The Prevalence of Substance Abuse among Multiple Sclerosis Patients

Masoud Etemadifar[1], Mehri Salari[2], Narges Mahdizadeh[1], Sevim Soleimani[3] and Robab Maghsoudi[4]

[1]*School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran*

[2]*Functional Neurosurgery Research Center, Shohada Tajrish Neurosurgical Center of Excellence, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

[3]*Student Research Committee, Faculty of Medicine Shahid Beheshti University of Medical Sciences, Tehran, Iran*

[4]*Department of Urology, Firoozgar Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran*

Corresponding Author*

Sevim Soleimani
Student Research Committee,
Faculty of Medicine
Shahid Beheshti University of Medical Sciences,
Tehran, Iran
E-mail: sevim.soleimani@gmail.com

Received date: 13-March-2024, Manuscript No: jmso-24-129451; **Editor assigned:** 15-March-2024, Pre-QC No. jmso-24-129451(PQ); **Reviewed:** 25-March-2024, QC No. jmso-24-129451(Q); **Revised date**: 28-March-2024, Manuscript No: jmso-24-129451(R); **Published date:** 30-March-2024, DOI: 10.35248/2376-0389.24.11.03.541

Abstract

Introduction

Multiple Sclerosis (MS) is a chronic, immune-mediated inflammatory disease of the central nervous system that results in myelin destruction in the brain and spinal cord. Substance abuse disorder is a chronic disorder characterized by compulsive drug use. Alcohol and nicotine are considered substances that can cause addiction as well.

Method

This study was conducted to investigate the prevalence of narcotic and psychedelic drugs, alcohol, and tobacco use among MS patients. It is a census descriptive-analytical study that was conducted on 435 patients. The research data was collected from the medical records of all patients referred to the Isfahan Multiple Sclerosis clinic in 2022. The gathered data were analyzed using SPSS software and descriptive statistics, Mann-Whitney U test, Kolmogorov-Smirnov test, Kendall Tau B correlation coefficient, and partial correlation coefficient.

Results

The results show that almost 8% of MS patients abuse narcotic or psychedelic drugs, 15% drink alcohol, and approximately 25% smoke cigarettes. Moreover, men are significantly more likely to abuse drugs, alcohol, and tobacco. Regarding alcohol and cigarettes, most of the patients have started consuming before the diagnosis of their disease; however, they have started drug abuse after the symptoms of the disease initiated. In terms of The Expanded Disability Status Scale index and the number of attacks, duration of MS, treatment follow-up, and personal belief in the positive effect of drug treatment, no statistically significant difference was observed between patients with substance abuse and other patients.

Conclusion

These results emphasize the need for targeted interventions and support services tailored to address substance abuse issues within the MS patient population, recognizing the complexities of these coexisting conditions and the potential impact on the overall well-being of individuals with MS.

Keywords: Drug abuse • Alcohol • Multiple Sclerosis• Tobacco • Isfahan

Introduction

Multiple Sclerosis (MS) is a chronic, immune-mediated inflammatory disease of the central nervous system that destroys myelin in the brain and spinal cord. The precise etiology of MS is not yet known, but studies show that environmental factors can play a role in MS development in genetically susceptible populations [1].

Approximately 2.8 million individuals worldwide are estimated to be affected by MS, corresponding to a prevalence rate of 35.9 cases per 100,000 individuals. The prevalence of MS has shown an upward trend across all global regions since 2013, notwithstanding persistent disparities in prevalence estimates. The aggregate incidence rate, drawn from data reported by 75 countries, stands at 2.1 cases per 100,000 individuals per year. Notably, females exhibit a twofold higher likelihood of MS compared to males [2]. MS commonly manifests in young adults aged 20 years to 30 years, often presenting symptoms like one-sided optic nerve inflammation, partial spinal cord inflammation, sensory irregularities, or brainstem disorders. Diagnosis hinges on a blend of clinical indications, radiographic proof (e.g., MRI T2 abnormalities), and laboratory results (e.g., specific oligoclonal bands in cerebrospinal fluid), following the guidelines of the 2017 McDonald Criteria. There exist nine categories of Disease-Modifying Therapies (DMTs) for managing relapsing-remitting MS, characterized by alternating relapses and periods of stable neurological function, as well as secondary progressive MS, which entails a gradual escalation of disability after a phase of relapses. These DMTs, including interferons, glatiramer acetate, and monoclonal antibodies, aim to diminish relapses and MRI abnormalities [3].

Several fundamental epidemiological aspects of MS have been firmly established, encompassing population prevalence, recurrence risks among siblings and twins, and the proportion of female patients. Moreover, more than 233 genetic sites have been identified as associated with MS, with 32 situated within the Major Histocompatibility Complex (MHC) and one on the X chromosome. The onset of MS results from a combination of genetic predisposition and exposure to environmental factors. While only a small percentage of the population exhibits genetic susceptibility, which necessitates specific combinations of non-additive genetic risk factors, a significant portion of susceptible individuals experience common environmental exposures. The interaction between genetic elements, exemplified by the HLA-DRB1*15:01~HLA-DQB1*06:02~a1 (H^+) haplotype, and environmental influences is pivotal in the development of MS [4].

Some factors have strong evidence for involvement in MS, like long-lasting smoking, however, several other lifestyle factors, i.e. drug abuse and alcohol consumption have been associated with MS, but these associations have not been consistently confirmed [5].

Drug addiction, also known as substance abuse disorder is a chronic disorder characterized by compulsive drug use. Several drug classifications can cause addiction, such as opioids, stimulants, hallucinogens, and psychoactive drugs despite adverse consequences [6]. Alcohol and nicotine are considered substances that can cause addiction as well [7].

A few studies have been carried out on the epidemiology of drug abuse, smoking, and alcohol consumption among MS patients in Iran but none has been done relating to whether they started abusing substances before or after developing symptoms. Therefore in this study in addition to the epidemiology of drug abuse, we tried to determine the extent to which MS patients turn to drug abuse after being diagnosed with the disease [8,9].

Multiple Sclerosis (MS), recognized as a condition imposing substantial burdens on patients, their families, and societies at large, prompts an exploration beyond the mere statistical prevalence of substance abuse [8]. Therefore, Patient's perception of MS affects the quality of their social and individual life. We aim to unravel the intricate layers of patient perception, examining how MS influences the quality of both social and individual life and the subjective assessment of their health. In doing so, this research endeavors to contribute insights into the nuanced interplay between multiple sclerosis, substance abuse, and the holistic impact on the lives of affected individuals.

Method

We conducted this census descriptive cross-sectional study in Isfahan/Iran in 2022. The study population was 435 MS Patients who were referred to the Isfahan multiple sclerosis clinics in 2022. Data were collected through patients' medical reports, face-to-face interviews, and a questionnaire which underwent the examination of reliability and validity. Content Validity Index (CVI) and Content Validity Ratio (CVR) indices were used to check the validity, which was equal to 0.99 and 0.8, respectively, indicating the validity of the questionnaire. Reliability was calculated using Cronbach's alpha coefficient, which was estimated to be 0.807 demonstrating that the stability and reliability of the questionnaire are acceptable.

The data were analyzed using SPSS software and descriptive statistics, Mann-Whitney U test, Kolmogorov-Smirnov test, Chi-Square test, Cramer's V, Kendall Tau B, and partial correlation coefficient. The questionnaire included 5 sections:

1. Individual and demographical characteristics (including gender, age, education, and occupation of the respondent)
2. Disease status (including duration of disease, EDSS (The expanded disability status scale which is the most commonly used measure of disability for multiple sclerosis), history of persistent pain in three months before the interview, and number of attacks throughout the course of the disease) [9].
3. Treatment status (including regular and continuous follow-up of treatment and the type of therapeutic drug used)
4. Status of substance abuse (status of alcohol, cigarette, hookah, and drug abuse, amount and onset of abuse)
5. Patients' perspectives regarding the impact of MS on their personal and social life, the degree of isolation feeling and loneliness, belief in the effect of the consumed substance on reducing the symptoms of the disease, the patients' assessment of their general health condition, the effect of the therapeutic drug on improving living conditions).

Results

435 MS patients (327 females (75.2%), 108 males (24.8%)) with a mean age of 37.94 ± 9.97 were evaluated. Regarding their education, 81.9% of them were at high school and college levels. 24.8% of patients with MS in Isfahan use cigarettes and hookah continuously, 80.7% of smokers had a habit of smoking before the disease symptoms initiated, and their number is significantly higher than the patients who started smoking after developing the symptoms(p-value=0.000). The research data also demonstrates that 15.2 percent of patients use alcohol and the majority of them (75.8%) started drinking before the disease (p-value=0.000). The results also show that 8.3% of patients with MS in Isfahan abuse drugs, and unlike tobacco and alcohol, the majority (83.7%) of them started using drugs after the diagnosis, which is significantly higher than those who started using before diagnosis (p-value=0.000) [Table 1].

While 19.4% of men with MS suffer from drug addiction, this proportion among women is 4.6%, and the results of the Chi-Square test demonstrate a significant relationship between gender and drug abuse (p-value=0.000). While alcohol consumption was 27.8% among men, this rate was 11% among women. Also, the smoking rate among men was 58.3% and among women 13.8%. Based on the results of the chi-square test the relationship between gender and alcohol consumption (p-value: 0.000, Cramer's V: 0.203) and between gender and smoking rate (p-value: 0.000, Cramer's V: 0.446), are significant.

The proportion of drug abuse among people over 50 years (18.4%) and people under 30 (11.7%) is higher than other age groups. The results show that most of the patients under 40 have used alcohol and the relationship between age and alcohol consumption was significant (p-value: 0.005, Cramer's V: 0.202). No statistically

significant difference was observed in smoking with age difference (p-value: 0.799).

Regarding occupation, the proportion of drug abuse among housewives (25%), people working in the private sector (17.9%), and self-employed people (17.4%) is higher than other occupation groups, and also there is a significant relationship between the occupational group variable and drug abuse (p- value=0.001) and the relationships between occupation and alcohol consumption and also smoking (p-value: 0.000) are significant. The highest smoking rate is seen among governmental employees, and alcohol consumption, as well as drug consumption, have the highest rate among self-employed people and private sector employees; There was no significant relationship between literacy level and drug abuse. However, the relationship between literacy level and alcohol consumption as well as smoking is significant. The highest consumption rate of alcohol and tobacco has been observed among people with higher education [Table 2].

There was no significant relationship between the type of therapeutic drug used by the patients and illicit drugs, alcohol consumption, and smoking.

According to the Mann-Whitney U test, in terms of EDSS scores between MS patients with drug abuse (Mean=2.35, SEM=0.21) and other patients (Mean=2.19, SEM=0.07) no significant difference was observed. There was also no statistically significant difference in the number of attacks throughout the disease, between MS patients with drug abuse (Mean=1.83, SEM=1.54) and their counterparts (Mean=2.25, SEM=0.10). However, there was a significant difference (p-Value=0.047) in the duration of disease, between the two groups [Table 3].

Supplementary analysis was performed using a partial correlation coefficient and the variable of controlling the disease duration, and the results showed that there is no significant difference between the group with alcohol consumption and their counterparts in terms of the EDSS index and number of attacks throughout the disease by controlling the variable above.

Table 1. The status of smoking, alcohol consumption, and drug abuse among patients with MS in Isfahan and its comparison based on the onset of consumption.

	Total(N=435)	Before MS	After MS	p-value
Drug Abuse	36 (8.3)	6 (16.7)	30 (83.7)	0
Alcohol Consumption	66 (15.2)	50 (75.8)	16 (24.2)	0
Smoking	108 (24.8)	88 (80.7)	20 (19.3)	0

Table 2. The state of drug, alcohol, and tobacco abuse among patients with MS and its comparison based on individual and demographic characteristics.

		Addicted	Non-Addicted	p-value
EDSS (Mean ± SEM)	Drugs	2.35 ± 0.21	2.19 ± 0.07	0.181
	Alcohol	1.83 ± 0.126	2.27 ± 0.076	0.004
	smoke	1.95 ± 0.11	2.29 ± 0.081	0.012
Duration of MS (year) (Mean ± SEM)	Drugs	9.2 ± 1.05	7.4 ± 0.32	0.047
	Alcohol	5.33 ± 0.667	7.95 ± 0.331	0.002
	smoke	6.62 ± 0.59	7.86 ± 0.35	0.057
Number of attacks (Mean ± SEM)	Drugs	1.83 ± 1.54	2.25 ± 0.10	0.315
	Alcohol	1.55 ± 0.115	2.34 ± 0.111	0.004
	smoke	1.79 ± 0.15	2.36 ± 0.12	0.006
Persistent Pain in the last three months (%)	Drugs	27.8	7	0
	Alcohol	3	10	0.004
	smoke	5.6	10	0.006
Health self-assessment (out of 5)	Drugs	3.08 ± 0.14	3.49 ± 0.042	0.002
	Alcohol	3.33 ± 0.102	3.48 ± 0.044	0.124
	smoke	3.38 ± 0.08	3.48 ± 0.047	0.281

Table 3. Mann-Whitney U test results for Comparing the Mean EDSS score, duration of the disease, number of attacks throughout the course of disease among patients with drug abuse and other patients

		Drug		Alcohol		Tobacco	
		Addicted	Non-Addicted	Consumer	Non-consumer	Smoker	Non-smoker
Gender–no. (%)	Total	36 (8.3)	399 (91.7)	66 (15.2)	369 (84.8)	108 (24.8)	327 (75.2)
	Male	21 (19.4)	87 (80.6)	30 (27.8)	78 (72.2)	63 (58.3)	45 (41.7)
	Female	15 (4.6)	312 (95.4)	36 (11.0)	291 (89.0)	45 (13.8)	282 (86.2)
p-value (Cramer's value)		0.000 (0.233)	-	0.000 (0.202)	-	0.000 (0.446)	-
Age Group/Categorized (year) – no. (%)	≤30 years	11 (11.7)	83 (88.3)	22 (23.4)	72 (76.6)	27 (28.7)	67 (71.3)
	31 years-40 years	8 (4.3)	180 (95.7)	32 (17.0)	156 (83.0)	44 (23.4)	144 (76.6)
	41 years-50 years	10 (8.7)	105 (91.3)	11 (9.6)	104 (90.4)	28 (24.3)	87 (75.7)
	>50 years	7 (18.4)	31 (81.6)	1 (2.6)	37 (97.4)	9 (23.7)	29 (76.3)
p-value (Cramer's value)	-	0.014 (0.156)	-	0.005 (0.172)	-	0.799 (NS)	-
Occupation – no. (%)	Student	0 (0.0)	16 (100)	2 (12.5)	14 (87.5)	3 (18.8)	13 (81.3)
	Housewife	2 (25.0)	6 (75)	0 (0)	8 (100)	4 (50.0)	4 (50.0)
	Unemployed	7 (4.2)	161 (95.8)	8 (4.8)	160 (95.2)	9 (5.4)	159 (94.6)
	Self-employed	8 (17.4)	38 (82.6)	11 (23.9)	35 (76.1)	17 (37.0)	29 (63.0)
	Government sector	7 (6.5)	100 (93.5)	21 (19.6)	86 (80.4)	40 (37.4)	67 (62.6)
	Private sector	12 (17.9)	55 (82.1)	15 (22.4)	52 (77.6)	28 (41.8)	39 (58.2)
	retired	0 (0.0)	23 (100)	9 (39.1)	14 (60.9)	7 (30.4)	16 (69.6)
p-value (Cramer's value)	-	0.001 (0.234)	-	0.000 (0.275)	-	0.000 (0.373)	-
Education – no. (%)	Illiterate/Elementary	3 (14.3)	18 (85.7)	0 (0)	21 (100)	1 (4.8)	20 (95.2)
	Secondary/high school	14 (8.4)	152 (91.6)	9 (5.4)	157 (94.6)	32 (19.3)	134 (80.7)
	College (BSc)	15 (7.9)	175 (92.1)	32 (16.8)	158 (83.2)	53 (27.9)	137 (72.1)
	Higher education	4 (6.9)	54 (93.1)	25 (43.1)	33 (56.9)	22 (37.9)	36 (62.1)
p-value (Cramer's value)	-	0.756 (NS)	-	0.000 (0.344)	-	0.004 (0.177)	-

The mean of the 5-valued Likert scale (1=very low, 2=low, 3=average, 4=high, 5=very high) was assessed using the Mann-Whitney U test for comparing the general health assessment level of the groups. The group with drug abuse (Mean=3.08, SEM=0.14) evaluated their health level more poorly than other non-addicted patients (Mean=3.49, SEM=0.42).

Both groups of addicted and non-addicted patients followed up on their therapeutic drug treatment regularly, and more than 90% of them positively evaluated the effect of drug treatment on improving their living conditions based on their personal views.

Meanwhile, 75% of addict patients significantly estimate a more negative impact of the disease on their personal (p-value=0.03), the negative impact of the disease on social life (p-value=0.03), and the feeling of isolation and loneliness (p-value=0.00). Regarding alcohol consumers and non-alcohol users, approximately 59% of both groups believed in the negative impact of the disease on their personal and social lives, and in this sense, no significant difference was observed between the two groups. Also, about 90% of patients in both groups believed

in the positive effect of drug treatment on their condition; 41% of patients with alcohol consumption felt isolated and lonely; however, the rate was 28.2% among non-alcoholic patients. Also, 3% of alcohol consumer patients have had a history of persistent pain in the last three months, which was 10% in patients.

Discussion

Overall 435 MS patients predominantly females (75.2%), with an average age of 37.94 were examined. Substance abuse prevalence was as follows: 24.8% used tobacco, 15.2% alcohol, and 8.3% illicit drugs. Noteworthy gender disparities were observed, with men exhibiting higher rates of drug abuse (19.4%) compared to women (4.6%). The study found no significant relationship between the type of therapeutic drug used and substance abuse. Regarding clinical variables, EDSS scores and the number of attacks did not significantly differ between MS patients with and without substance abuse, except for a notable difference in disease duration.

We found that approximately 8% of MS patients abuse drugs, While Noorbala and his colleagues findings demonstrated that 4.6% of Iranian individuals used Opium and its derivatives, which means that substance abuse among MS patients is twice as much as the normal population. Also according to Noorbala *et al*, 1.9% of Iranians use Alcoholic beverages, while our findings showed that 15% of MS patients drink alcohol which is higher compared to the healthy population [10]. However, Bombardier *et al*. study demonstrated that 14% of the MS patients were screened positive for possible alcohol abuse or dependence which is similar to our findings [11]. Beier *et al* reported that 40% of individuals who were diagnosed with MS met or exceeded the cutoff for excessive alcohol use in the East Coast United States [12].

While our findings are in line with Bombardier *et al*. who also reported 7.4% misuse of illicit drugs among MS patients, they are different from Beier *et al*. findings who reported 4% drug abuse among MS patients.

Our data research also showed that alcohol consumption is higher among educated and younger people and this finding is in line with Beier *et al*. who reported MS patients who consume alcohol were more highly educated and younger than non-consumers [12].

Based on our study results, 24.8% of MS patients smoke cigarettes which is similar to Ebadi *et al* findings which claim that 25.6% of Iran's normal population do so [13].

Our Findings show that men are significantly more likely to use drugs which is similar to what Noorbala reported [10]. Regarding alcohol and cigarettes, most of the patients have started consuming before the diagnosis of the disease, and this data can confirm this research finding that the consumption of tobacco and alcohol is a risk factor for MS. But considering drug abuse, they have turned to consumption more after disease onset, specifically after the symptoms started, which may be rooted in the popular middle-eastern belief that opioids have a positive effect in relieving symptoms, which, as discussed earlier, has been rejected in this research. Regarding drugs, most of the patients have started using them after getting sick. Age-wise, individuals over 50 and under 30 demonstrated higher drug abuse rates. Occupational differences were evident, with housewives, private sector employees, and self-employed individuals having higher drug abuse rates. Educational levels influenced alcohol and tobacco consumption, with higher education associated with increased rates.

Moreover, a supplementary analysis revealed that, when controlling for disease duration, there were no significant differences in EDSS scores and the number of attacks between patients with a history of alcohol consumption and those without.

A systematic review conducted by Fragoso and Cardoso concluded that alcohol use might be related both to bad and good outcomes in MS and stated that there are no recommendations on doses that might be acceptable [8].

Concerning the number of attacks, treatment follow-up, and personal belief in the positive effects of drug treatment, no distinctions were noted between patients with substance abuse and their counterparts. Intriguingly, the use of illicit drugs did not exhibit discernible improvement or exacerbation of symptoms.

The impact of MS on the personal and social aspects of patients with a history of drug abuse surpasses that of their counterparts. These individuals report heightened feelings of isolation and loneliness, coupled with a diminished self-assessment of their health. It can be inferred that drug abuse potentially contributes to these challenges.

Regarding alcohol consumption, patients with a history of drinking experienced increased feelings of loneliness and a lower appraisal of their health status. This observation might be attributed to the prohibition of alcohol in Iran, leading individuals to consume it in solitary or highly private settings, thereby justifying the heightened sense of isolation. Conversely, in the comparison between smokers and non-smokers, no significant differences were observed between the two groups in nearly all aspects.

Conclusion

In light of the concerted efforts undertaken in recent years to enhance awareness regarding the adverse consequences of smoking and the imperative nature of cessation, the outcomes have demonstrated limited effectiveness. Thus, there arises a need for contemplation on viable alternatives encompassing innovative and creative strategies to facilitate the cessation of cigarette use. Regarding alcohol consumption, it becomes imperative to expound upon its detrimental effects. In the domain of opioids and other illicit drugs, a prerequisite for successful intervention involves the dissemination of necessary education to dispel misguided cultural beliefs and deep-seated misconceptions.

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Cite this article: Soleimani, S. The Prevalence of Substance Abuse among Multiple Sclerosis Patients. J Mult Scler. 2024,13,(3),541