SOCIOECONOMIC STATUS AND LIFESTYLE IN YOUNG ISCHAEMIC STROKE PATIENTS: A POSSIBLE RELATIONSHIP TO STROKE RECOVERY AND RISK OF RECURRENT EVENT

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SUMMARY

Objectives: Socioeconomic status (SES) and lifestyle have impact on recovery after ischaemic stroke (IS) and on risk of recurrent ischaemic stroke (RIS) in elderly patients. With regard to currently available limited data on young people, we aimed to assess SES and parameters of lifestyle and evaluate their relationship to stroke recovery and risk of RIS in young patients.

Methods: We analysed consecutive young IS patients < 50 years enrolled in the prospective HISTORY (Heart and Ischaemic STrOke Relationship studY) study registered on ClinicalTrials.gov (NCT01541163). Data were acquired from structured a self-evaluating multiple-choice questionnaire. Clinical outcome was assessed using the Modified Rankin Scale (MRS) after 3 months with score 0–1 for excellent outcome.

Results: Data were obtained from 297 (163 males, mean age 39.6 ± 7.8 years) young patients. Patients with MRS 0–1 (237, 79.8%) did not differ in SES except university education (21.1 vs. 3.3%; p = 0.001), less smoked (16.5 vs. 58.3%; p < 0.001), more of them did regular sport activities (79.1 vs. 51.6%; p = 0.02) and passed regular preventive medical checks (45.6 vs. 24.2%; p = 0.01). Twelve (4%) patients suffered from RIS during a follow-up with median of 25 months. They did not differ in SES but had higher body mass index (31.6 vs. 26.7; p = 0.007), reported less regular sport activities (16.7 vs. 73.0%; p < 0.001) and less regular medical checks (8.3 vs. 40.0%; p = 0.001).

Conclusion: In young patients, SES had no relationship to clinical outcome after IS and to risk of RIS except education level. Some parameters of health lifestyle were presented more in patients with excellent outcome and without RIS during the follow-up.

Key words: young, ischaemic stroke, socioeconomic status, lifestyle, outcome, recurrent ischaemic stroke

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INTRODUCTION

Socioeconomic status (SES) and different lifestyle parameters have impact on recovery after ischaemic stroke (IS) and on risk of recurrent ischaemic stroke (RIS) in elderly patients (1–9). Although most young patients achieve a good 3-month clinical outcome after IS (10–13), different factors may have impact on better recovery; especially lower stroke severity and substantially less serious comorbidities (13–16). Nevertheless, the impact of SES and lifestyle on stroke recovery in young patients remains unclear due to a lack of relevant research.

Previous studies showed controversial associations between SES and risk of recurrent IS (RIS) in elderly stroke patients (17–22). In young patients, the relationship between SES and risk of RIS remains unclear (23).

Specific lifestyle risk factors associated with IS were well identified in elderly patients previously (9, 16, 24), but in young patients, only limited data are available (13).

Besides the known important modifiable lifestyle risk factors, also other aspects of young lifestyle including mental and psychic status may be associated with the risk of IS or with better recovery after stroke (7), however, these aspects have not yet been sufficiently investigated.

With regard to available limited reports, mostly based on data from the retrospective analyses or patients' registries, we aimed to assess SES and parameters of lifestyle before IS in young patients < 50 years and evaluate their possible relationship to stroke recovery, risk of RIS and stroke aetiology in the form of prospective study. A better identification of relevant lifestyle factors may contribute to an improvement of stroke prevention and adherence to healthier lifestyle in young.

MATERIALS AND METHODS

We analysed the data of consecutive young IS patients < 50 years, who were enrolled in the prospective single-centre observational HISTORY (Heart and Ischaemic STrOke Relationship studY) study registered on ClinicalTrials.gov (identifier NCT01541163) between the years 2011 and 2020 (25). All enrolled patients underwent an identical diagnostic protocol, which was published in detail previously (13, 25).

A 3-month clinical outcome was assessed by an experienced certified neurologist and using the Modified Rankin Scale (MRS). For this study analysis, an excellent clinical outcome was defined as a score 0–1. All patients used antiplatelets or anticoagulants in the secondary prevention according to the stroke aetiology. Most enrolled patients were followed through a clinical or phone controls at least once a year in the follow-up. In some patients, the follow-up controls were performed through the phone call with their practitioners. Causes of strokes were classified and graded according to the ASCOD classification (26). All patients with the ASCOD score other than "grade 1" (potentially causal) were classified as cryptogenic (26).

Analysed data were obtained from a structured self-evaluating multiple-choice questionnaire, which most patients fulfilled during the hospital stay. Some patients completed it after the discharge during the scheduled follow-up outpatient controls. The questionnaire was structured into four main parts: demographic characteristics including vascular risk factors and conditions, socioeconomic status, lifestyle, and self-evaluation of mental and psychic status before IS. The assessment of SES involved level of education, income, occupation, marital status, and place of residence. Data of all patients were collected anonymously under allocated anonymous reference numbers in the study database. Subsequent data processing and analysing of patients' clinical parameters was done in a blinded form.

The study protocol was in compliance with the Declaration of Helsinki (1975) and was approved by the Ethical Committee of our hospital. All patients gave an informed consent to participation in the study.

SPSS software (version 22.0; IBM corp., Armonk, NY, USA) was used for the statistical analysis. Normality of distribution was checked using the Shapiro-Wilk test. All parameters with non-normal distributions are presented as means ± SD, medians, and interquartile ranges. The Man-Whitney test was used for non-parametric values and the chi-square test and Fisher's exact test were used for parametric values. For the group analysis of quantitative parameters, Kruskal-Wallis and Dunn's post-hoc test was used. All tests used an α-level of 0.05 for significance.

RESULTS

Data were obtained and analysed from 297 (163 males, mean age 39.6 ± 7.8 years) young IS patients < 50 years enrolled in the HISTORY study during the years 2011 and 2020. The demographic, baseline and clinical characteristics, and investigated parameters of SES and lifestyle of all enrolled patients are shown in Table 1. Young females with IS had lower BMI (25.5 ± 2.9 vs. 29.0 ± 4.8, $p < 0.001$), less smoked (15.6 vs. 38.7%, $p < 0.001$), less drank alcohol (28.0 vs. 61.3%, $p < 0.001$), more females passed regular preventive medical checks (53.6 vs. 27.1%, $p < 0.001$), and more reported enough sleep and relax in a period before IS occurred in comparison with males (31.9 vs. 14.5%, $p = 0.0004$) (Table 1).

Significant stress before IS was reported by 155 (52.2%) patients and stress was more frequent in women (62.3 vs. 44.0%, $p = 0.002$) (Table 2). A satisfaction with a quality of life before IS was present in 58.6% of patients, and males were satisfied more frequently than women (50.6 vs. 36.3%, $p = 0.009$) (Table 2). On the contrary, 31.0% of patients stated frequent or constant feelings of anxiety, depression or moodiness before IS without sex difference (Table 2).

Two hundred ten (70.7%) patients were identified as cryptogenic according to the ASCOD classification (Table 3) and no difference was found among individual stroke aetiological subtypes in all investigated parameters except age: the patients with cardio-embolic stroke were older than patients with other (uncommon) stroke aetiology (Table 3).

Two hundred thirty-seven (79.8%) patients achieved excellent 3-month clinical outcome (MRS 0–1) and no difference was found in the rate of excellent outcome between males and females (Table 1). Patients with MRS 0–1 were less smokers (16.5 vs. 58.3%, $p < 0.001$), had more frequently university education (21.1 vs. 3.3%, $p = 0.001$), more of them did regular sport activities (79.1 vs. 51.6%, $p = 0.02$), and more of them passed regular preventive medical checks before IS (45.6 vs. 24.2%, $p = 0.01$) (Table 4).

Twelve (4.0%) patients suffered from RIS during the follow-up with a median of 25 months and no difference was found in the rate of RIS between males and females (4.9 vs. 3.0%, $p = 0.708$) (Table 5). Patients with RIS had higher body mass index (31.6 vs. 26.7%, $p = 0.007$), less of them did regular sport activities (16.7 vs. 73.0%, $p < 0.001$) and less of them passed regular medical checks before IS (8.3 vs. 40.0%, $p = 0.001$) (Table 5). Patients without RIS drank more wine than patients with RIS (23.3 vs. 0%, $p = 0.01$) (Table 5).

DISCUSSION

In the presented study, no difference in SES was found between young IS patients < 50 years with excellent (MRS 0–1) and poorer 3-month clinical outcome except education level (Table 4). To our knowledge, a very few studies analysed the possible associations between SES and clinical outcomes in young IS patients and our findings are in contrast to the results reported from previous studies in elderly or age-unselected patients (1–5, 8). These studies showed that elderly patients with lower SES had poorer outcome in comparison with those with higher SES (1, 27), probably due to the fact that more severe neurological deficits and more comorbidities were reported in patients with lower SES (4). Pre-stroke occupation was associated with better outcomes in patients with mild IS, but not education, income or marital status (8). Fact, that we did not find any differences in SES between patients with excellent and poorer outcome except the education level, may be also related to generally small SES differences in our population without limitations in access to healthcare system in our country.

Table 1. *Comparison of selected demographic, baseline and clinical characteristics, and investigated parameters of SES and lifestyle between males and females (N = 297)*

	Total n (%)	Males n (%)	Females n (%)	p-value
Number of enrolled patients	297	163	134	–
Age (years), mean (SD)	39.6 (7.8)	39.0 (6.5)	40.3 (7.3)	0.106
Ischaemic stroke in ant. circulation	215 (72.4)	116 (71.2)	99 (73.8)	0.803
NIHSS at admission (median)	4	4	3	0.902
IV thrombolysis	107 (36.0)	59 (36.2)	48 (35.8)	1.000
Mechanical thrombectomy	56 (18.9)	30 (18.4)	26 (19.4)	0.908
MRS 0–1 after 3 months	237 (79.8)	128 (78.5)	110 (82.1)	0.405
RIS during follow-up	12 (4.0)	8 (4.9)	4 (3.0)	0.708
BMI, mean (SD)	27.5 (4.3)	29.0 (4.8)	25.5 (2.9)	< 0.001
Education				
Secondary school and higher	175 (59.0)	88 (54.2)	87 (64.6)	0.057
University	52 (17.5)	32 (19.7)	20 (15.1)	0.288
Smoking	74 (24.9)	63 (38.7)	21 (15.6)	< 0.001
Alcohol drinking[a]	138 (46.5)	100 (61.3)	38 (28.0)	< 0.001
Beer	91 (65.9)	79 (79.0)	12 (31.1)	< 0.001
Wine	67 (48.6)	39 (39.0)	28 (72.6)	0.534
Spirits	18 (13.0)	13 (13.0)	5 (13.1)	0.127
Frequency of alcohol drinking				
Daily	8 (2.7)	8 (4.9)	0	< 0.001
Every other day	21 (7.1)	18 (11.3)	3 (2.3)	
Twice per week	79 (26.6)	58 (35.3)	21 (15.5)	
Once per week	30 (10.1)	16 (9.8)	14 (10.2)	
Twice per month	54 (18.2)	22 (13.5)	32 (24.2)	
Exceptionally	67 (22.6)	28 (17.2)	39 (29.0)	
Never	38 (12.8)	13 (8.0)	25 (18.6)	
Married	169 (56.9)	92 (56.4)	77 (57.4)	0.860
Children				
None	74 (24.9)	51 (32.2)	23 (16.8)	0.020
One or two	191 (64.3)	96 (59.2)	95 (71.0)	
Three or more	32 (10.8)	16 (9.6)	16 (12.2)	
Employment	255 (85.9)	143 (87.8)	112 (83.6)	0.307
Income				
Low	64 (21.6)	36 (22.1)	28 (21.0)	0.906
Average	216 (72.7)	113 (69.3)	103 (76.9)	0.104
High	17 (5.7)	14 (8.6)	3 (2.2)	0.237
Living in urban areas	159 (53.5)	90 (55.2)	69 (51.5)	0.522
Regular sport activity[b]	210 (70.7)	116 (71.2)	94 (70.1)	0.848
Regular feeding[c]	250 (84.2)	131 (80.4)	119 (88.8)	0.047
Regular preventive medical checks	116 (39.1)	44 (27.1)	72 (53.6)	< 0.001
Enough relax and sleep	67 (22.6)	24 (14.5)	43 (31.9)	< 0.001

[a]at least once per week; [b]at least one hour per week; [c]at least three times per day; BMI – body mass index; IV – intravenous; NIHSS – National Institute of Health Stroke Scale; MRS – modified Rankin Scale; RIS – recurrent ischaemic stroke; SD – standard deviation

Our patients with excellent 3-month clinical outcome less smoked, more of them did regular sport activities and more of them passed regular medical checks before IS in comparison to those with poorer outcome (Table 4). These findings support a suggestion of positive effect of healthy lifestyle on recovery after IS. The found association between regular sport activity and

Table 2. *Mental and psychic status and quality of life before ischaemic stroke (patient' self-evaluation); comparison between males and females (N = 297)*

	Total n (%)	Males n (%)	Females n (%)	p-value
Number of enrolled patients	297	163	134	–
Significant stress before IS	155 (52.2)	72 (44.0)	83 (62.3)	0.002
Frequent or constant feelings of anxiety, depression or moodiness	92 (31.0)	51 (31.3)	41 (31.0)	1.000
QoL very satisfied	43 (14.5)	18 (10.8)	25 (18.6)	0.064
QoL satisfied	131 (44.1)	83 (50.6)	48 (36.3)	0.009
QoL neutral	104 (35.0)	50 (30.4)	54 (40.2)	0.084
QoL unsatisfied	17 (5.7)	10 (6.3)	7 (4.9)	0.737
QoL very unsatisfied	2 (0.7)	2 (1.3)	0	0.503

IS – ischaemic stroke; QoL – quality of life

excellent 3-month clinical outcome is in line with the previous report that low self-reported sport activity before IS predicted poor 1-year functional outcome (7).

No difference in SES including education level was found between young IS patients with RIS and without RIS in our study (Table 5), which is in contrast to previous studies in elderly patients; either positive or negative impact of SES on risk of RIS was shown in the previous studies (17–22). Results of the Swedish nationwide observational study showed that higher education and income were associated with reduced risk of RIS (28). It has been demonstrated that patients with lower SES had less access to adequate secondary prevention and patients with lower education and income had lower likelihood of prescription of statins and oral anticoagulants (for atrial fibrillation) in the secondary prevention than the patients with university education and high income (29–31).

Low physical activity or inactivity is considered one of the most prevalent modifiable risk factors in young IS patients, but its strength of association remains still not enough studied (16). It is generally accepted that low physical activity is associated with a metabolic syndrome and its components, which may increase the risk of IS (15). In the SIFAP1 study, the physical inactivity was the second most frequent risk factor (48.2%) in young IS patients (32). In our study, only 29.3% patients declared no regular sport activity before IS and significantly more patients without RIS did regular sport activities than those with RIS (Table 5).

In line with previously reported results, males had greater alcohol consumption and less slept in our study, but young females had lower BMI and less smoked than males in our study (Table 1), which is in contrast to previous reports (32). Furthermore, we did not observe any other previously reported difference between our males and females (Table 1) (32).

Besides the important modifiable risk factors, we evaluated also other relevant aspects of lifestyle. More patients with excellent 3-month outcome after IS and more patients without RIS passed regular preventive medical checks in comparison to those with poorer 3-month outcome and to those with RIS (Table 4). More patients without RIS reported also enough sleep and relax in the period before IS occurred (Table 5). These findings may also contribute to the improvement of prevention in young population.

In our study, more than a half of young patients reported a significant stress before IS and 31.0% of patients stated frequent or constant feelings of anxiety, depression or moodiness before IS (Table 2). It is generally accepted, that stress and negative emotions including depression, anger and hostility affect cardiovascular morbidity and mortality and may increase the risk of stroke (33–37).

No difference was found in SES and in all investigated lifestyle parameters among individual aetiological subtypes of IS according to the ASCOD classification in our study set (Table 3), however, unhealthy lifestyle may be associated with presence of vascular risk factors and metabolic disorders and the patients would have more likely large artery atherosclerosis, small vessels disease or cardio-embolic aetiological subtype of IS (14, 38–40). A great disparity in numbers of patients among individual aetiological subgroups may be a potential reason of our neutral result.

Several limitations of our study should be mentioned. We used a single centre design without health controls comparison and based on the protocol of the prospective HISTORY study (25). An exploratory character of presented study, which was designed as primarily descriptive with a lack of power for logistic regression analysis, represents another limit. A self-evaluation with self-reports of all investigated parameters could increase misclassification bias and might led to over or underestimations of evaluated parameters. For the assessment of physical activity, we did not use definition of the WHO or other societies, which were used mostly in the studies on elderly patients. With regard to lower age of our study patients, we used a total time of sport activities done per week, which we considered more appropriate, as a parameter for the assessment of physical activity in our young patients. Small differences in SES in our population and similar access to health care for all citizens in our country may also limit our results. We did not use standardized measures for QoL self-evaluation as well as for the assessment of psychic status.

CONCLUSIONS

SES had no relationship to clinical outcome after IS and to risk of RIS except education level in our study. Patients with

Table 3. *Comparison of investigated parameters among aetiological subtypes of IS according to ASCOD classification*

Stroke aetiology	CIS n (%)	CE n (%)	LAA n (%)	SVD n (%)	Dissection n (%)	Other n (%)	p-value
Number of enrolled patients	210	47	8	2	18	12	–
Age (years), mean (SD) median	41.9 (6.9) 44.0	44.3 (4.2) 44.0	45.5 (3.6) 45.6	46.5 (0.7) 46.5	40.4 (6.6) 43.0	36.1 (5.3) 37.0	0.029[#]
BMI, mean (SD) median	26.7 (4.7) 26.0	27.9 (5.6) 28.4	30.0 (8.4) 26.8	30.1 (0.4) 30.1	24.9 (4.6) 25.2	27.2 (4.9) 27.3	0.469
Education							
Secondary school and higher	123 (58.6)	28 (59.6)	5 (62.5)	1 (50.0)	11 (61.1)	7 (58.3)	0.371
University	42 (20.0)	6 (12.7)	0	0	3 (16.7)	1 (8.3)	
Smoking	49 (23.3)	14 (29.8)	3 (37.5)	0	6 (33.3)	2 (16.7)	0.596
Alcohol drinking[a]	99 (47.1)	21 (44.7)	4 (50.0)	1 (50.0)	8 (44.4)	5 (41.7)	0.305
Beer	62 (29.5)	15 (31.9)	3 (37.5)	1 (50.0)	6 (33.3)	4 (33.3)	0.762
Wine	51 (24.3)	11 (23.4)	0	0	2 (11.1)	3 (33.3)	0.737
Spirits	14 (6.7)	4 (8.5)	0	0	0	0	0.149
Frequency of alcohol drinking							
Daily	8 (3.8)	2 (4.3)	2 (25.0)	0	2 (11.1)	0	0.122
Every second day	18 (8.6)	6 (12.8)	1 (12.5)	0	0	0	
Twice per week	52 (24.8)	8 (17.0)	1 (12.5)	2 (100.0)	4 (22.2)	3 (25.0)	
Once per week	21 (10.0)	5 (10.6)	0	0	2 (11.1)	2 (16.7)	
Twice per month	34 (16.2)	2 (4.3)	0	0	0	2 (16.7)	
Exceptionally	50 (23.8)	0	0	0	0	0	
Never	28 (13.3)	6 (12.8)	0	0	2 (11.1)	2 (16.7)	
Married	120 (57.1)	26 (55.3)	6 (75.0)	1 (50.0)	6 (33.3)	10 (83.3)	0.168
Children							
None	56 (26.7)	11 (23.4)	0	0	4 (22.2)	3 (25.0)	0.906
One or two	135 (64.3)	33 (70.2)	4 (50.0)	2 (100.0)	9 (50.0)	8 (66.7)	
Three or more	24 (11.4)	4 (8.5)	1 (12.5)	0	2 (11.1)	1 (8.3)	
Employment	181 (86.2)	41 (87.2)	6 (75.0)	2 (100.0)	15 (83.3)	10 (83.3)	0.597
Income							
Low	45 (21.4)	10 (21.3)	2 (25.0)	0	4 (22.2)	3 (25.0)	0.305
Average or higher	165 (88.6)	37 (82.9)	6 (87.5)	2 (100.0)	14 (94.4)	9 (66.7)	
Living in urban areas	108 (51.4)	31 (65.9)	4 (50.0)	1 (50.0)	10 (55.6)	5 (41.6)	0.445
Regular sport activity[b]	152 (72.4)	35 (74.4)	4 (50.0)	0	12 (66.7)	8 (66.7)	0.263
Regular feeding[c]	180 (85.7)	40 (85.1)	4 (50.0)	1 (50.0)	15 (83.3)	10 (83.3)	0.266
Regular preventive medical checks	89 (42.4)	18 (38.3)	2 (25.0)	0	4 (22.2)	3 (25.0)	0.140
Enough relax and sleep	49 (23.3)	12 (25.5)	0	0	4 (22.2)	2 (16.7)	0.414

[a]at least once per week; [b]at least one hour per week; [c]at least three times per day; [#]CE vs. others (Dunn's post-hoc test);
CIS – cryptogenic ischaemic stroke; CE – cardioembolic; LAA – large artery atherosclerosis; SVD – small vessels disease

excellent 3-month outcome after IS and patients without RIS had healthier lifestyle before IS. More than a half of young IS patients reported significant stress before IS and one third of patients reported negative emotions and depression before IS in our study. Our findings emphasize the impact of healthy lifestyle on stroke recovery and risk of IS in young patients < 50 years and the importance of mental health and regular preventive medical checks for stroke prevention.

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Conflict of Interests

None declared

Table 4. *Comparison of investigated parameters between patients with excellent clinical outcome after 3 months (MRS 0–1) and patients with neurological and functional sequels (MRS 2–5)*

	MRS 0–1 n (%)	MRS 2–5 n (%)	p-value
Number of enrolled patients	237	60	–
Age (years), mean (SD) median	41.9 (6.5) 44.0	42.2 (7.1) 45.0	0.551
BMI, mean (SD) median	26.2 (4.6) 25.2	26.9 (5.0) 26.4	0.476
Education			
Secondary school and higher	141 (59.5)	34 (56.7)	0.705
University	50 (21.1)	2 (3.3)	0.010
Smoking	39 (16.5)	35 (58.3)	<0.001
Alcohol drinking[a]	109 (46.0)	29 (48.3)	0.879
Beer	72 (30.1)	19 (31.7)	0.904
Wine	57 (24.1)	10 (16.7)	0.548
Spirits	12 (5.1)	6 (10.0)	0.300
Frequency of alcohol drinking			
Daily	4 (0.8)	4 (6.7)	0.107
Every other day	16 (6.8)	5 (8.3)	0.805
Twice per week	62 (26.2)	18 (30.0)	0.906
Once per week	24 (10.1)	6 (10.0)	0.908
Twice per month	47 (19.8)	7 (11.7)	0.074
Exceptionally	55 (23.2)	12 (20.0)	0.252
Never	30 (12.7)	8 (13.3)	0.794
Married	137 (57.8)	32 (53.3)	0.206
Children			
None	62 (26.1)	12 (20.0)	0.480
One or two	159 (66.7)	33 (55.0)	
Three or more	24 (10.1)	7 (11.9)	
Employment	208 (87.8)	47 (78.3)	0.104
Income			
Low	49 (21.0)	15 (25.0)	0.118
Average or higher	188 (79.3)	45 (75.0)	0.925
Living in urban areas	131 (55.3)	28 (46.7)	0.257
Regular sport activity[b]	181 (76.4)	29 (48.3)	0.002
Regular feeding[c]	201 (84.8)	49 (81.7)	0.568
Regular preventive medical checks	105 (44.3)	11 (18.3)	0.010
Enough relax and sleep	53 (22.4)	14 (23.3)	0.803

[a]at least once per week; [b]at least one hour per week; [c]at least three times per day; BMI – body mass index; MRS – modified Rankin Scale; SD – standard deviation

Table 5. *Comparison of investigated parameters between patients with and without RIS*

	non-RIS n (%)	RIS	p-value
Number of enrolled patients	285	12	–
Age (years), mean (SD)	42.0 (6.6)	41.2 (4.8)	0.401
BMI, mean (SD)	26.7 (4.9)	31.6 (2.8)	0.007
Education			
Secondary school and higher	168 (58.9)	7 (58.3)	0.903
University	51 (17.9)	1 (8.3)	0.338
Smoking	70 (24.6)	4 (33.3)	0.213
Alcohol drinking[a]	132 (46.3)	6 (50.0)	0.682
Beer	86 (30.2)	5 (41.7)	0.402
Wine	67 (23.5)	0	0.010
Spirits	17 (6.0)	1 (8.3)	0.857
Frequency of alcohol drinking			
Daily	8 (2.8)	0	0.435
Every next day	21 (7.3)	0	
Twice per week	75 (26.3)	4 (33.3)	
Once per week	28 (9.8)	2 (16.7)	
Twice per month	54 (18.9)	0	
Exceptionally	67 (23.5)	0	
Never	36 (12.6)	2 (33.3)	
Married	163 (57.1)	6 (50.0)	0.401
Children			
None	70 (24.6)	4 (33.3)	0.619
One or two	185 (64.9)	6 (50.0)	
Three or more	30 (10.5)	2 (16.7)	
Employment	244 (85.6)	11 (91.7)	1.000
Income			
Low	62 (21.7)	2 (16.7)	0.508
Average or higher	223 (78.2)	10 (83.3)	
Living in urban areas	151 (53.0)	8 (66.7)	0.682
Regular sport activity[b]	208 (73.0)	2 (16.7)	< 0.001
Regular feeding[c]	240 (84.2)	10 (83.3)	1.000
Regular preventive medical checks	115 (40.0)	1 (8.3)	0.001
Enough relax and sleep	66 (23.2)	0	0.107

[a]at least once per week; [b]at least one hour per week; [c]at least three times per day; RIS – recurrent ischaemic stroke; BMI – body mass index; SD – standard deviation

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