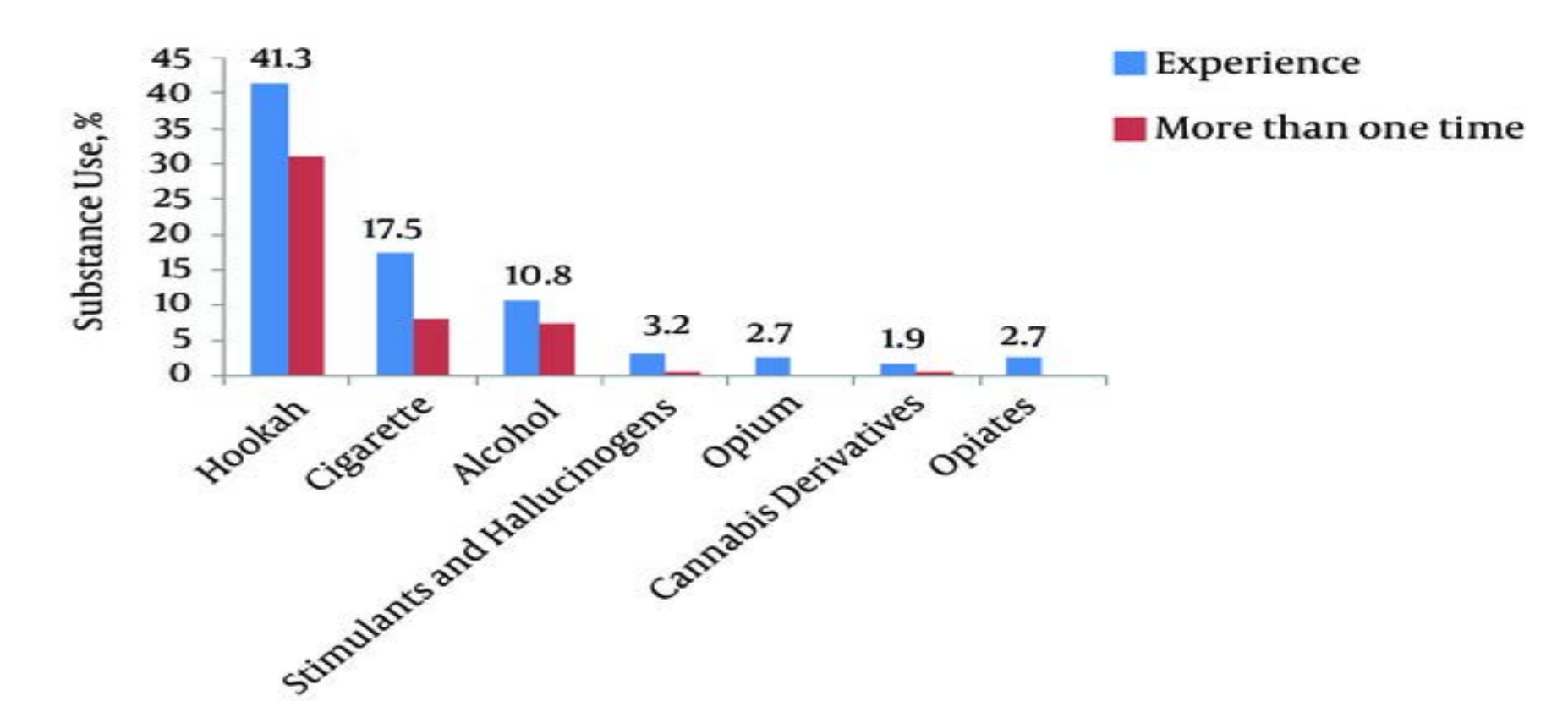
The ever smoked people were significantly more likely to develop PPMS than people who had never smoked (OR: 2.48, 95%CI: 1.44-4.27) and the odds in past smokers (OR: 3.23, 95%CI: 1.54-6.79) was higher than never smoked (Table 2).

The odds of PPMS among passive smokers was 2.2 times compared to someone who has never been a passive smoker (95%CI: 1.34-3.62).

The prevalence of drug substances and alcohol consumption was rare in the case group (Table 3). smoking tobacco and water-pipe at the same time increases the odds of developing PPMS by almost 6 times compared to people who do not smoke either (OR: 5.94, 95%CI: 2.3-15.34).

People who are both ever smoked and passive smoker are 4.5 times more likely to get PPMS (OR: 4.54, 95%CI: 2.29-8.98), this odd is 2.7 times higher in people who smoke waterpipe and are passive smokers (OR: 2.74, 95%CI: 1.26-5.94).

Finally, the PPMS odd among those having all three smoking exposures was 10 times higher than those who did not (OR: 10.45, 95%CI: 3.5-31.2) (Table4).



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#### CONCLUSIONS

We found cigarette smoking and being exposed to passive smoking as important risk factors for developing of PPMS and using three types of smoking had a large odds ratio than those without any types. According to global increase in tobacco smoking, and waterpipe smoking in MENA region, this finding emphasize to conduct interventional program to prevention of smoking (3-5).



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