



Alcohol misuse in patients with multiple sclerosis

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ABSTRACT – Objective: The aim of the study was to determine the prevalence of alcohol misuse in patients with multiple sclerosis (MS) and to analyze the link between alcohol misuse and patient age, sex, clinical course of MS, disease duration, and degree of disability. *Patients and methods:* The respondents were MS patients older than 18 that underwent inpatient rehabilitation at the Lipik Special Hospital in the period from May 15, 2015 to November 15, 2015. The exclusion criterion was serious cognitive impairment. Data on patient age, sex, degree of disability, clinical course of MS, and time elapsed from MS diagnosis were collected. Diagnosis of alcohol misuse was made by use of the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) questionnaire. Study patients were divided into two groups according to the presence or absence of alcohol misuse. *Results:* The total number of respondents was 158, of which 15 (9.5%) screened positive for alcohol misuse. In the group of patients with alcohol misuse there was a significantly higher proportion of men ($p=0.048$). There were no statistically significant between-group differences according to age ($p=0.787$), disease duration ($p=0.506$), level of disability ($p=0.367$), and course of disease ($p=0.663$). *Conclusion:* According to this study, alcohol misuse was present in 9.5% of MS patients. Because of the numerous health and social consequences of excessive alcohol intake, comprehensive care of MS patients should include counseling on the adverse effects of alcohol.

Key words: multiple sclerosis, alcohol misuse, AUDIT-C questionnaire

INTRODUCTION

According to the World Health Organization (WHO) definition, alcohol misuse is the use of alcohol for a purpose not consistent with legal or medical guidelines (1). The term includes a whole spectrum of drinking above the recommended

limits including hazardous alcohol use, harmful alcohol use, and alcohol dependence. Hazardous use is a pattern of alcohol consumption that increases the risk of adverse consequences for the user, while

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Table 1. *The Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) screening questionnaire (16)*

1. How often do you have a drink containing alcohol? *
Never (0 points), Monthly or less (1 point), Two to four times a month (2 points), Two to three times a week (3 points), Four or more times a week (4 points)
2. How many drinks containing alcohol do you have on a typical day when you are drinking?
1 or 2 (0 points), 3 or 4 (1 point), 5 or 6 (2 points), 7 to 9 (3 points), 10 or more (4 points)
3. How often do you have six or more drinks on one occasion?
Never (0 points), Less than monthly (1 point), Monthly (2 points), Weekly (3 points), Daily or almost daily (4 points)

*A drink containing alcohol is typically a can of beer, a glass of wine, or a shot of hard liquor (e.g., scotch or vodka)

harmful use causes damage to health, which could be physical or mental. Alcohol dependence is defined as a cluster of behavioral, cognitive, and physiologic phenomena that develop after repeated alcohol use and that typically include strong desire to consume alcohol and difficulties in controlling its use, persisting in its use, a higher priority given to alcohol use than other activities and obligations, as well as increased tolerance (1). The term harmful alcohol use is a WHO equivalent for the term alcohol abuse described by the American Psychiatric Association (APA) in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-4), where it is defined as a maladaptive pattern of drinking, leading to clinically significant impairment or distress, as manifested by at least one of the 'abuse' criteria occurring within a 12-month period (2). A 'dependence' diagnosis according to DSM-4 criteria would receive anyone with three or more of the 'dependence' criteria during the same 12-month period (2). Studies consistently showed a high reliability of DSM-4 and WHO alcohol dependence criteria, but lower reliability of alcohol abuse/harmful use criteria (3). The term 'heavy drinking' is referred to drinking that exceeds a certain daily volume of alcohol (three drinks or more a day) or quantity *per* occasion (five drinks or more on an occasion, at least once a week or at least 60 grams or more of pure alcohol on at least one occasion in the past 30 days) (1). Heavy drinking is also included in the spectrum of alcohol misuse (1). In the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), APA no longer uses the terms alcohol abuse and alcohol dependence, but rather refers to 'alcohol use disorders', which are defined as mild, moderate or severe to indicate the level of severity, which is determined by the number of diagnostic criteria met by an individual (4).

Most patients with alcohol misuse are not alcohol dependent, but many of these non-dependent patients account for morbidity and mortality attributed to drinking (5). In addition to compromising

physical and mental health, conditions already affected by multiple sclerosis (MS), alcohol misuse may lead to decreased adherence to medical treatment (6). Data on alcohol misuse among MS patients are rather limited. In the studies addressing its prevalence in MS patients, rates between 3% and 40% have been reported (7-15). There are various methods to identify alcohol misuse, e.g., formal diagnostic interviews or screening questionnaires (15).

In our study, the Alcohol Use Disorder Identification Test-Consumption (AUDIT-C) questionnaire was used as a measuring instrument (16). It is a brief validated 3-item screening questionnaire for all forms of alcohol misuse (Table 1). The response options for each of the three questions are scored 0-4 points, and the possible scores range 0-12 points. AUDIT-C scores greater than or equal to 4 in men and greater than or equal to 3 in women are considered positive for alcohol misuse, based on previous validation studies (16-18). The AUDIT-C questionnaire is derived from the Alcohol Use Disorder Identification Test (AUDIT), a 10-item alcohol screen designed by WHO (19). Another commonly used alcohol intake screening questionnaire, the CAGE questionnaire (20), has equal or inferior screening performance than AUDIT-C (21). The 10-item AUDIT questionnaire is not often in use, probably because of its length (21).

The aim of the study was to determine the prevalence of alcohol misuse in MS patients and to analyze the link between alcohol misuse and patient sex, age, clinical course of MS, disease duration, and degree of disability.

PATIENTS AND METHODS

The study included 158 patients with MS that underwent inpatient rehabilitation at the Lipik Special Hospital for Medical Rehabilitation in the period from May 15, 2015 to November 15, 2015.

Table 2. Demographic and clinical characteristics of respondents

Characteristic	Alcohol misuse positive patients	Alcohol misuse negative patients
n (%)	15 (9.5)	143 (90.5)
Age (yrs), \pm SD	50.4 \pm 14.63	51.2 \pm 10.71
Female, n (%)	8 (53.3)	109 (76.2)
Male, n (%)	7 (46.7)	34 (23.8)
EDSS	4	5.5
MS course, n (%)		
RRMS	6 (40)	74 (51.7)
SPMS	9 (60)	64 (44.8)
PPMS	0 (0)	3 (2.1)
Benign MS	0 (0)	2 (1.4)
Time elapsed from MS diagnosis (yrs), \pm SD	15.2 \pm 14.92	13.5 \pm 9.36

EDSS = Expanded Disability Status Scale; MS = multiple sclerosis; RRMS = relapsing-remitting multiple sclerosis; SPMS = secondary progressive multiple sclerosis; PPMS = primary progressive multiple sclerosis; Benign MS = benign multiple sclerosis

Participating in the study were patients older than 18 and diagnosed with MS according to the revised McDonald criteria (22). The exclusion criterion was serious cognitive impairment. Data on patient age, sex, degree of disability, clinical course of MS, and time elapsed from MS diagnosis were collected. The degree of disability for all study subjects was based on the Expanded Disability Status Scale (EDSS) (23), and assessment of cognitive status was performed using the Mini Mental Status Exam (MMSE) (24). Diagnosis of alcohol misuse was made by use of the AUDIT-C questionnaire. Since all validation studies for AUDIT-C had been conducted prior to DSM-5 criteria issuing, terminology according to the WHO and DSM-4 criteria was used on the evaluation and description of alcohol misuse. The respondents were assured that their participation in the study was anonymous and that the data collected would only be used as summary data. The respondents filled out the questionnaire on their own, with interviewer assistance when needed. Patients were divided into two groups according to the presence or absence of alcohol misuse.

The study was approved by the Hospital Ethics Committee and patients were required to provide written consent for their participation.

Independent t-test was used to determine if difference existed between the groups of patients and Pearson's correlation coefficient as a measure of the strength of the association between quantitative variables. For all analyses, the level of significance was set at $p < 0.05$. The distribution of collected data passed the test for normality. Statistical analysis was performed using the SOFA Statistics for Windows.

RESULTS

The study included 158 patients, 117 (74.0%) female and 41 (26.0%) male, mean age 51.1 years, age range 25-80 years. The mean time elapsed from MS diagnosis was 13.6 years (range, 6 months to 62 years). The relapsing-remitting course of the disease (RRMS) was diagnosed in 80 (50.6%), secondary progressive MS (SPMS) in 73 (46.2%), primary progressive MS (PPMS) in 3 (1.9%), and benign MS in 2 (1.3%) patients. The median EDSS was 5.0, range 1.5 to 9.

Out of 158 study patients, 15 (9.5%) screened positive for alcohol misuse, with the median AUDIT-C score of 4 (range 3-8). Patient characteristics according to the presence/absence of alcohol misuse are shown in Table 2. Patients were divided into two groups according to the presence/absence of alcohol misuse (Table 2). In the group of patients with alcohol misuse, there was a significantly higher proportion of men ($p=0.048$). There were no statistically significant between-group differences according to age ($p=0.787$), disease duration ($p=0.506$), level of disability ($p=0.367$), and course of disease ($p=0.663$).

Due to the small number of patients that suffered from PPMS and benign MS course, only patients with RRMS and SPMS were included in the analysis of the relationship of alcohol misuse and MS course.

DISCUSSION

Heterogeneous literature data on the prevalence of alcohol misuse among MS patients could be due to

Table 3. *Probability of alcohol dependence by Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) score (25)*

Men	Women
Score Probability of dependence	Score Probability of dependence
0-2 0.01	0-1 0.01
3-4 0.09	2 0.03
5-6 0.22	3 0.09
7-9 0.45	4-6 0.24
10-12 0.75	7-9 0.42
	10-12 0.88

differences in the methods of data collection, sample size and cultural context (7,15). A number of methods have been used to identify alcohol misuse, e.g., formal diagnostic interviews, data from administrative databases, and screening questionnaires (15). Results relating to patients with MS cannot be extrapolated from one country or continent to another, assuming that patients will show similar behavioral patterns (7).

Previous studies have shown that most patients screening positive on the AUDIT-C fall in the hazardous pattern, but are not alcohol dependent (5). Although test results do not allow clear differentiation between alcohol dependence and other forms of alcohol misuse, the probability of alcohol dependence based on AUDIT-C raises with higher test score (25), as shown in Table 3.

According to AUDIT-C score, patients can be placed in one of the risk zones of alcohol dependence (25). The highest AUDIT-C zone in men and women (10-12 points) raised the post-screening probability of alcohol dependence to 75% and 88%, respectively. The next highest zone for men and women (7-9 points) resulted in post-screening probability of 45% in men and 42% in women, whereas the third highest zone increased the post-screening probability to a lesser extent, 22% in men (5-6 points) and 24% in women (4-6 points).

In our study, 9.5% of respondents screened positive for all forms of alcohol misuse, with the median AUDIT-C score of 4 (range 3-8); 3.5 for women (range 3-4) and 4 for men (range 4-8). Out of seven male patients screening positive for alcohol misuse, six patients had AUDIT-C score 4 and one patient AUDIT-C score 8; out of eight female patients screening positive for alcohol misuse, four patients had AUDIT-C score 3 and another four patients AUDIT-C score 4. These findings suggest that most patients that screened positive consumed alcohol in a hazardous or heavy drinking pattern rather

than being alcohol dependent. There was no correlation between AUDIT-C score and age ($p=0.022$, $r=-0.183$), disease duration ($p=0.846$, $r=-0.016$) and EDSS score ($p=0.015$, $r=-0.193$), so there was no association of alcohol use with patient age, disease duration and level of disability. A possible explanation for the small proportion of patients in the zone of high risk for alcohol dependence is patients' fear from neurological deficit worsening and effective doctor-patient communication that provided necessary information on the adverse consequences of alcohol intake; when asked to fill in the questionnaire about alcohol usage, many of our patients spontaneously mentioned that they avoided alcohol drinks because of fear from MS worsening or that they followed physician's advice not to drink.

A limitation of the study was the fact that using AUDIT-C or any other questionnaire does not set a definitive diagnosis of alcohol misuse, but provides screening instead. Therefore, positive patients require further assessment.

There are only few studies that analyzed the link between alcohol misuse and disease related or demographic characteristics of respondents. In our study, alcohol misuse was more common in men, whereas we found no statistically significant differences according to age, disease duration, level of disability, and course of disease between the patients with and without alcohol misuse.

In the study by Beier *et al.* (14), alcohol misuse was more common in men, while in the studies by Turner *et al.* (9) and Fragoso *et al.* (7) the prevalence was similar in both sexes. As other factors that may influence sex difference in the prevalence of alcohol misuse were not analyzed in any of the studies, the reason for different findings in MS patients remain unknown.

In the study by Fragoso *et al.* (7), there was no statistically significant age difference between the patients with and without alcohol misuse, as in our study. Opposite to these findings, a few previous studies found that alcohol misuse was more prevalent in a younger age group (8,10,14). Lower level of disability was found in the group of patients with alcohol misuse in all studies that compared alcohol intake and disability level between two groups of patients (7-10).

In the study by Bombardier *et al.* (8), alcohol misuse was more common in patients with shorter disease duration. None of the studies analyzed the factors that may influence the relationship of alcohol misuse in MS patients according to particular

age groups, level of incapacity (medium, moderate and severe), disease duration, and disease course.

Unlike the previous studies, in which respondents were selected from MS societies and hospital databases, or respondents were attending outpatient consultation, our respondents were MS patients referred for inpatient rehabilitation. Different selection of respondents could have an impact on the results, since our sample excluded some of patients with short disease duration associated with low functional deficit, younger age, and relapsing-remitting course of the disease because these patients are rarely treated as inpatients.

CONCLUSION

According to this study, alcohol misuse was present in 9.5% of MS patients. Because of the numerous health and social consequences of excessive alcohol intake, comprehensive care of MS patients should include counseling on the adverse effects of alcohol.

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Zlouporaba alkohola u oboljelih od multiple skleroze

SAŽETAK – Cilja rada: Cilj rada je bio odrediti učestalost zlouporabe alkohola kod oboljelih od multiple skleroze (MS) i analizirati povezanost zlouporabe alkohola sa spolom i dobi bolesnika, kliničkim oblikom MS, trajanjem bolesti i stupnjem onesposobljenosti. **Ispitanici i metode:** Ispitanici su bili oboljeli od MS stariji od 18 godina koji su u razdoblju od 15. svibnja 2015. do 15. studenoga 2015. provodili stacionarnu rehabilitaciju u Specijalnoj bolnici Lipik. Isključni kriterij bilo je teže kognitivno oštećenje. Prikupljeni su podatci o spolu i dobi ispitanika, stupnju onesposobljenosti, kliničkom obliku MS i vremenu proteklom od postavljanja dijagnoze MS. Dijagnoza zlouporabe alkohola postavljena je pomoću upitnika AUDIT-C (*Alcohol Use Disorders Identification Test – Consumption*). Ispitanici su podijeljeni u dvije skupine ovisno o prisutnosti ili odsutnosti zlouporabe alkohola. **Rezultati:** Ukupan broj ispitanika bio je 158, od kojih je 15 (9,5%) bilo pozitivno na probiru za zlouporabu alkohola. Utvrđena je statistički značajno veća zastupljenost muškaraca ($p=0,048$) u skupini ispitanika koja je zloupotrebljavala alkohol. Nije nađena statistički značajna razlika između dviju skupina u odnosu na životnu dob ($p=0,787$), trajanje bolesti ($p=0,506$), stupanj onesposobljenosti ($p=0,367$) i klinički tijek bolesti ($p=0,663$). **Zaključak:** Prema ovoj je studiji zlouporaba alkohola bila prisutna u 9,5% oboljelih od MS. Zbog brojnih zdravstvenih i socijalnih posljedica prekomjernog uzimanja alkohola, briga o pacijentima oboljelim od MS trebala bi obuhvatiti i savjetovanje o štetnim učincima alkohola.

Ključne riječi: multipla skleroza, zlouporaba alkohola, upitnik AUDIT-C