A MULTIDISCIPLINARY APPROACH TO TREATING OBESITY IN A COMMUNITY HEALTH CENTRE

CELOSTNI PRISTOP ZDRAVLJENJA DEBELOSTI NA PRIMARNI RAVNI

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ABSTRACT

Objectives. The aim of the study is to assess the weight loss programme with regards to the long-term effectiveness of weight reduction and weight maintenance, using completion rate and BMI, blood sugar, cholesterol and blood pressure levels as outcomes. The aim of the study also includes identifying the factors associated with adherence to the programme.

Methods. The programme was developed by a multidisciplinary team. It included 6 months of introduction and another 18 months of maintenance. The data for 397 participants was collected after 24 months.

Results. 346 participants have completed the introduction and 123 have completed the programme. In the introduction, the average weight loss was 12% of the initial weight. The participants, who completed the full programme, lost 9.4% of their initial weight. The participants also significantly ($p<0.05$) reduced their blood sugar and cholesterol levels, as well as their blood pressure. The factors associated with adherence to the programme are: age over 50, lower educational levels, lower initial weight and higher weight loss in the introduction.

Conclusions. The multi-disciplinary approach to obesity treatment was effective for a selected group of people. The proportion of dropouts was relatively high, but still low compared to similar programmes. Group treatment and mutual support are of a great importance in bringing about and maintaining the changes.

Keywords:
obesity therapy, weight reduction programme, primary health care, health care team, Slovenia, patient adherence

IZVLEČEK

***Izhodišča**. Namen raziskave je bil opredeliti kratkoročno in dolgoročno uspešnost programa glede na vztrajanje v njem, ITM, vrednost krvnega sladkorja, holesterola in krvnega tlaka pri udeležencih, ki so program zaključili. Želeli smo tudi opredeliti dejavnike, ki napovedujejo vztrajanje v programu.*

***Metode**. V programu sodeluje multidisciplinarni tim strokovnjakov: zdravnik, diplomirana medicinska sestra, fizioterapevt in profesor telesne vadbe. Program ima dva dela: 6-mesečni shujševalni del in 18-mesečni vzdrževalni del. V program se je vključilo 397 udeležencev po nasvetu osebnega zdravnika. Podatke smo ocenili po 24 mesecih.*

***Rezultati**. Prvi, shujševalni del programa je zaključilo 346 udeležencev, od tega jih je 123 zaključilo celotni program. V shujševalnem delu je bilo povprečno znižanje teže za 12% začetne teže, pri tistih, ki so zaključili vzdrževalni program, pa za 9,4% začetne teže. Udeležencem se je po dveh letih statistično pomembno ($p<0,05$) znižala vrednost krvnega sladkorja in holesterola, prav tako sta se znižala tudi sistolični in diastolični krvni tlak. Dejavniki, ki so vplivali na daljše vztrajanje v programu, so bili starost nad 50 let, nižja izobrazba, nižja vstopna teža in večja izguba kilogramov v prvem delu programa.*

***Zaključek**. Z raziskavo smo želeli dokazati, da je multidisciplinarni pristop zdravljenja debelosti za tiste, ki zaključijo program v celoti, učinkovit. Delež tistih, ki so program zaključili predčasno, je relativno visok, vendar v primerjavi z ostalimi podobnimi programi še vedno nizek. Izkazalo se je, da so pogost stik s strokovnjakom, skupinska obravnava ter podpora ljudem z enakimi težavami izrednega pomena pri spreminjanju in vzdrževanju sprememb.*

Ključne besede:
zdravljenje debelosti, program vzdrževanja nižje teže, primarno zdravstveno varstvo, Slovenija, vztrajanje v programu

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1 INTRODUCTION

Obesity is a chronic disease caused by psychological, social and genetic factors. Its incidence in the world continues to grow (1, 2). This growth is due to an easier access to food, higher food diversity, decreased bodily activity and the stress of modern living. The increased body weight is associated with an increased risk of developing various health problems (3). Even a small weight loss, from 5 to 10%, helps to improve one's health (4).

The problem of obesity can be addressed on various levels. In 2014, more than 1.9 billion adults aged 18 years and older were overweight worldwide. At least 600 million of them were clinically obese; of which 39% adults were overweight and 13% obese (5). Based on the latest estimates in the European Union countries, 30-70% of the population is overweight, and obesity affects 10-30% of adults (5). The number of overweight children in EU has also been rising steadily (5). Slovenia is among EU countries with a high proportion of obesity, with 37.7% of overweight and 17.2% of obese adults (6). The proportion of adolescents who are overweight and obese is also increasing (7).

On an individual level, more than 30,000 different methods for weight management have been published (8, 9). A lot of them use alternative and complementary techniques. Many different types of treatment, including dieting by limiting caloric intake, behavioural approach, physical activity, medical therapy or surgery alone, have shown that the reduced weight gradually returns after the completed programme (10, 11). The most successful methods include multidisciplinary approaches, based on an individual work with a patient or a group, which helps maintain their motivation (12). Recently, more emphasis has been put on the long-term effectiveness of multidisciplinary programmes.

The new guidelines (13) recommend programmes that include three key components, namely: a moderately reduced diet, an increased physical activity and the use of behavioural strategies to help patients achieve and maintain a healthy body weight. According to the recommendations, team approach should be used, involving trained professionals, where primary care is considered to be the best setting for this activity.

Because of their complexity, these programmes are rare, poorly evaluated and poorly studied in a systematic manner, or they often fail to achieve and maintain the desired body weight (14).

In Slovenia, a National Health Programme for cardiovascular diseases was implemented in 2001, and its preventive programmes were implemented in health centres. One of the programmes is a programme of weight reduction and lifestyle change, which lasts for 16 weeks.

1.1 Description of the Weight Loss Programme

In an urban health centre in Ljubljana, Slovenia, a long term programme of weight reduction has been developing over the years.Theprogramme is a multidisciplinary one, and it was developed by a group of different experts. Doctors, graduate nurses, a professorof physical education and aphysical therapist all contributed to the creation and the implementation of the programme.

The method is based on the principle that the patient should be monitored even after he/she has reached the target weight, and that the multidimensional problem of obesity should be treated with a multidisciplinary approach.

The programme has two parts. The initial phase is aimed at lowering body weight and it lasts for six months. This phase is followed by the monitoring phase, which is aimed at maintaining the weight and keeping the changes in lifestyle. The total duration of the programme is two years.

There are four objectives or goals that the participants are supposed to achieve in the programme:

- To maintain healthy eating habits, including the limitation of the daily caloric intake, from 500 to 1000 kcal from the energy needs of the obese adult.
- To engage in an appropriate physical activity.
- To improve self-confidence and quality of life.
- To maintain the lifestyle changes.

At the beginning, each participant is assessed by the programme physician, who assesses their readiness for health changes, records their history of dieting and assesses their personal eating habits, trigger events for overeating, barriers to success, as well as the time of being obese and maximum body weight at any time. Afterwards, a clinical and laboratory examination is made to identify other potential risk factors. On the basis of this, the physician, together with the participant, sets a healthy, realistic target with regards to the patient's weight. The target is discussed on an individual level, considering the decrease in body fat percentage while preserving lean mass.

Phase 1: the initial phase

The initial phase of the programme was designed to motivate participants to perform a regularand continuous physical activity of moderate intensity, and it consists of three sessions per week.

The programme starts with a visit to the physician in charge of the programme. These visits are repeated every two weeks. On alternate weeks, group sessions for 12 participants are organized. The group is led by a nurse who has been specially educated in the area of obesity, and who is, at the beginning of the programme, under

the supervision of physician. The nurse leads the group, devises an individual meal and activity plan. After this stage, the nurse analyses dietary and activity diaries, identifies lapses, helps solving the problems, monitors change in body weight and body structure, which facilitates motivation.

Additionally, physical activity is organized once a week at a gym and once a week outdoors. These sessions are led by a teacher of physical education, or a physiotherapist. The group sessions in this part of the programme consist of educational and psychotherapeutic elements (behavioural, family and relationship therapy) with an emphasis on self-monitoring and social support for change. The aim of the initial part of the programme was to achieve the target weight through smaller realistic goals, at least for 5-10 % for the initial weight loss. In this period, we help the participants find out how to change their old habits and adhere to a healthier lifestyle.

Phase 2: the maintenance phase

The weight maintenance programme is organized three times a week. It consists of weekly group therapy and twice-a-week physical activity at a health centre. The participants are also encouraged to follow intense exercise at least twice on the remaining days of the week (e.g. brisk walking, jogging, cycling, and swimming) on their own.

The goal of the maintenance programme is to enable the participants to maintain the lifestyle changes they have adopted in the previous phase. It showed that 20% could afford the occasional minor offenses in diet, but had to be constantly corrected by an increased physical activity. The results of the inspection were regularly monitored, recorded, and compared with the agreed objectives. They compared the old and new habits in their lifestyle, and were motivated to maintain the new, lower weight and a healthy lifestyle. The participants in this part of the programme are given more information on anti-stress techniques, maintaining weight during holidays, picnics, visits to restaurants, and other everyday situations.

The aim of the paper is to evaluate the programme with regards to the short-term effectiveness of the weight loss programme, as well as to confirm the effectiveness of the programme with regards to health risk reduction, including BMI, blood sugar, cholesterol and blood pressure, which influence the development of chronic non-infectious diseases. The paper also aims to determine the impacts of social factors, age, sex, education and social status on persevering in the programme, and the maintenance of a lower weight after the completed weight-reduction process.

2 METHODS

The programme was advertised in the health centre and offered to people who had problems with obesity. Patients were recruited at the advice of their physician.

2.1 Subjects

The study included the participants, who visited the Health centre Ljubljana, between 2005 and 2010, and were invited to participate in the programme. Among the people invited, 397 agreed to enter a two-year Obesity treatment programme. We included persons with BMI above 27, with one or more risk factors, and those with BMI of more than 30, regardless of other risk factors.

Exclusion criteria were BMI < 27, and severe physical diseases, for example, patients with serious chronic or acute diagnosis, patients with psychotic diseases and pregnant women.

2.2 Measurements

The nutritional status was assessed anthropometrically (body weight, body height) and by means of indices, such as body mass and BMI. Weight was measured using a calibrated electronic scale, to the nearest 0.1 kg. Height was measured by Martin anthropometer to the nearest 0.1 cm.

On the basis of the data obtained and BMI, still the best proxy for body fat percentage among rations of weight and height (15), the targeted body weight was calculated. The target weight was established on the individual level, taking into account patients' maximum weight and the duration of their weight gainin years (16).

The risk factors, i.e. blood sugar and cholesterol, were examined in serum every six months using laboratory methods and by measuring the blood pressure.

2.3 Success Criteria

The success criteria were: long term effectiveness, completion rate and BMI, blood sugar, cholesterol and blood pressure in patients that had finished the programme.

We assessed the effectiveness by the share of those who achieved and maintained, at the end of the 24 months' programme, at least 5 to 10% lower than their initial weight. We also wanted to identify the factors associated with a greater likelihood of finishing the programme.

2.4 Statistical Analyses

Logistic regression was used as a method of determining the factors that influence success. The accepted risk was 5%. The analysis was made using SPSS for Windows software version 13.

2.5 Ethical Considerations

We received written consent from all the participants allowing us to analyse the data. The study was approved by the National Ethics Committee of Slovenia, No.:24PK/06/11, Date: 27. 5. 2011

3 RESULTS

3.1 Description of the Sample

The number of participants who participated in the programme between 2005 and 2010 was 397 (352 women, 45 men). The initial programme was completed by 345 participants (34 men and 312 women). Out of them, about a third (123: 109 women and 14 men) then completed the full programme, which contained a cycle of 12 individual medical treatments, 12 group medical treatments and 24 hours of physical activities in health centre in six months. The average age of the participants that entered the programme was 53.3 (±11.7) years. The youngest participant was 19 years old and the oldest one 73. The majority of those in the two-year programme had a secondary school education (69 participants), the second greatest number included those with a lower education (34 participants), while the number of those with a college or university degree was the lowest (19 participants).

3.2 Success Criteria

3.2.1 Adherence

Table 1. The adherence to the programme by sex.

	Men	Women	P
Patients that have finished the six month programme	20 (44.4%)	203 (57.7%)	P<0.005
Patients that have finished the whole programme	14 (31.1%)	109 (30.9%)	P=0.995
Drop-outs	11 (24.4%)	40 (11.4%)	P<0.005
Total	45 (100%)	352 (100%)	

The sex difference in the adherence was statistically important (p<0.005): women were more likely to adhere to the programme.

3.2.2 Changes in BMI

Upon entering the programme, the average BMI was 34.7 (SD 4.3). Figure 1 shows the changes in BMI throughout the programme.

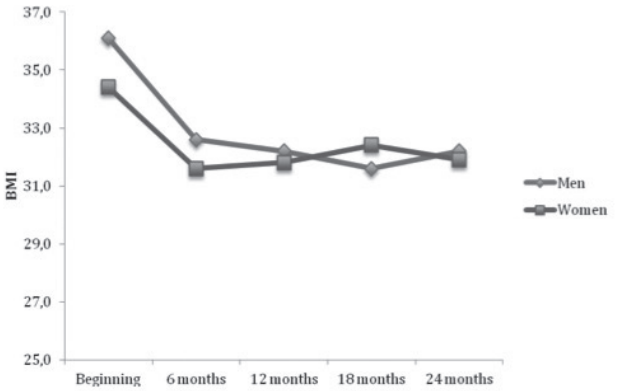

Figure 1. Values of BMI in the participants at the beginning and after 6, 12, 18 and 24 months.

The BMI decrease was statistically significant (p<0.05), the gender difference was not statistically significant (Table 2).

Table 2. BMI before and after the programme. Mean and standard deviation.

BMI (kg/m²)	The beginning of the programme	The end of the programme	P
Men	36.1 (3.3)	32.4 (4.3)	P<0.05
Women	34.5 (4.4)	32.0 (4.1)	P<0.05
Total	34.7 (4.3)	32.1 (4.1)	P<0.05

3.2.3 Cholesterol, Glucose and Blood Pressure Levels

After two years, the participants showed a statistically significant reduction in their blood sugar value (p<0.001), cholesterol (p<0.01), as well as systolic (p<0.001) and diastolic blood pressure (p<0.001). The results are shown in Table 3.

Table 3. The average values and SD of glucose, cholesterol, systolic and diastolic blood pressure (BP) before and after the programme.

BMI (kg/m²)	The beginning of the programme	The end of the programme	P
Glucose (mmol/l)	6.2 (1.6)	5.8 (1.3)	P<0.001
Cholesterol	5.7 (0.9)	5.5 (0.9)	P<0.005
Systolic BP (mmHg)	135.1 (19.0)	130.4 (15.6)	P<0.001
Diastolic BP (mmHg)	84.8 (11.0)	81.2 (9.4)	P<0.001

3.3 Predicting the Factors of Adherence

The factors influencing adherence to the programme are: age over 50, lower education levels, lower initial weight, and higher weight loss in the first part of programme (Table 4).

Table 4. Factors determining adherence to the programme.

	B	SE	Wald	Df	P	Exp (B)	95.0% interval EXP (B)	
							Min	Max
Education (1)	0.6430	0.2951	4.747	1	0.029	1.902	1.067	3.392
Age (1)	-0.6219	0.2545	5.968	1	0.015	0.537	0.326	0.884
Weight	-0.0089	0.0034	6.640	1	0.010	0.991	0.985	0.998
Difference in weight after 6 Months	0.0363	0.0196	3.430	1	0.064	1.037	0.998	1.077

4 DISCUSSION

4.1 Methodological Considerations

The sample of people participating in the programme does not reflect the prevalence of obesity in the population: there were nine times more women than men; the sample was not representative of Slovenia, since the programme was only conducted in urban health centres. Moreover, the sample consisted of significantly more women than men, because women were much more likely to decide to participate. Other authors also cited higher participation of women than men in the weight loss programmes (17, 18), which is due to the fact that obesity seems a more important issue for women than men, and that women tend to use health services more often (19), although statistics show that men are more likely to be overweight or obese (20). The relative non-attendance of men is probably an issue for the future,therefore alternative approaches more suitable for men should be considered.

4.2 Measures of Success

The first measure of success was adherence to the programme. The reported failure rates in the literature range from 10 to 80% (21). Patients tend to drop out of weight-loss programmes relatively quickly; usually in or around the sixth month of their treatment (22). From this perspective, our programme has been relatively successful, since nearly 87% of all patients finished the initial six months' part of the programme. The adherence rate to the long-term programme was, of course, lower, but still at the respectable 31%. In the literature, success rates between 20 and 45% are considered satisfactory (23, 24), so we can conclude that the adherence rate in our programme was relatively high for this type of health problem.

Other measures of success were expected: the average weight loss in the first six months of the initial programme was almost 10kg or 12% of the initial weight, which is comparable to similar published programmes in the world (14, 25). It is interesting to note that men were more successful than women in losing weight, which was also shown in studies by Petek (17) and Bishof (25). These results indicate, as does our study, a relatively greater success in maintaining low weight for men.

A lot of studies that have followed up patients for a longer period of time report a re-lapse of body weight after six months (26). Our study showed that women have indeed increased their weight slightly, while men still managed to reduce their weight up to 12 months after the programme. After that period, male and female participants increased their body weight moderately. Nevertheless, the increases of 2.2 kg at 12 months and of 2.6 kg after 24 months are small and within the success criteria in the guidelines, which consider that the maintenance programme has been successful, if patients do not gain more than 3 kg from the lowest achieved weight in the programme in two years (27).

The long-term success of those who completed the programme is also important, since, after two years, 40% of participants still maintained 10% less weightand less than 5% lower weight was maintained by 66% of participants. This is better than in the study by Teixeira, where, at the 24 month follow up, 45% of participants had retained a weight loss of at least 5% of their initial body weight. (28)

BMI is a better indicator of weight loss, as an important indication of the reduction and as an indicator of health risk (29) reached by the programme participants. The BMI in both sexes decreased significantly. As in other studies

(30, 31), we found that there was a significant reduction in other risk factors as well, such as blood pressure, sugar and cholesterol.

We can also see that, although the youngest age group was most successful in losing weight during the first part of the programme, the long-term effects were better in the age group between 51, while, in another study (32), no difference was observed for the degree of weight loss when classified by age.

4.3 Factors Influencing Adherence

Educational level, age over 50 years, a lower initial weight and weight loss within the first six months were important predictors of adherence to the programme. Maybe the cause for the higher dropout rate of those with a higher education were, as stated in the study by Grossi et al. (33), practical problems, problems at work and logistics, whereas, in the study by Greenberg, the level of education made no difference (34).

The effect of initial weight was observed by Baautista et al. (35); in their study, a higher initial BMI was also associated with a higher drop-out rate. A greater weight loss in the first part of the programme was also described in the study by Greenbergdb (34).In another study (36), the amount of weight loss during the first three weeks of treatment had a marginal effect on reducing adherence. Social status and sex had no impact on perseverance in our study. Interestingly, however, the fact that, in the first part of the programme, men were more successful did not affect greater persistence.

5 CONCLUSION

Our study shows that a multidisciplinary approach to treating obesity works for a selected group of patients, and that this approach has long-term effects. The complexity of the programme reflects the complexity of obesity as a health care problem, which requires long term commitment on behalf of both patients and healthcare providers. Frequent contacts with an expert, based on empathy, group treatment and mutual support between persons with equal problems are of great importance in bringing about and maintaining changes.

The multidisciplinary programme requires a commitment of the participants and staff, so this raises the question of the cost benefit.

On a systemic level, this programme fulfils the criteria to be upgraded to primary health care, the family medicine area of healthy weight loss.

Nevertheless, the issue of how to approach the groups of patients who find such methods unsuitable for them still remain. Obviously, new approacheswhich are more suitable for men need to be developed.

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CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

The study was approved by the National Ethics Committee of Slovenia, No.:24PK/06/11.

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ALCOHOL DRINKING AMONG THE STUDENTS OF THE UNIVERSITY OF MARIBOR, SLOVENIA

PITJE ALKOHOLA MED ŠTUDENTI UNIVERZE V MARIBORU, SLOVENIJA

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ABSTRACT

Background. Hazardous and harmful alcohol drinking is an important health, social and economic issue in Slovenia amongst all age groups. While drinking in Slovenia has been well researched amongst elementary and high school students, there is a lack of research on drinking amongst university students.

Methods. We conducted a cross-sectional study among first- and fourth-year students of the University of Maribor, Slovenia, attending the mandatory preventive health check between October 2009 and May 2010. During this health check, they filled in a non-anonymous lifestyle questionnaire. AUDIT-C questionnaire on alcohol use and questions on smoking and illicit drug use were also included.

Results. 3.130 students were included in the analysis, 1219 (38.9%) were males. There were 871 (27.8%) students that were screened as risky drinkers. The highest percentage of risky drinkers attended the Faculty for Wood Technology and the lowest the Faculty for Health Sciences. Students, recognized as healthier by the physicians, reported risky drinking significantly less often (p=0.015). Students with higher BMI reported risky drinking significantly more often (p=0.012). Variables, proved to be independently associated with the risky drinking in the multivariate analysis, were: bad health status (p=0.044), male sex (p<0.001), daily consumption of fried food (p=0.017), smoking (p<0.001), illicit drugs (p<0.001), attending the Faculty for Civil Engineering (p=0.006), not attending the Faculty for Health Sciences (p=0.002)

Conclusions. While the prevalence of risky drinking among students in this study is high, a structured preventive programme should be implemented for students,which will include also illicit drug use and smoking.

Keywords:
university students, risky alcohol drinking, binge drinking

IZVLEČEK

***Uvod**. Tvegano in škodljivo pitje alkohola je pomembna zdravstvena, socialna in ekonomska tema v Sloveniji, ki se dotika vseh starostnih skupin prebivalstva. Pitje alkohola je dobro raziskano med osnovnošolci in srednješolsko mladino, malo pa je podatkov o pitju alkohola med študenti.*

***Metode**. Izvedena je bila presečna raziskava med študenti prvih in četrtih letnikov Univerze v Mariboru, ki so obiskali obvezni preventivni zdravniški pregled med oktobrom 2009 in majem 2010. V okviru tega pregleda so izpolnili tudi neanonimni vprašalnik o življenjskem slogu, ki je med drugim vključeval vprašalnik AUDIT-C za oceno pitja alkohola ter vprašanja glede kajenja in rabe prepovedanih drog.*

***Rezultati**. V analizo je bilo vključenih 3130 študentov, od tega je bilo 1219 (38,9 %) moških. S presejalnim testom je bilo prepoznanih 871 (27,8 %) tveganih pivcev. Največji odstotek tveganih pivcev je bil med študenti višje lesarske šole, najnižji pa med študenti visoke zdravstvene šole. Med študenti, ki so jih zdravniki opredelili za bolj zdrave, je bilo statistično značilno manj tveganih pivcev (p=0,015). Med študenti s povišanim indeksom telesne mase je bilo statistično značilno več tveganih pivcev (p=0,012). Spremenljivke, ki so bile pri multivariantni analizi neodvisno povezane s tveganim pitjem, so bile slabo zdravstveno stanje (p=0,044), moški spol (p<0,001), vsakodnevno uživanje ocvrte hrane (p=0,017), kajenje (p<0,001), raba prepovedanih drog (p<0,001), študij na Fakulteti za gradbeništvo (p=0,006) in ne biti študent Visoke zdravstvene šole (p=0,002).*

***Zaključek**. Glede na ugotovljen velik odstotek tveganih pivcev bi bilo treba za študente uvesti strukturiran preventivni program za zmanjšanje pitja alkohola, ki bi vključeval tudi aktivnosti v zvezi s kajenjem in prepovedanimi drogami.*

Ključne besede:
univerzitetni študenti, tvegano pitje alkohola, popivanje

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1 INTRODUCTION

The WHO European region is the heaviest drinking region of the world, with 11 litres of pure alcohol/year/inhabitant of 15 years of age and over, which is 2.5 times more than the rest of the world (1). More than 60 diseases are directly related to alcohol drinking (2) and, in Europe, it is the second most important cause of premature death and morbidity (3). Alcohol drinking over low risk drinking limits (14 alcohol units/week or less for men and 7 units/week for women) puts women and people in younger age groups at higher mortality risks than men (4). Heavy episodic drinking (6 units or more per one occasion for men and 4 units or more per one occasion for women), even in non-hazardous drinkers, puts a person at health risks, and such binge drinking is the highest in young adults (5); additionally, it is even increasing among high school students (more among girls than boys) in some countries in Europe (6).

Slovenia is a wine producing country with 2 million inhabitants; drinking wine and home-made brandy has been a part of its culture for centuries. Slovenia has one of the highest alcohol consumption in Europe, but data are inconsistent: 11-18 litres of pure alcohol//year/inhabitant of 15-year-olds and over; 1-7 litres of that amount is unregistered (1, 7, 8), which is more than two times larger than is an average in Europe – 2.67 litres (9). Children start drinking alcohol already early in their childhood: Kolšek (10) reported that, in Slovenia, 73% of children (while Boben-Bardutzky et al. (11) reported only 52%) drank their first glass of alcohol before the age of 10 years. 5% of 10 yearsold (10) and 27% of 15 years old children (12) drink alcohol several times a week; 13% of 10 years old children have already been drunk, and 40% of them did not drink alcohol in the past year (10). Among 15 and 16 years old adolescents only 7% are lifetime teetotallers (the average in ESPAD countries is 13%, but there are differences between countries), and 21% of them have been drunk in the past month, while the average in ESPAD countries is 17% (6, 13). One quarter of deaths among young adults is directly related to alcohol (14). The frequency of alcohol drinking in Europe has been slightly decreasing in the last 10 years, but, in Slovenia, it is changing – decreasing and increasing, so, in the year 2010, it was the same as in the year 2000 (8, 15, 16), but, anyway, it has slightly decreased in the last 25 years (14). It is therefore not surprising that, according to the data from an anonymous questionnaire on the website of the national project 'Message from the bottle – www.nalijem.si', 58% adult men and 49% adult women are drinking over low risk drinking limits, among those who answered the questionnaire (17). The research, conducted in 2012, in Slovenia, by Sorko and Boben, among a non-representative sample of adult population (18), has found 35.5% of harmful drinkers among adult interviewees; more than 10% had three or four positive answers at 4-item CAGE questionnaire (19) and, among those who were interviewed, men were drinking higher amounts and more frequently.

While there were many studies done among university students in Europe (20-22), only a few local research projects have been conducted in Slovenia, but they have not used standardized questions about alcohol drinking (23-26), except for one that was conducted among the students of the University of Ljubljana (27).

The aim of this study was to determine the prevalence of risky drinking among the students of the second largest University in Slovenia – the University of Maribor, and possible associations of risky drinking with demographic and health characteristics of the students.

2 METHODS

2.1 Participants

A cross-sectional study has been conducted among first- and fourth-year students at the University of Maribor, in the study year 2009/2010. Between October 2009 and May 2010, 3.173 questionnaires were filled in. 1.232 (38.8%) students were males, 2.087 (65.8%) were first year students. 43 questionnaires were not completed and were excluded from the analysis.

2.2 Procedure

During the first and the fourth study year, all students have a mandatory health check at the Health Centre for students, and, at the beginning of this health check, they have to fill in a questionnaire (a written format), which, besides the personal data, includes also the questions about their life style and their alcohol drinking habits. At the end of the mandatory check-up, a well experienced physician, who performed it, rated the students' health on the scale from 10 to 50 (10 = healthy, 20 = healthy with risk factors, 30 = light health damage, 40 = medium health damage, 50 = heavy health damage), according to the findings at check-up and in terms of students' answers about their health problems. The gathered data from these health checks were analysed individually by the health care team, but for our research we received all data in one Excel file, excluding personal data.

2.3 Measures for Alcohol Drinking

A part of the lifestyle questionnaire for students was AUDIT-C questionnaire. We used the Slovenian adaptation of AUDIT-C questionnaire (28), which gives less false positive and false negative results, compared to the original questionnaire, because of the adapted answers to the second question and gender-specific changes in the text of the third question; consequently, a cut off

point for men is 6 points and for women 5 points. When a student was screened positive on AUDIT-C, he got a simple advice to reduce his drinking; a similar advice was given if screened positive for smoking, or any use of illegal drugs.

2.4 Statistical Analysis

The data was analysed with the SPSS 13.0 package (SPSS Inc., Chicago, IL). We calculated the descriptive data. In the bivariate analysis, we used the independent t-test and chi-square test. In the multivariate analysis, we used the logistic regression. The variables proved to be statistically significant in the bivariate analysis; they were entered into the multivariate analysis. We considered $p<0.05$ to be statistically significant.

3 RESULTS

Out of 3,130 students, there were 1,911 (61.1%) women (Table 1). Mean students' health, as rated by the physicians, was 16.2 ± 10.3. Mean BMI of the students was 23.7 ± 4.1.

According to AUDIT-C, 871 (27.8%), students were identified as risky drinkers. The highest percentage of risky drinkers attended the Faculty for Wood Technology and the lowest the Faculty for Health Sciences (Table 2).

Table 2. Risky drinking of alcohol according to different faculties* - students of the University of Maribor, Slovenia, 2009-2010.

Faculty	N (%) of risky drinkers of alcohol
Tourism	36 (38.7)
Wood technology	17 (38.6)
Civil engineering	97 (37.7)
Electrical engineering	115 (34.8)
Mechanical engineering	47 (34.3)
Transport	36 (33.0)
Mathematics	43 (28.1)
Food science and technology	12 (27.3)
Chemistry	26 (26.5)
Philosophy	104 (26.5)
Agriculture	44 (25.7)
Law	39 (25.3)
Economic	164 (24.9)
Pedagogy	57 (24.1)
Business secretary	9 (16.4)
Health Sciences	13 (11.0)

* faculties with N of respondents lower than 30 were excluded

Table 1. Demographic and health characteristics of the students of the University of Maribor, Slovenia, 2009-2010.

Characteristic	Number (%)
Sex	
Male	1219 (38.9)
Female	1911 (61.1)
Faculty	
Economic	659 (21.1)
Philosophy	392 (12.5)
Electrical engineering	330 (10.5)
Pedagogy	265 (8.5)
Civil engineering	257 (8.2)
Agriculture	171 (5.5)
Law	154 (4.9)
Mathematics	153 (4.9)
Mechanical engineering	137 (4.4)
Health sciences	118 (3.8)
Transport	109 (3.5)
Chemistry	98 (3.1)
Tourism	93 (3.0)
Business secretary	55 (1.8)
Food science and technology	44 (1.4)
Wood technology	44 (1.4)
Theology	29 (0.9)
Others (Security sciences, Medical, Organizational sciences)	22 (0.7)
Study year	
First	2.059 (65.8)
Fourth	1.071 (34.2)
The type of food consumed every day	
Fruit	3.096 (98.9)
Milk	3.056 (97.6)
Meat	3.044 (97.3)
Fried food	2.859 (91.3)
Fish	2.680 (85.6)
Smoking cigarettes regularly	690 (22.0)
Illegal drugs (ever used)	287 (9.2)
Any health problem detected at the routine check-up	1.862 (59.5)
Health status as determined by physicians	
Healthy	2.241 (71.6)
Healthy with risk factors	4 (0.1)
Light health damage	805 (25.7)
Medium health damage	4 (0.1)
Heavy health damage	76 (2.4)

Mean score of AUDIT-C was 3.7 ± 2.2 (Table 3).

Table 3. Mean (and standard deviation) of AUDIT-C for selected variables.

Variable	AUDIT-C mean ± standard deviation
Sex	
Male	4.6 ± 2.3
Female	3.1 ± 1.9
Fried food every day	
Yes	3.8 ± 2.2
No	2.9 ± 2.1
Smoking	
Yes	4.4 ± 2.1
No	3.5 ± 2.2
Illegal drugs	
Yes	5.3 ± 2.2
No	3.5 ± 2.1
The Faculty of Electrical Engineering	
Yes	4.4 ± 2.3
No	3.6 ± 2.1
The Faculty of Civil Engineering	
Yes	4.4 ± 2.2
No	3.6 ± 2.2
The Faculty for Pedagogy	
Yes	3.1 ± 2.0
No	3.7 ± 2.2
The Faculty for Health Sciences	
Yes	2.5 ± 1.8
No	3.7 ± 2.2
The Faculty for Tourism	
Yes	4.1 ± 2.5
No	3.7 ± 2.2

Students, rated as having better health by the physicians, reported risky drinking significantly less often (15.5 ± 9.7 vs. 16.4 ± 10.5, t=-2.340, p=0.015). Students with higher BMI reported risky drinking significantly more often (24.0 ± 3.8 vs. 23.6 ± 4.1, t=2.508, p=0.012). There were also significant differences in risky drinking associated with sex, some eating habits, smoking, the use of illicit drugs and type of faculty (Table 4). On the other hand, there was no difference in risky drinking associated with the study year (p=0.354) and sports activities of students (p=0.321).

In the multivariate analysis, the following variables proved to be independently associated with the risky drinking: worse health status, male sex, daily consumption of fried food, and smoking, illegal drugs, attending the Faculty for Civil Engineering and not attending the Faculty for Health Sciences (Table 5).

Table 4. Bivariate associations of risky drinking with sex, lifestyle and the type of faculty (only the significant associations are shown), students of the University of Maribor, Slovenia, 2009-2010.

Variable	% of students with risky drinking	Chi-square	df	p
Men vs. women	35.8 vs. 22.8	62.666	1	< 0.001
Fried food every day: yes vs. no	28.6 vs. 19.9	9.222	1	0.002
Smoking: yes vs. no	40.0 vs. 24.4	65.301	1	< 0.001
Illegal drugs: yes vs. no	54.4 vs. 25.1	110.716	1	< 0.001
Attending				
The Faculty of Electrical Engineering: yes vs. no	34.8 vs. 27.0	9.054	1	0.003
The Faculty of Civil Engineering: yes vs. no	37.7 vs. 26.9	13.707	1	< 0.001
The Faculty for Pedagogy: yes vs. no	21.5 vs. 28.4	5.754	1	0.018
The Faculty for Health Sciences: yes vs. no	11.0 vs. 28.5	17.254	1	< 0.001
The Faculty for Tourism: yes vs. no	38.7 vs. 27.5	5.652	1	0.025

Table 5. Multivariate analysis* for risky drinking of the students of the University of Maribor, Slovenia, 2009-2010.

Dependent variable	Independent variables	Odds ratio	95% lower and upper C. I. for odds ratio	p
Risky drinking	Worse health status as assessed by the physicians	0.992	0.983-1.000	0.044
	Male sex	1.36	1.230-1.469	< 0.001
	Fried food every day	1.486	1.072-2.059	0.017
	Smoking	1.952	1.615-2.360	< 0.001
	Illegal drugs	2.760	2.131-3.575	< 0.001
	Attending the Faculty for Electrical Engineering	1.216	0.930-1.588	0.152
	Attending the Faculty for Civil Engineering	1.493	1.121-1.988	0.006
	Not attending the Faculty for Pedagogy	1.077	0.723-1.332	0.923
	Not attending the Faculty for Health Sciences	1.623	1.303-1.796	0.002
	Attending the Faculty for Tourism	1.510	0.960-2.375	0.074
	Higher BMI	1.009	0.988-1.030	0.404

* chi-square = 224.375, df = 11, p < 0.001, Nagelkerke R2 = 0.100
BMI = body mass index

4 DISCUSSION

The main findings of our study showed that more than one quarter of the students (27.8%) were screened as risky drinkers. Risky drinking was associated with male sex, bad health status, eating fried food every day, smoking, any use of illegal drugs and attending some faculties.

Leskovar & Fridl (25) in their study from 2007 found much more risky drinkers (46.3%) among students of the same University. There were also fewer teetotallers (5.6%) than in our study (7.8%). Such difference may be explained by the difference in the size of the sample (214 students in their sample and 3.130 in ours) and by different methodology. In their study, students filled in the questionnaire anonymously and on a voluntary basis, while in our study the questionnaire was not anonymous and it was an obligation to fill it in during the health check. In the same study year, Biščak-Hafner et al. (27) found 11.8% teetotallers and 23.1% risky drinkers among students of the University of Ljubljana, Slovenia. They found also 16.8% binge drinkers (at least monthly), while in our study, there were 20.3%. In their study, the same methodology was used as in our study, and it would be interesting to find out which factors were important for such a difference. The proportion of risky drinkers among young adults in other European countries differs a lot, but different methodologies makes comparisons rather difficult. In England, Heather et al. (29) found much more risky drinkers than were in our study: 61.0% students scored positive on AUDIT questionnaire (40.0% hazardous drinkers, 11.0% harmful drinkers and 10.0% with probable dependence), but, similar to our study, there were differences between the universities. Stock et al. (22) conducted a study in seven European countries (Bulgaria, Denmark, Germany, Lithuania, Poland, Spain and Turkey) and found important differences among countries in problem drinking (at least one positive answer at CAGE questionnaire) – there were 24.0% of males and 13.0% of female students as problem drinkers (data for all countries). The data is not completely comparable to the results of AUDIT questionnaire that was used in our study, because the sensitivity and specificity of these two questionnaires to identify hazardous drinkers are not the same (30). Sebena et al. (21) also used CAGE questionnaire in five European countries (Bulgaria, Germany, Poland, Slovakia and UK) and found 11.8% to 22.1% problem drinkers among students, but they considered problem drinking at two or more positive responses to CAGE questionnaire. Gmel et al. (31) in Switzerland, among 19 years old men, found 7.2% teetotallers and 75.5% binge drinkers, but the studied population were all young males enrolling for mandatory army recruitment procedures, not only university students. Such big differences between countries can be partly explained by different methodology used in studies, by different overall alcohol consumption in countries and by cultural and historical differences (32).

Our study, as well as studies in many other countries, showed that more men are drinking alcohol and more men are binge drinkers than women (3, 5, 6, 20, 22, 24, 27, 29, 31). This result is not surprising as drinking alcohol historically was more or less men's domain, but in the last decades things are changing. Social roles of women (and also men's roles) are changing, women are more and more included equally in the society, many behaviours that were traditionally men's domain are taken over by women and, consequently, sex differences in alcohol drinking are becoming less evident (2, 6), which will probably cause

more alcohol-related health consequences for women in the next period.

Smoking and the use of illegal drugs are associated with higher alcohol consumption (3, 5, 6, 33, 34), which came as no surprise as a result also in our study, because it is known that different risky behaviours can be identified frequently in at-risk adolescents as a 'problem behaviour syndrome.' This association in youth can be explained from neurological and psychosocial perspectives (33, 35): In our study, we found that bad health status was associated with less alcohol drinking, which is similar to some other studies (5, 22), but depressive disorders may have the opposite result (21).

Our study showed also the association between alcohol drinking and eating fried food daily, which should be studied further to explain this relation, while there are not many studies on the relations between alcohol and different food intakes.

We found that alcohol drinking is associated with attending some faculties. A special interest was put on students of health sciences, where we found that they drank less compared to other students. International data on this topic are controversial. Thakore et al. (34) published a similar association, but Gerstenkom & Suwala (36) in Poland found 46.5% hazardous drinkers among students of medicine, which is quite different from students of health studies in our study, who drank even less than students of other faculties.

We found no association between sports activities and alcohol drinking, but the data from the literature is controversial (38-40), which may mean that some specific unidentified factors are related to the possible influence of sports activities on drinking habits.

Strengths of our study are the data which we collected of the students of all faculties of the second biggest university in Slovenia. We included the largest number of students of this University in the study so far – all students that came to the mandatory health check. The use of the specific and sensitive standardized international questionnaire gives good results and enables valid comparisons with the data of other similar studies. Used statistical methods showed important factors that were associated with alcohol drinking, the most interesting one, and not studied enough so far, was bad health status. Our study has also some limitations. Our data did not include students that had not come to the health check. We missed some students because of the time limit of the survey, whereas some students came for the check-up in the next study year and some students left the university during their first study year. Another problem of the study could be the use of the questionnaire which was not anonymous. This could have had an influence on the sincerity of students' answers – they might have declared lower, more 'acceptable' numbers of drinks. As the whole questionnaire included only a limited number of questions, we probably missed out on some other factors that could be associated with alcohol drinking habits (e.g. religion, a social-economic status, place of living – at home or in campus, parents' drinking habits, etc.).

5 CONCLUSIONS

Although our results showed lower proportion of risky drinkers, comparing to the data from some other countries, we cannot be satisfied. The society as a whole, the government and also the University with its faculties should organize activities that would decrease students' drinking, if we know that 25% of deaths among young males and 10% among young females are related to alcohol (2), which would also have an influence on students' smoking habits and their use of illegal drugs. Besides general measures that significantly influence alcohol consumption (40) (e.g. higher taxes for alcohol beverages, reduced availability of alcohol, alcohol advertisement restrictions), regular screening and brief interventions should be implemented into primary health care, especially for adolescents and young adults, in addition to the popularization of, for the youth, a more acceptable web-based help for risky drinkers that includes the assessment of alcohol drinking habits, coupled with brief interventions which have been proven to be effective (41). It would be worth for politicians to consider to increase the minimum legal drinking age from 18 to the age 21, as it is in the United States, and as it is proven to be effective in reducing underage drinking and alcohol-related problems (42).

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CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

The Committee of Republic Slovenia for medical ethics approved the study on October, 27th, 2009; No. 71/10/09.

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SOCIO-ECONOMIC CHARACTERISTICS IN NOTIFIED ERYTHEMA MIGRANS PATIENTS

SOCIALNO-EKONOMSKE ZNAČILNOSTI PRIJAVLJENIH BOLNIKOV Z ERYTHEMO MIGRANS

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ABSTRACT

Background. Lyme borreliosis disease results from infection by members of the Borrelia burgdorferi sensu lato complex. The most common clinical presentation of Lyme borreliosis is erythema migrans (EM). To gain knowledge of the epidemiological parameters and the risk factors of EM in Slovenia, a survey has been carried out in 2010.

Methods. A short anonymous and self-administrated questionnaire was sent to 4917 notified EM patients in 2010, aiming to collect epidemiological data and assess socio-economic determinants in patients with EM.

Results. Three thousand and five (61%) patients with EM returned completed questionnaires. One thousand and nine hundred twenty-nine (74%) patients noted the tick where the EM developed. The tick bite was most often located on the legs in adults and in the head/neck area in children. The time that elapsed before the tick has been removed increased significantly with age. The attached tick was most frequently overlooked in preschool children. Nearly 70% of patients believed that they contracted the infection with borrelia near home. Infection away from their permanent residence was more often the case in those with a higher level of education and in 15-49 age groups. Compared to the Slovenian general population over 14 years of age, those with a higher level of education, the unemployed and farmers were overrepresented among the EM patients.

Conclusions. The risk of Lyme borreliosis is widespread in Slovenia, with some areas more affected then others. Determinants of exposure to infected ticks are different, and depend on the socio-economic status and demographic characteristics.

Keywords:
erythema migrans, Lyme borreliosis, tick bite, surveillance, survey

IZVLEČEK

***Izhodišče**. Lymska borelioza je posledica okužbe z bakterijami kompleksa Borrelia burgdorferi sensu lato. Erythema migrans (EM) je najpogostejša klinična oblika lymske borelioze. Namen raziskave je bil pridobiti epidemiološke podatke in preučiti socialno-ekonomske značilnosti prijavljenih bolnikov z EM v Sloveniji.*

***Metode**. Kratek anonimni vprašalnik je bil poslan vsem 4917 bolnikom, prijavljenih z diagnozo EM v letu 2010, da bi se zbrali epidemiološki podatki in ocenile socialno-ekonomske determinante.*

***Rezultati**. 3005 (61%) bolnikov z EM je vrnilo popolno ali delno izpolnjene vprašalnike. 1929 bolnikov (74%) je navedlo, da se je EM pojavil na mestu predhodnega vboda klopa. Vbod klopa je bil največkrat na nogah pri odraslih in v predelu glave ali vratu pri otrocih. Čas od vboda klopa do njegove odstranitve je bil značilno daljši pri starejših, pogosteje pa so ga spregledali pri predšolskih otrocih kot pri odraslih bolnikih. Približno 70% bolnikov z EM je menilo, da so se z borelijo okužili v bližini doma. Okužba zunaj kraja stalnega prebivališča je bila pogostejša pri tistih z višjo stopnjo izobrazbe in v starostni skupini 15-49 let. V primerjavi s strukturo slovenskega prebivalstva nad 14 let je bilo med bolniki z EM več tistih z višjo stopnjo izobrazbe, brezposelnih in kmetov.*

***Zaključek**. Lymska borelioza je v Sloveniji zelo razširjena, pri čemer je primerov več v nekaterih predelih. Determinante izpostavljenosti okuženim klopom so različne in odvisne od socialno-ekonomskega statusa in demografskih značilnosti.*

Ključne besede:
erythema migrans, lymska borelioza, klopi, spremljanje, ankete

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1 INTRODUCTION

Lyme borreliosis (LB) is the most frequently reported vector-borne disease in Slovenia (1, 2). The main vector of the causative microorganism, the spirochete *Borrelia burgdorferi*, is *Ixodes ricinus* (3). The appearance and distribution of LB is determined by the natural environment, climatic factors and dynamic interactions between the natural landscape and human activities in the appropriate habitats (4-7). The main reservoir of *B. burgdorferi* is small and medium-sized mammals, birds (especially passerine birds), reptiles and insectivores. Ungulates support the tick population and can be infected with *Borrelia*. They are not a competent reservoir, as the ticks are not capable of acquiring *Borrelia* during their blood meal (8). The landscape structure and climatic factors have an effect on the number of ticks, hosts and the composition of the host community (9). The relationship is complex, depending on factors not yet fully quantified (6).

The effect of the weather and changes in climate were recognized as an important determinant of LB incidence (10). LB incidence usually increases after mild winters and during warm, humid summers (11). Entomologic risk is not the only critical driver of human vector-borne infections. In addition, weather conditions have an influence on human behaviour as well as on tick abundance and tick infection rate. It was suggested that the recent increases in vector-borne diseases in some Central European countries and the Baltic States may have arisen largely from changes in human behaviour that have brought more people into contact with infected ticks (6). The socio-economic transition that started in the early nineties, the current economic recession and the consequential increase in the unemployment rate affected the utilization of tick-infested forests and increased the incidence of tick-borne encephalitis in the Baltic States and Poland, as well as LB (7). Living in spatially dispersed houses, in wealthy suburban areas, and spending free time doing outdoor activities were found to be the driving forces behind LB in a Belgian study (12).

Lyme borreliosis has been an obligatory reportable communicable disease in Slovenia from 1986 onwards. The reported incidence rates are one of the highest in Europe (from 200/100,000 to 250/100,000) (10). To gain knowledge of the epidemiological parameters of the disease in Slovenia, a survey was begun in 2010. The principal aims of the survey were to assess socio-economic determinants in the notified erythema migrans (EM) patients in 2010 in Slovenia, and their geographic distribution.

2 METHODS

2. 1 Notification System

A patient diagnosed with LB clinically and microbiologically, or on clinical grounds alone (for EM patients) has to be notified to regional public health authorities, using the standard notification form. In principle, the notification includes the following data: the name, surname, date of birth, permanent address, time of the onset of symptoms/signs, notification date, hospitalization, outcome data and information on whether or not the diagnosis was confirmed by microbiological tests. At regional public health institutes, the notified cases are recorded in the electronic Database for Notifiable Communicable Diseases. The notifications collected regionally are sent to the National Institute of Public Health on a weekly basis, and the data (including personal identifiers and address) is merged at the national level.

According to the International Classification of Diseases (ICD-10), patients with acute or chronic LB are coded by the treating physician as erythema migrans (A69.2), Lyme meningitis (G01.0), Lyme polyneuropathia (G63.0) or Lyme arthritis (M01.2). Patients with EM (representing 97% of all notified LB patients) are typically treated by primary care physicians (general practitioners, family doctors or by paediatricians). Most of the EM patients were diagnosed on clinical grounds alone. Exceptionally, the diagnosis was confirmed by PCR or the culture of a skin biopsy specimen. Patients with other clinical entities, i.e. Lyme meningitis, polyneuropathia or arthritis, are typically referred to the secondary level and the diagnosis is confirmed microbiologically.

2.2 The Survey

A short (two page) anonymous and self-administrated questionnaire was sent to all the notified patients coded as EM, together with an invitation letter no later than 30 days after the notification. The patients with late manifestations of a *Borrelia* infection were not invited to participate, as the recall bias would probably distort the results of the survey.

The patients were requested to disclose their gender and age (in years), without a name or any other identifier, education level and employment status (employed, unemployed, retired or student). The patients were asked if they were at risk of tick-borne diseases because of the work they do for a living (farmers, forest workers, professional hunters or working on constructions in natural environments, e.g. building roads through forests, etc.). The feedback forms contained questions on the tick bite at the site of the EM, the location of the tick bite (head, neck, arms, legs or torso) and the estimated duration of the tick attachment. The patients were asked to pinpoint, if possible, the most probable geographic location (at

the county level) where they judged the infection with *Borrelia* occurred. We were interested in whether or not the infection took place in close proximity to where they lived. Near-home infection was defined as a *Borrelia* infection within a 5 kilometre radius of a permanent residence.

The most probable geographic location of the infection was entered on the map of Slovenia. The population by county was extracted from the web pages of the Statistical Office of the Republic of Slovenia (http://www.stat.si/tema_demografsko.asp) and the incidence rates of EM cases were calculated on a county level.

2.3 Statistical Analysis

The data collected was entered into Microsoft Excel and subsequently analysed using the R statistical software package (13). The descriptive statistics included frequency analyses (percentages) for categorical variables. The denominator used to calculate all the percentages was the number of patients with available (non-missing) data for each specific variable. A chi-square test was used to test the differences between sample and general population demographic distributions. Bivariate logistic regression was used to assess the effect of each independent variable on the odds of one outcome vs. the other for every dependent variable. P values of <0.05 were considered statistically significant (using Bonferroni correction for multiple comparisons).

As the age and gender structure of the responders differed from the structure of the notified EM patients, the raking procedure was applied. Raking is a procedure for adjusting the sample weights in a survey, so that the adjusted weights match known population totals for the post-stratified classifications, when only the marginal population totals are known. The resulting adjusted sample weights provide a closer match between the sample and the population (14). In general, this weighting procedure uses auxiliary data from a supplementary source, such as a larger survey or census. The advantages of this method are to reduce the bias and variance of the estimates, force the totals to match external totals and adjust for sources of error (15).

The raking procedure was repeated until the values converged (i.e. yielding the same age/gender structure as among the notified EM patients). The weighted data of the responders was compared to the general population data retrieved from the web pages of the Statistical Office of Republic of Slovenia (SORS, http://www.stat.si/).

3 RESULTS

The questionnaire was sent to 4917 notified EM patients in 2010. 3005 (61%) returned completed or partially completed questionnaires. The age/gender structure of the responders differed from the age/gender structure of the notified EM patients, with the elderly and females being significantly over-represented ($p<0.0001$ and $p=0.001$, respectively). The results throughout this paper are presented as weighted data.

3.1 Education Level and Employment Status

To allow comparison of EM patients' demographic distribution to general Slovenian population, only data for the responders above 14 years of age was used. 556 (22.1%) responders had finished primary school, 1328 (52.8%) secondary school/gymnasium and 562 (22.3%) college/faculty. There were a higher percentage of those with a higher level of education and less of those without any accomplished education (without finishing the eight-year primary education programme) in comparison to the Slovenian general population over 14 years of age (Table 1).

More than one third of the respondents were employed (1226, 37.8%) and approximately a third were retired (986, 33.1%). There were 571 (19.2%) students and 101 (3.4%) housewives. 197 (6.6%) respondents with EM declared that they were unemployed. Unemployment has been associated with higher odds for infection with Borrelia compared to employed responders (Table 1).

Roughly, one fifth of the respondents were professionally at risk of tick-bites. According to official statistics, there were 3% of registered farmers in Slovenia in 2010. Being a farmer was associated with three times higher odds of EM than among the adult Slovenian working and unemployed population (Table 1).

Table 1. Notified EM patients compared to general Slovenian population in terms of the level of education, employment status being a farmer (CI= confidence interval).

	Number (%) - sample	Number (%) - overall population	Odds ratio (95% CI)	p-value (Wald x^2)
Level of education				
Higher level of education	562 (22.4%)	562 (22.4%)	1	1
Without finishing primary education	69 (2.7%)	69 (2.7%)	0.52 (0.41-0.67)	0.52 (0.41-0.67)
Primary education	556 (22.1%)	556 (22.1%)	0.85 (0.76-0.96)	0.85 (0.76-0.96)
Secondary school	1328 (52.8%)	1328 (52.8%)	0.76 (0.69-0.84)	0.76 (0.69-0.84)
Employment status				
Employed	1226 (86.3%)	1226 (86.3%)	1	1
Unemployed	197 (13.8%)	197 (13.8%)	2.04 (1.75-2.37)	2.04 (1.75-2.37)
Farming				
All other vocations except farming	2520 (90.4%)	2520 (90.4%)	1	1
Being a farmer or working on a farm	266 (9.6%)	266 (9.6%)	3.42 (3.01-3.88)	3.42 (3.01-3.88)

3.2 Tick Bite

1929 (74%) patients noticed the tick on the site where the EM developed later. There was no statistically significant difference between male and female patients (p=0.578). The tick bite on the EM site was most frequently overlooked in preschool children and most frequently noticed in patients over 65, as shown in Figure 1. The same holds for tick-bites on other locations (the data is not shown).

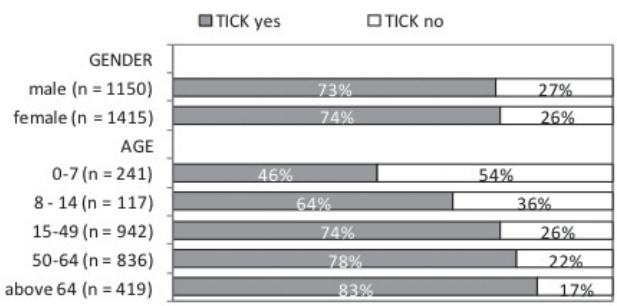

Figure 1. The percentage of patients who noticed the tick-bite on the site of the erythema migrans.

The most frequent location of a tick bite was the legs (1362, 45.3%), followed by the torso (948, 31.6%) and arms (529, 17.6%). Patients with EM were bitten least frequently on the head or neck. Age and gender influenced the location of the tick bite. Significantly higher numbers of females claimed to have the tick on the lower extremities (p=0.001) than the male patients. No differences were noticed for other locations. The torso was the most frequent location in the 50-64 age group, and the head or neck in preschool children.

The patients were asked for their opinion on how long the tick has been attached to the skin before it was found and removed. 444 (14.8%), 639 (21.3%) and 510 (17.0%) estimated that the tick was attached for <6, 6-12 and 12-24 hours, respectively. 336 (11.2%) were less specific and judged that the tick was attacked for ≥24 hours, or the responders were not able to assess the duration of the tick attachment, or left the question unanswered. The time that elapsed before the attached tick was noticed and removed increased with age (p<0.0001). Ticks located on the head/neck area were noticed more quickly than those attached to the torso, legs or arms (p<0.0001). Within the estimated 6-12 hours interval of the tick attachment, the ticks were most frequently noticed on the arms (p<0.0001) and on the legs after 12 hours (p<0.0001). Patients with more than one tick attached tended to notice the ticks later than with those who had only one bite (p=0.007).

2093 (69.7%) patients believed that they contracted the infection near the place they lived, and 596 (19.8%) believed they became infected with *Borrelia* away from their permanent residence. 316 (10.5%) left this question unanswered. A near-home infection was less likely (OR=0.54, CI: 0.38-0.76, p=0.0003) in the 15-49 age group, compared to preschool children (age group 0-7). Being a pensioner or housewife predisposed infection in the vicinity of home. In comparison to working population, housewives have 2.47 (CI: 1.33-4.61, p=0.002) and pensioners 1.76 (CI: 1.41-2.21, p<0.0001) fold greater odds for getting infected near home. Odds ratio for infection in another district was 2.63 (CI: 1.73-3.23, p<0.0001) for respondents with a higher education level in comparison to respondents with no formal education.

Forests, meadows or pastures and gardens were the most probable location of infection in 55%, 30% and 15% of the responders, respectively. Male responders claimed to get the tick bite in woods more often than female responders (OR 1.64, CI 1.42-1.90, p<0.0001). On the other hand, males were less frequently bitten in the garden then females (OR 0.44, CI 0.35-0.54, p<0.0001).

3.3 Map

The patients were asked about the most probable geographical location of their infection. The county incidence rates are shown in Figure 2.

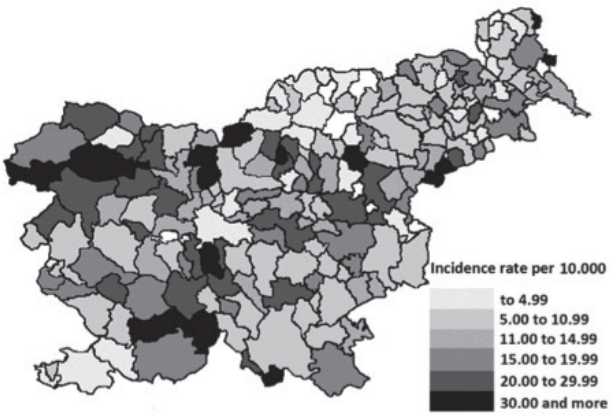

Figure 2. The incidence rate (per 10.000 inhabitants) of erythema migrans cases by counties with most probable site of infection, Slovenia 2010.

4 DISCUSSION

Lyme borreliosis is the most prevalent arthropod-borne disease in the temperate regions of the northern hemisphere. The real burden of LB is difficult to assess (16). The published data derives from studies limited to the areas where the disease is fairly prevalent, or the data is collected through active or passive public health surveillance systems (10). In case of the latter, the completeness and quality of the data is variable depending on willingness of the physicians to report it (16, 17). The main drawback of the passive notification systems is underreporting and therefore underscoring the incidence of LB by at least 3 times (17). Conversely, there is the possibility of over-diagnosis by the medical community in high risk areas. Local hypersensitivity to tick bites is the most common reasons for the misclassification of patients with erythema (18). In Slovenia, the incidence rate of notified EM cases was 245 per 100,000 inhabitants in 2010, which is one of the highest in the world. Without doubt, not all patients with EM were notified. Conversely, it might be that some patients with erythematous skin lesion after a tick bite were wrongly classified as EM. The validity of EM diagnosis has not been verified after the notification, which is one of the limitations of the present study, along with under-ascertainment and under-reporting. Even so, the true incidence of LB is high, as already shown by clinical studies (19).

The age and gender distribution of notified patients with EM (and survey responders) was comparable with the published data (10). As in most of the studies from Europe, there were more female than male patients, with the peak incidence rates in the 50-64 age groups (Figure 1). There might be some biological reasons for the high incidence rates in these age groups, though the lifestyle of middle agers and seniors is probably the main driving force behind infection with *Borrelia* (10). In 2010, the average age of retirement in Slovenia was 56.2 years – one of the lowest in the European Union (SORS, http://www.stat.si/novica_prikazi.aspx?id=3461). Relatively young and still fit pensioners have time to spend in natural environments for leisure activities. There is also an alternative explanation for the obvious high exposure to risky environments – as the monthly income after retirement is rather low (the monthly income was approximately 700 euros in 2010 on average), growing vegetables in the garden or picking berries and mushrooms in the forests becomes a necessity and not just a hobby for at least some pensioners. The unfavourable socio-economic status of those who had lost their jobs most likely explains the higher probability of EM among the unemployed, compared to employed responders. The impact of poverty on the incidence of tick-borne encephalitis (TBE) has been studied in Baltic States and Eastern European countries (7). It was shown that increased unemployment triggered a sudden increase in the risk for TBE. In Poland, in one of the studies, nearly half of the survey respondents stated that the worse financial status of the family was the main reason for an increased harvest (20).

The advanced level of education increased the odds for EM (Table 1). There are a few possible explanations. Higher education correlates with a healthier lifestyle, and out-door recreational activities are a part of it. The study from Belgium showed that there was a higher incidence rate of LB in the wealthy peri-urban areas, where living in houses with large gardens favoured human-vector contact (12). A higher income combined with higher education affects the disease awareness as well (12). It is possible that the responders with a higher level of education looked for medical advice earlier and more often than those less knowledgeable. Being a farmer has been recognized as a risk factor for LB by previous studies, and this is confirmed in the present survey (21).

A tick bite on the site of the EM was noticed by 79% patients in a study from Southern Sweden and 71% in a study from France. In the present survey, almost 75% of the responders noted the tick bite at the site of the EM. The tick bite was most commonly overlooked in small children. It seems that children were not inspected by their parents thoroughly for ticks after activities in forests and other natural environments.

The most frequent location of the tick bite were the legs and torso with more female then male patients bitten in the lower extremity – the same distribution found by previous studies (21, 22). The head and neck area was

a frequent location of the tick bite for children – an expected finding as children often crouch or sit on the ground while playing out-doors.

The estimated time of tick attachment was less than a day in more than half of the survey responders. The transmission of borreliae can occur in a few hours if the ticks contain high numbers of bacteria in their salivary glands (10). The transmission is always more likely with longer attachment, but the lag period seems to vary with the genospecies. *B. burgdorferi* sensu stricto is not usually transmitted before the tick has been attached for 48 hours, while *B. afzelii* (the most prevalent species in Slovenia) can be acquired with an attachment period of less than 24 hours (10, 23). Nevertheless, the time of attachment was only assessed and the reliability of this information is impossible to test. Furthermore, the data were collected with a time-lag of at least month duration. The recall bias is therefore one of the limitations of the study, which warrants the caution in interpretation or generalization of the results.

Nearly 70% of the patients claimed to get infected near their permanent residence. The percentage of those who presumably got infected in another region was much lower in the French population based study (10%). The male gender, being young adult or middle-aged and higher educated, correlated with the tick bite away from home. The active, wealthier population probably acquired the infection with borrelia while staying at their weekend houses or spending leisure time out-doors. The natural environments where the infection occurred were different in male and female patients, as expected. Females are usually more engaged in gardening and therefore are at risk of tick bites in their gardens. Timbering is physically demanding and remains a typical male job. There are unrivalled numbers of male members in hunting societies compared to females. Therefore, male responders were more often bitten by the tick then females in forests.

The different incidence rates among the counties (as shown on Figure 3) were probably influenced by the abundance of ticks infected with borrelia and by human-vector interaction in a suitable habitat. The increased fragmentation of deciduous forest has been identified as a natural environment favouring the abundance of the host reservoir (small mammals) and infected ticks (24). Slovenia is the third most forested country in the Europe (http://www.zgs.gov.si/slo/gozdovi-slovenije/index.html). Forests cover approximately 60% of the country with at least 22% of the forests being highly fragmentized (25). Most Slovenian counties (71%) are sparsely inhabited and only two counties are classified as thickly populated according to EUROSTAT's concept of urbanization rate. The dispersion of the population in highly forested countries creates ideal conditions for coming into contact with tick-borne diseases. A Polish study has showed regional differences in LB incidence that correlated with the availability of medical personnel, including physicians (26). In Slovenia, the situation is not comparable – the country is very small and has a relative geographically equal distribution of health-care institutions providing health care for every citizen of the country.

5 CONCLUSIONS

Determinants of exposure to infected ticks are different and depend on socio-economic status and demographic characteristics. Infection with borrelia seems to be connected to recreational activities in highly educated middle class individuals and an occupational disease for farmers. The poor economic situation of underprivileged members of society (e.g. the unemployed, pensioners) most likely creates the need for spending more time in risky environments, and becomes a driving force for LB. Whatever the reason for exposure to infected ticks, the high incidence rate in Slovenia demands public health attention and intensive efforts to educate the population about preventive measures and the manifestations of the disease.

CONFLICTS OF INTEREST

The authors declared that they have no financial, professional or personal conflicting interests related to this article.

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ETHICAL APPROVAL

National Medical Ethics Committee was not asked for ethical approval.

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AGE AT SMOKING INITIATION IN SLOVENIA
STAROST OB PRVEM KAJENJU V SLOVENIJI

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ABSTRACT

Keywords:
smoking, adolescents, young adult, Slovenia

Background. Smoking is initiated mostly by adolescents and young adults. In Slovenia, we have limited data about this. The purpose of this paper is to show data on age at smoking initiation and differences in age at smoking initiation by gender, age groups, education, social class and geographical region among inhabitants of Slovenia.

Methods. We used data from the cross-sectional survey 'Health-related behaviour 2012' in Slovenian population aged from 25 to 74 years.

Results. 4591 ever smokers, aged 25-74, that gave information about the age at smoking initiation were included in the analysis. At the age of 25 or less, smoking was initiated by 96.7% of Slovene ever smokers, at the age of 18 or less by 71.0%. The average age at smoking initiation was 17.7 years. Male ever smokers initiated smoking at an earlier age compared to female ones. Age at smoking initiation was decreasing in both male and female ever smokers, but was more pronounced in females. In male ever smokers, there were no differences in average smoking initiation age by education, self-reported social class and geographical regions, while in female ever smokers, there were significant differences in terms of education and geographical regions.

Conclusion. The initiation of smoking predominantly occurs in adolescents and young adults. Age at smoking initiation has decreased in recent decades. Our study confirms the importance of early and sustained smoking prevention programmes in youth and the importance of national comprehensive tobacco control programme with effective tobacco control measures to ban tobacco products marketing.

IZVLEČEK

Ključne besede:
kajenje, mladostniki, mladi odrasli, Slovenija

***Uvod**. Podatki iz tujine kažejo, da začnejo kaditi praviloma mladostniki in mladi odrasli. Za Slovenijo imamo o tem malo podatkov. Namen prispevka je prikaz podatkov o starosti ob začetku kajenja in razlik v začetku kajenja glede na spol, starostne skupine, izobrazbo, družbeni sloj in geografsko regijo med prebivalci v Sloveniji.*

***Metode**. Uporabili smo podatke iz presečne pregledne raziskave »Z zdravjem povezan vedenjski slog 2012« med prebivalci Slovenije, starimi od 25 do 74 let.*

***Rezultati**. V analizo je bilo vključenih 4591 posameznikov, starih 25-74 let, ki so kadarkoli v življenju kadili, in so podali podatke o starosti ob začetku kajenja. V starosti 25 let ali manj je prvič kadilo 96,7% prebivalcev, ki so kadarkoli v življenju kadili, v starosti 18 let ali manj pa 71,0 %. Povprečna starost ob prvem kajenju je bila 17,7 leta. Moški, ki so kadili kadarkoli v življenju, so prvič kadili pri nižji povprečni starosti kot ženske. Povprečna starost ob začetku kajenja se je zniževala pri obeh spolih, a izraziteje med ženskami. V povprečni starosti ob začetku kajenja pri moških, ki so kadili kadarkoli v življenju, ni razlik glede na izobrazbo, samoporočani družbeni sloj in geografsko regijo, medtem ko so pri ženskah prisotne značilne razlike glede na izobrazbo in geografsko regijo. Ženske z najvišjo stopnjo izobrazbe, ki so kadile kadarkoli v življenju, in tiste iz vzhodne geografske regije so prvič kadile pri nižji starosti.*

***Zaključek**. Kaditi začnejo in nadaljujejo do rednega kajenja večinoma mladostniki in mladi odrasli. Starost ob začetku kajenja se je v zadnjih desetletjih zniževala. Podatki iz raziskave potrjujejo pomembnost zgodnjih in dolgotrajnih programov preprečevanja kajenja med mladimi ter nacionalnega celovitega programa ukrepov nadzora nad tobakom za zaustavitev marketinga tobačnih izdelkov.*

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1 INTRODUCTION

Tobacco use is one of the leading causes of morbidity and (premature) mortality in Slovenia. Every year almost 3600 inhabitants of Slovenia die of diseases caused by tobacco smoking (1), later referred to as smoking. Smoking is initiated mostly by adolescents and young adults (2-6). In United States of America, 96.3% of 30-39 years old inhabitants, who had ever smoked, first smoked a part or all of a cigarette at the age of 25 or less, and 71.4% at the age of 18 or less. The average age at smoking initiation was 15.9 years (3). We found limited data about age at smoking initiation from Europe and Slovenia. 94% of 27 European Union member states inhabitants aged 15 or more, that had ever smoked, started to smoke at least once a week at the age of 25 or less, and 70% at the age of 18 or less. The average age at smoking initiation was 17.6 years (7). In Great Britain, 66% of adults, who had ever smoked, reported that they have initiated smoking before they reached 18 years of age (8). There is limited data about age at smoking initiation for Slovenia. Eurobarometer survey shows ages at initiation of at least weekly smoking, but not first smoking, for inhabitants aged 15 or more. 83% of those reported that they initiated at least weekly smoking at the age of 25 or less, and 53% at the age of 18 or less, the average age at initiation of weekly smoking was 20.1 years (7). The data about smoking initiation is also available from two international studies among adolescents. Among 15 to 16 years old adolescents who had ever smoked, 32% report that they smoked their first cigarette at 13 years of age or less (9) and 24.3% of 15-year-olds reported that they have first smoked cigarettes (more than a puff) at 13 years of age or less (10).

Age at smoking initiation is important in many aspects. It is an important indicator of subsequent smoking habits. The younger the person is at smoking initiation, the greater the likelihood of becoming addicted, of progression to regular smoking, of smoking more in adulthood and of difficulty in giving up smoking (3, 6). Age at smoking initiation is also important in respect to later health outcomes. Research shows that the risk for at least some of the tobacco-related illnesses is higher if the individual initiates smoking at younger ages (11). A more in depth analysis of age patterns of smoking initiation would thus contribute to the present knowledge on this topic in Slovenia.

The objective of this paper is to present Slovenian data on age at smoking initiation and average age at smoking initiation, and to explore differences in smoking initiation between genders, age groups and geographical regions. As there are significant differences in smoking by socio-economic status (12, 13), and research on socio-economic differences in age at smoking initiation is scarce, we also aim to examine differences in smoking initiation by measures of socio-economic position (education and self-reported social class).

2 METHODS

The data from 2012 Slovenian Countrywide Integrated Non-communicable Diseases Intervention (CINDI) Health Monitor database of 25-74 years old inhabitants of Slovenia were used for the current analysis. The main objective of CINDI Health Monitor is to monitor health behaviour and lifestyle-related risk factors in order to evaluate and promote favourable health behaviour in populations.

The basis of the sample for this cross-sectional survey was the Slovenian Central Population Register. The sample was prepared by Statistical Office of the Republic of Slovenia based on a stratified simple random sampling design (stratification by region and type of settlement). 16,000 inhabitants of Slovenia were included in the sample. The survey questionnaire was applied through a mixed-mode survey (mail and Web). The response rate was 59.6%. Sample weighting was done according to 5-year age groups, sex and health region. Research methodology and data analysis methodology in detail are available elsewhere (14, 15).

The survey questionnaire, based on CINDI Health Monitor Core Questionnaire, was self-administered and covered a variety of topics related to health and risk factors, including tobacco use. The data on age at smoking initiation for ever smokers was obtained from the question ‘’If you are a current smoker or you have smoked in the past, how old were you when you first smoked?’ Participants were asked to write down the relevant age. With all participants, we also checked if they were ever smokers with other relevant smoking-related questions. Only ever smokers that reported age at smoking initiation were included in the analysis.

Education was assessed by a question in which participants could choose among the following categories: incomplete primary education, primary education, lower secondary education, upper secondary education, post-secondary, but non-tertiary education, tertiary education short-cycle, tertiary education bachelor level, or equivalent and tertiary education specialization, master level or doctoral level, or the equivalent. We merged those into three categories (primary or less, secondary and tertiary). Social class was assessed by a question in which participants could choose among the following categories: lower, labour, middle, upper-middle and upper. We merged those into three categories (lowest or working, middle and upper).

Geographical regions were determined by merging nine health regions in three geographical regions. The Western

region represents Nova Gorica, Koper and Kranj health regions, the Central region represents Ljubljana health region and the Eastern region represents Novo Mesto, Celje, Maribor, Murska Sobota and Ravne health regions.

Analyses were conducted using SPSS software, version 21 and R, version 3.1.2. Frequencies, percentages and average values were calculated and regression models were used for testing for associations between variables. The value of $p<0.05$ was used for statistical significance.

3 RESULTS

3.1 Sample Characteristics

Characteristics of the study population are presented in Table 1.

Table 1. Distribution of the sample by gender, age, education, self-reported social class and geographical region.

	All study participants (n, %)	Reported age at smoking initiation (n, %)
Total	9498 (100.0%)	4591 (100.0%)
Gender		
Male	4805 (50.6%)	2660 (57.9%)
Female	4693 (49.4%)	1931 (42.1%)
Age		
25-34	2045 (21.5%)	928 (20.2%)
35-44	2073 (21.8%)	938 (20.4%)
45-54	2135 (22.5%)	1181 (25.7%)
55-64	1971 (20.8%)	1077 (23.5%)
65-74	1273 (13.4%)	468 (10.2%)
Education		
Primary or less	1350 (14.3%)	580 (12.7%)
Secondary	5310 (56.1%)	2885 (63.1%)
Tertiary	2797 (29.6%)	1107 (24.2%)
Social class		
Lowest and working class	3710 (41.2%)	1973 (45.1%)
Middle class	4393 (48.8%)	2023 (46.3%)
Upper class	905 (10.1%)	374 (8.6%)
Geographical region		
Western	2101 (22.1%)	997 (21.7%)
Central	2941 (30.9%)	1440 (31.4%)
Eastern	4466 (47.0%)	2154 (46.9%)

3. 2 Age at Smoking Initiation

Cumulative shares of recalled age at smoking initiation in ever smokers, aged 25-74, in total and by gender, are presented in Figure 1. Male and female ever smokers have significantly different age patterns of smoking initiation ($p<0.01$), with males more likely than females initiating smoking at younger ages.

Cumulative shares of recalled age at smoking initiation for 10 year age groups of ever smokers of both genders and for males and females separately, are presented in Figures 2, 3, and 4. There are significant differences in age patterns of smoking initiation among age groups for both genders together ($p<0.01$) and each gender separately (male: $p<0.01$; female: $p<0.01$). In all cases, ever smokers in younger age groups more likely than those in older age groups initiate smoking at a younger age. There are more pronounced differences between age groups in female ever smokers than male.

There are significant differences in age patterns of smoking initiation between genders in all age groups, except the youngest (35-44: $p=0.001$; 45-54: $p=0.026$; 55-64: $p<0.001$; 65-74: $p<0.001$). Male smokers in these age groups are more likely than females to initiate smoking at an earlier age.

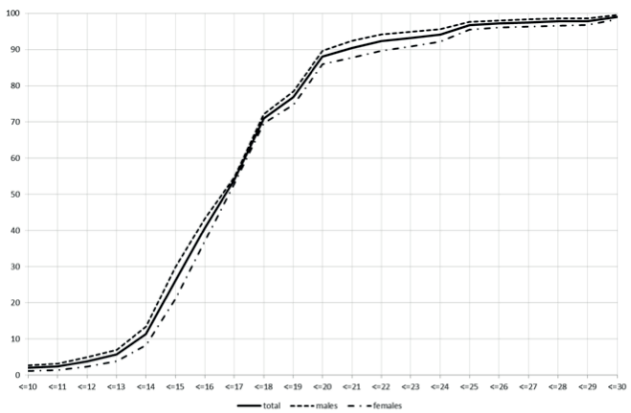

Figure 1. Cumulative shares of recalled age at smoking initiation in ever smokers, aged 25-74, in total and by gender.

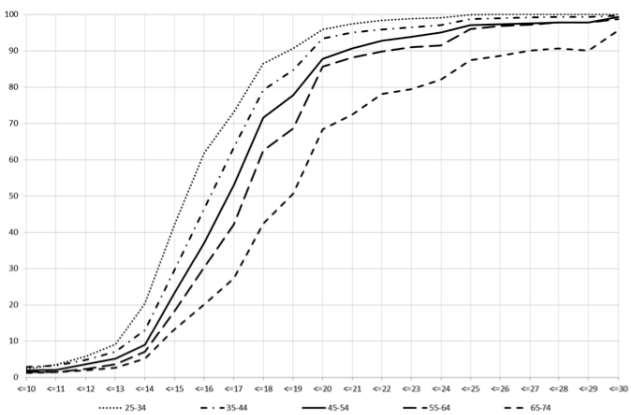

Figure 2. Cumulative shares of recalled age at smoking initiation for 10 year age groups in ever smokers of both genders.

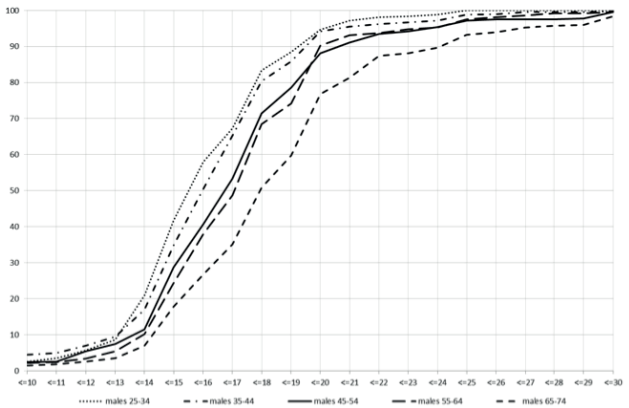

Figure 3. Cumulative shares of recalled age at smoking initiation for 10 year age groups in male ever smokers.

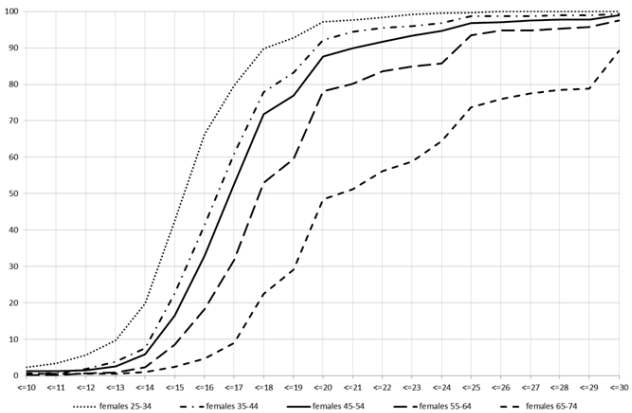

Figure 4. Cumulative shares of recalled age at smoking initiation for 10 year age groups in female ever smokers.

3.3 Average Age at Smoking Initiation

Average ages at smoking initiation by gender, 10 year age groups, education, self-reported social class and geographical regions are presented for all ever smokers in Table 2, and separate for each gender in Tables 3 and 4. Male and female ever smokers have significantly different average ages at smoking initiation, with males being more likely to initiate smoking at a lower average age then females. Male and female ever smokers also have significantly different average ages at smoking initiation in all age groups over 35 ($p<0.010$). In all these age groups, males are more likely to initiate smoking at a lower average age. There is no significant difference in average age at smoking initiation among male and female ever smokers in the youngest age group (25 to 34), even though the difference is not far from a significant one ($p=0.054$).

There is also a significant difference in average ages at smoking initiation between different age groups in ever smokers of both genders together ($p<0.010$), and in each gender separately ($p<0.010$). Male and female ever smokers in younger age groups are more likely to initiate smoking at younger ages.

Table 2. Average ages at smoking initiation in total, by gender, education, self-reported social class and geographical regions for ever smokers aged 25-74 and for 10 year age groups.

Both genders	% (95% CI)	25-74	25-34	35-44	45-54	55-64	65-74
Total		17.7 (17.6-17.8)	16.1 (15.9-16.3)	16.9 (16.7-17.2)	17.7 (17.5-18.0)	18.4 (18.2-18.6)	20.4 (20.0-20.8)
Gender	Males	17.3 (17.2-17.5)	16.3 (16.0-16.6)	16.6 (16.3-16.9)	17.5 (17.2-17.8)	17.7 (17.4-17.9)	19.1 (18.7-19.6)
	Females	18.1 (17.9-18.3)	15.9 (15.7-16.2)	17.4 (17.0-17.7)	18.0 (17.7-18.3)	19.6 (19.2-19.9)	23.4 (22.5-24.2)
	P-value	0.0000	0.0548	0.0012	0.0265	0.0000	0.0000
Education	Primary or less	18.1 (17.7-18.5)	16.4 (15.3-17.4)	16.2 (15.6-16.7)	17.8 (17.1-18.6)	18.7 (18.1-19.2)	20.8 (19.6-22.0)
	Secondary	17.6 (17.5-17.7)	16.1 (15.8-16.3)	16.9 (16.7-17.2)	17.7 (17.5-18.0)	18.1 (17.9-18.4)	20.3 (19.7-20.9)
	Tertiary	17.6 (17.4-17.8)	16.2 (15.9-16.5)	17.2 (16.7-17.7)	17.7 (17.2-18.3)	18.9 (18.3-19.6)	20.4 (19.6-21.2)
	P-value	0.0420	0.7989	0.0141	0.9626	0.0271	0.7357
Social class	Lowest and working class	17.6 (17.4-17.8)	16.0 (15.7-16.3)	16.7 (16.4-17.1)	17.8 (17.5-18.1)	18.1 (17.8-18.4)	20.0 (19.2-20.8)
	Middle class	17.7 (17.5-17.9)	16.0 (15.8-16.3)	17.1 (16.7-17.4)	17.7 (17.4-18.1)	18.7 (18.3-19.1)	20.6 (20.0-21.2)
	Upper class	17.8 (17.4-18.2)	16.4 (15.6-17.1)	17.1 (16.4-17.9)	18.0 (17.2-18.9)	18.2 (17.4-19.0)	20.3 (19.2-21.4)
	P-value	0.3791	0.7051	0.3413	0.8531	0.0668	0.5449
Geographical region	Western	17.9 (17.6-18.1)	16.4 (16.0-16.8)	16.9 (16.4-17.4)	17.9 (17.3-18.4)	18.5 (18.1-18.9)	20.3 (19.4-21.3)
	Central	17.8 (17.5-18.0)	15.9 (15.6-16.3)	17.4 (17.0-17.8)	17.9 (17.5-18.3)	18.5 (18.1-18.9)	20.2 (19.5-20.9)
	Eastern	17.5 (17.4-17.7)	16.2 (15.9-16.5)	16.7 (16.3-17.0)	17.6 (17.3-17.9)	18.2 (17.9-18.6)	20.6 (19.9-21.3)
	P-region	0.0585	0.2061	0.0214	0.4430	0.5421	0.6962

Table 3. Average ages at smoking initiation in total, by education, self-reported social class and geographical regions in male ever smokers aged 25-74 and for 10 year age groups.

Males	% (95% CI)	25-74	25-34	35-44	45-54	55-64	65-74
Total		17.3 (17.2-17.5)	16.3 (16.0-16.6)	16.6 (16.3-16.9)	17.5 (17.2-17.8)	17.7 (17.4-17.9)	19.1 (18.7-19.6)
Education	Primary or less	17.3 (16.8-17.7)	16.9 (15.6-18.2)	15.4 (14.5-16.2)	17.6 (16.3-18.9)	17.3 (16.7-17.9)	18.6 (17.7-19.5)
	Secondary	17.3 (17.1-17.4)	16.1 (15.7-16.4)	16.7 (16.3-17.0)	17.5 (17.2-17.9)	17.5 (17.2-17.8)	19.0 (18.4-19.7)
	Tertiary	17.7 (17.3-18.1)	16.7 (16.1-17.3)	16.8 (15.9-17.8)	17.4 (16.6-18.1)	18.6 (17.6-19.6)	19.9 (19.0-20.8)
	P-value	0.1200	0.1483	0.0161	0.8955	0.0683	0.1278
Social class	Lowest and working class	17.2 (17.0-17.4)	16.1 (15.7-16.5)	16.5 (16.0-16.9)	17.7 (17.2-18.2)	17.4 (17.1-17.8)	18.4 (17.7-19.2)
	Middle class	17.5 (17.2-17.7)	16.3 (15.9-16.7)	16.8 (16.3-17.3)	17.4 (16.9-18.0)	17.9 (17.4-18.3)	19.8 (19.0-20.5)
	Upper class	17.5 (17.0-18.0)	15.6 (13.9-17.3)	16.8 (15.5-18.1)	17.2 (16.4-18.1)	18.0 (16.9-19.1)	19.2 (18.2-20.2)
	P-value	0.2701	0.5500	0.5946	0.5716	0.2665	0.0498
Geographical region	Western	17.4 (17.1-17.6)	16.4 (15.9-17.0)	16.8 (16.1-17.4)	17.3 (16.7-17.9)	17.6 (17.2-18.1)	18.9 (18.1-19.8)
	Central	17.3 (17.1-17.6)	16.0 (15.5-16.5)	17.1 (16.5-17.7)	17.7 (17.2-18.3)	17.6 (17.1-18.1)	18.9 (18.1-19.6)
	Eastern	17.3 (17.1-17.6)	16.5 (16.0-17.0)	16.3 (15.8-16.7)	17.5 (17.0-18.0)	17.7 (17.3-18.1)	19.5 (18.7-20.3)
	P-region	0.9997	0.3421	0.0913	0.6002	0.9631	0.5387

Table 4. Average ages at smoking initiation in total, by education, self-reported social class and geographical regions in female ever smokers aged 25-74 and for 10 year age groups.

Females	% (95% CI)	25-74	25-34	35-44	45-54	55-64	65-74
Total		18.1 (17.9-18.3)	15.9 (15.7-16.2)	17.4 (17.0-17.7)	18.0 (17.7-18.3)	19.6 (19.2-19.9)	23.4 (22.5-24.2)
Education	Primary or less	19.2 (18.6-19.8)	14.9 (14.1-15.6)	16.9 (16.3-17.5)	18.0 (17.2-18.9)	20.5 (19.5-21.5)	24.5 (22.1-26.9)
	Secondary	18.2 (17.9-18.4)	16.1 (15.7-16.4)	17.4 (16.9-17.9)	18.0 (17.6-18.3)	19.3 (18.8-19.8)	23.5 (22.5-24.6)
	Tertiary	17.5 (17.2-17.8)	15.9 (15.5-16.2)	17.5 (16.9-18.0)	18.1 (17.4-18.8)	19.3 (18.6-20.1)	21.7 (20.3-23.1)
	P-value	0.0000	0.0185	0.2877	0.9500	0.0943	0.0506
Social class	Lowest and working class	18.2 (17.9-18.5)	15.9 (15.5-16.4)	17.2 (16.7-17.7)	17.9 (17.5-18.3)	19.4 (18.8-19.9)	24.8 (23.0-26.6)
	Middle class	18.0 (17.8-18.3)	15.7 (15.4-16.0)	17.4 (17.0-17.9)	18.0 (17.6-18.5)	19.9 (19.3-20.5)	22.3 (21.4-23.2)
	Upper class	18.2 (17.6-18.8)	16.7 (16.0-17.4)	17.4 (16.7-18.1)	18.8 (17.3-20.2)	18.5 (17.4-19.6)	23.0 (20.5-25.4)
	P-value	0.6074	0.0445	0.8276	0.5242	0.0829	0.0473
Geographical region	Western	18.7 (18.2-19.1)	16.3 (15.6-17.0)	17.0 (16.3-17.8)	18.6 (17.7-19.5)	19.9 (19.2-20.6)	24.6 (22.3-26.8)
	Central	18.3 (18.0-18.6)	15.8 (15.4-16.2)	17.8 (17.2-18.4)	18.1 (17.5-18.6)	19.6 (18.9-20.3)	22.7 (21.5-23.9)
	Eastern	17.8 (17.5-18.0)	15.9 (15.6-16.2)	17.2 (16.8-17.6)	17.7 (17.4-18.0)	19.3 (18.7-19.8)	23.4 (22.1-24.7)
	P-region	0.0006	0.4470	0.1374	0.1364	0.3823	0.3484

There is a significant difference in average ages at smoking initiation by education in ever smokers aged 25-74 and also in the age group 35-44. In both age groups, ever smokers with the lowest education start smoking at an earlier average age compared to those with secondary ($p=0.012$) and tertiary education ($p=0.006$). There is also a significant difference in average ages at smoking initiation by education in ever smokers aged 55-64, where those with secondary education start smoking at an earlier average age compared to ever smokers with tertiary education ($p=0.018$).

While there are no significant differences in average age at smoking initiation by education, self-reported social class and geographical region in male ever smokers aged 25-74, we found significant differences in average age at smoking initiation by education and geographical region in female ever smokers, aged 25-74. Female ever smokers aged 25-74 with tertiary education start smoking at an earlier average age compared to those with the lowest ($p<0.001$) and secondary education ($p=0.001$). In different age groups of female ever smokers, significant differences in average age at smoking initiation are present only in the youngest one, where female ever smokers aged 25-34 with secondary ($p=0.005$) and tertiary education ($p=0.017$) start smoking at an earlier average age, compared to those with the lowest education. Regarding geographical region, female ever smokers aged 25-74 from Eastern Slovenia start smoking at an earlier average age, compared to females from Central ($p=0.010$) and Western Slovenia ($p=0.001$), but there are no statistical differences in any of the 10 year age groups.

4 DISCUSSION

Our paper has four principal findings. First, almost all ever smokers of both genders, aged 25-74, initiated smoking at the age 25 or less, and almost three quarters at the age 18 or less. Second, male ever smokers aged 25-74 initiate smoking at an earlier age than female ever smokers of the same age. The average age at smoking initiation for both genders is slightly below 18, the difference in the average age at smoking initiation between genders being less than 1 year. Third, age at smoking initiation is decreasing in both male and female ever smokers, but more pronouncedly in females. While, in the last decades, the average age at smoking initiation decreased by approximately 3 years in male ever smokers, it decreased more than twice as much in females (approximately 8 years). The initial difference in average age at smoking initiation between genders, which is present in older age groups, gradually disappeared, and there are no differences in age at smoking initiation anymore in the youngest age groups (25-35) of male and female ever smokers. It seems that in the future we might expect female ever smokers to initiate smoking at younger ages compared to males. Fourth, in male ever smokers there are no differences in average age at smoking initiation by education, self-reported social class and geographical regions, while, in females, there are differences in average age at smoking initiation by education and geographical regions. Female ever smokers with the highest education and those from Eastern Slovenia start smoking at a lower average age. Different studies do not show significant differences in prevalence of smoking among different geographical

regions of Slovenia (16, 17). But they do show higher prevalence of different unhealthy lifestyles in the eastern region of Slovenia, compared to other regions, and a lower average age at smoking initiation is consistent with this findings.

Our findings regarding the age pattern of smoking initiation are in general consistent with the research from abroad (2-6, 8, 18). A more detailed comparison is not possible due to different research methodologies, age of participants included, no access to more detailed data and lack of published research in this area. The majority of published research comes from North America and not from historically and culturally similar countries. Also, more research is focused on age at regular smoking initiation than at smoking initiation.

There are numerous factors that influence adolescents' and young adults' smoking initiation. Among the most important ones are tobacco companies' marketing activities. Advertising and promotion of tobacco products have been shown to influence the onset and continuation of smoking among adolescents and young adults (3). Decreasing ages at smoking initiation, which are shown in our study, are undoubtedly, to a certain extent, the effect of tobacco products' marketing. In the recent decades, tobacco companies also intensively targeted girls and women (19), and we assume this is one of the most important reasons for more pronounced changes in women in our study. As the majority of smoking initiation begins among adolescents and young adults, it is clear that these age groups are highly important for the future success, sales and profit of tobacco industry. This is the reason why tobacco industry did, is and will dedicate substantial resources to develop and implement the most effective marketing strategies to attract adolescents and young adults to smoking, and, at the same time, support ineffective and obstruct effective tobacco control measures to prevent and decrease smoking among the youth (20).

The data from our study confirms the importance of intensive smoking prevention policies and interventions in adolescents and young adults. For maximum effectiveness prevention programmes must start early (before adolescence, in childhood) and continue throughout adolescence and young adulthood. A comprehensive national tobacco control programme with effective tobacco control measures to ban tobacco products marketing needs to be implemented, and health and non-smoking supporting environment created (3).

Our research is the first of such kind among a representative sample of adults in Slovenia. There are several potential limitations of this study. The cross-sectional design of the study does not allow for any conclusions on causality between the age at smoking initiation and independent variables used. Over one third of potential participants did not participate in the survey. The study uses self-administered questionnaire, thus under-reporting of smoking is possible. The self-reported data on age at smoking initiation may also be subject to recall bias, especially in older age groups. Any of these biases could bias our results in any direction. Although these limitations exist, our study offers valuable data for tobacco control and prevention.

In the future, we should continue to monitor changes in age patterns of smoking initiation. Future research on smoking initiation in Slovenia should also examine whether smokers who initiate smoking at an earlier age more likely become regular smokers and less likely quit smoking, in comparison with those that initiate smoking at a later age. The analysis of smoking initiation should also include a regular smoking initiation age, examine progression from smoking initiation to regular smoking and, for a better understanding of the impact of a socio-economic position on smoking initiation, include other measures of socio-economic position in childhood and adolescence (those related to the family of origin).

5 CONCLUSIONS

Our study demonstrates adolescence and young adulthood to be critical periods in smoking initiation. If young people would remain tobacco-free, most would probably never start to smoke as adults. In recent decades, smoking initiation shifts to younger ages in Slovenia, more pronounced in women than men. This will probably result in higher risks for development of diseases caused by smoking, higher levels of addiction and less quitting.

Our study confirms the importance of early and sustained smoking prevention programmes in youth, and the importance of national comprehensive tobacco control programme with effective tobacco control measures to ban tobacco products marketing.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

Received from the Republic of Slovenia National Medical Ethics Committee.

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ASSESSING EMPATHIC ATTITUDES IN MEDICAL STUDENTS: THE RE-VALIDATION OF THE JEFFERSON SCALE OF EMPATHY-STUDENT VERSION REPORT

OCENJEVANJE EMPATIČNE NARAVNANOSTI PRI ŠTUDENTIH MEDICINE: POROČILO O PONOVNI VALIDACIJI JEFFERSONOVE LESTVICE EMPATIJE – OBLIKA ZA ŠTUDENTE

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ABSTRACT

Introduction. Self-reported scales, such as the Jefferson Scale of Empathy – Student version (JSE-S), had been recognised to measure the empathic disposition rather than behavioural expression. This study aimed to re-validate the JSE-S and its factor structure prior further research on empathy in medical students.

Methods. A convenience sampling method was employed in two consecutive academic years, in 2012/13 and 2013/14, at the Faculty of Medicine in Ljubljana, Slovenia; first and final year students participated voluntarily. The JSE-S examined empathy levels. The principal component analysis was performed with Oblimin rotation and Kaisers' criteria. Factors with eigenvalues ≥ 1.25 were retained and items loading ≥ |0.40| were required for the interpretation of the factor structure.

Results. The total study sample size was 845 students, (580 (68.6%)) of them women; 327 (72.2%) were in the first (19.2 ± 1.9 years old) and 253 (61.7%) in the sixth (24.9 ± 1.1 years old) year of medical school. Females achieved higher JSE-S scores in all groups.
The three-factor JSE-S was confirmed, but only seven items were concordant in all groups. A higher proportion of explained variation for Perspective Taking and Standing in the Patient`s Shoes, and better internal consistency, was found in a reduced-item scale (16-18 items). When performing factor analysis of a seven-item scale, the percentages of explained variance increased with two factors extracted.

Conclusions. Only the cognitive dimension of JSE-S gave results as expected, therefore proper terminology, i.e. the object of assessment, must be used in further administration of JSE-S and empathy-related research in medical students.

Keywords:
empathy, attitude, values, medical students, self-assessment

IZVLEČEK

***Izhodišča**. Samoocenjevalne lestvice, kakršna je Jeffersonova lestvica empatije - oblika za študente (JSE-S), so se izkazale kot mere naravnanosti (stališč) in ne kot pripomočki za oceno in napoved vedenja. Zato je bilo treba pred nadaljnjimi raziskavami empatične naravnanosti pri študentih in preučevanjem odnosa med študijskim programom ter pristopi in empatično naravnanostjo študentov ponovno preveriti veljavnost JSE-S, bolj jasno opredeliti predmet merjenja ter variacije/razlike, povezane s spolom.*

***Metode**. S priložnostnim vzorčenjem v dveh zaporednih študijskih letih (2012/13 in 2013/14) so bili študenti prvega in šestega letnika Medicinske fakultete v Ljubljani povabljeni k anonimnemu in prostovoljnemu sodelovanju. Svojo empatično naravnanost so ocenjevali z JSE-S. S Student t-testom za neodvisne vzorce in enosmerno analizo variance so bile izračunane razlike po spolu in letniku študija. Vsi testi so bili dvosmerni, z mejo statistične pomembnosti P <0,05. Izvedena je bila validacija lestvice po metodi glavnih komponent z rotacijo Oblimin, ob upoštevanju Kaiserjevih meril. Nasičenost posameznih trditev ≥ |0,40| in faktorji z lastno vrednostjo ≥ 1,25 so bili podlaga za razlago faktorske strukture.*

***Rezultati**. Celotni vzorec je vključeval 845 študentov, med njimi je bilo 580 (68,6%) žensk, 327 (72,2%) je bilo študentov prvega letnika, starih 19,2 ± 1,9 leta, 253 (61,7%) pa študentov šestega letnika, starih 24,9 ± 1,1 leta. Ženske so dosegle višje skupne vrednosti na JSE-S v vseh skupinah.*
Tri faktorska struktura JSE-S se je potrdila, vendar se je le sedem trditev/postavk ujemalo v vseh štirih skupinah študentov. Ko je bila lestvica skrajšana na 16 oziroma 18 trditev, se je povečal delež pojasnjene variance pri faktorjih upoštevanje zornega kota drugega in zavzemanje pozicije drugega, boljša je bila tudi notranja konsistentnost. V faktorski analizi lestvice s sedmimi trditvami/postavkami je bil delež pojasnjene variance še večji, ne pa tudi notranja konsistentnost (Cronbach's a > 0,70). Izločena sta bila dva faktorja, oba po vsebini opisujeta kognitivno razsežnost empatije.

***Zaključki**. Pokazalo se je, da JSE-S meri empatično naravnanost, kar je treba upoštevati v prihodnjih raziskavah ter temu prilagoditi tudi poimenovanje lestvice. Predlagamo uporabo skrajšane lestvice s 16 trditvami, s skupno vrednostjo točk JSE-S kot mero samoocene kognitivne komponente empatije.*

Ključne besede:
empatija, stališča, vrednote, študenti medicine, samoocena

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1 INTRODUCTION

Empathy refers to an aspect of personality, which has an important role in interpersonal relationships and in facilitating competence in communication. Given that it is considered to be a desirable trait in the medical profession, there have been many trials assessing the level of empathy of students at some point during medical school, or prior to admission (1, 2). This past belief that empathy should be based in detached reasoning, without the physician experiencing the patient`s emotional state himself/herself (3, 4), was probably due to the conviction that empathy is an intellectual, rather than an emotional, form of knowing, as acknowledged by Halpern (2) when describing the function of empathy as the ability to recognize what it feels like to experience something. A definition presented by Stepien and Baernstein (5), describing the meaning of empathy as an understanding or appreciation of how someone else feels, has been broadened for a clinical context to include four aspects, i.e. emotive (the ability to imagine patients' emotions and perspectives), moral (the physician's internal motivation to empathize), cognitive (the intellectual ability to identify and understand patients' emotions and perspectives), and behavioural (the ability to convey understanding of those emotions and perspectives back to the patient). Others have defined empathy mainly at three levels, namely: affective (6, 7), cognitive (8, 9) and behavioural (8).

In the context of health care, empathy as a predominantly cognitive attribute, combined with the capacity to communicate the understanding of the patient's experiences, concerns, and perspectives and with an intention to help, has been explained and measured by Hojat and co-workers (10). Empathy was found to be likely to enhance patient satisfaction, adherence to therapy, and the willingness to divulge sensitive information that may assist diagnosis (11).

It is important to distinguish empathy, which is non-judgmental and considered to be manifested consciously (12), from sympathy, an effective response, which lacks a cognitive element and relates more to emotions and the development of feelings for a patient (13). As a component of the physician-patient relationship, empathy has been shown to affect both diagnosis and patient care (2, 14). Patients of physicians who had scored high in empathy reported better disease control and prognosis in comparison to patients of physicians with low empathy scores (10, 15). Recent empirical evidence suggests empathy is associated with improved clinical outcomes (14) and decreased anxiety in patients (16, 17).

1.2 Enhancing the Empathy of Medical Students

In Slovenia, similarly to other countries (18), medical students are accepted into medical school primarily on the basis of their achieved academic grades and cognitive skills. However, it has been suggested that effective educational programs might facilitate and improve students' empathic skills (19). For example, more than 80% of students felt empowered after empathy-based training (20), which gives grounds for assuming that empathy, or at least its cognitive dimension, can be taught. Hojat and co-workers (13) suggested that empathy has evolutionary, genetic, developmental, experiential, situational, and educational roots, and that its deficit could be improved, though not without effort. Early exposure to clinical training and a curriculum for professional competencies was shown to help to enhance the empathy of medical students (21). Empathy can therefore be improved by targeted educational activities (6), and the evidence of a correlation between empathy and clinical outcomes should be made widely known to medical students and their tutors (22-24).

The Slovenian version of the JSE-S has been validated already (25), but further work showed the need to re-validate the scale and provide more a precise definition of the subject in question, based on the limitation of the JSE-S as a measure of empathic disposition, rather than behavioural expression (26). Aside from that, this study aimed, for the first time in Slovenian medical teaching, to assess empathic levels of two generations of first and sixth year medical students, and to examine the variation of empathy during different years of medical education and between genders. The study was also designed to provide the conceptual groundwork to enable further research and evaluation of teaching models aimed at promoting empathy.

2 METHODS

2.1 Participants and Procedure

A convenience sampling method was employed in two consecutive academic years, 2012/13 and 2013/14, at the Faculty of Medicine in Ljubljana, Slovenia. The first ($n_{2012/13}$ = 234, $n_{2013/14}$ = 216) and the final year ($n_{2012/13}$ = 219, $n_{2013/14}$ = 176) medical students, attending the compulsory courses 'Communication' and 'Family Medicine,' respectively, were told about the project and its aims following a lecture during the academic schedule in the last week of May, i.e. in May 2013 and May 2014. Of 453 first year students, there were 327 (72.2%) females and 126 (27.8%) males; in both final year student groups (n = 392), there were 253 (64.5%) female and 139 (35.5%) male participants. The students were provided with an explanatory statement and informed that participation was voluntary. The JSE-S, administered to students to examine their self-reported empathy levels, took them approximately ten minutes to complete. Consent was

implied by the completion and submission of the JSE-S questionnaire, with the response rate in the different groups of students varying from 83.6% to 98.0%.

2.2 Measures

The Jefferson Scale of Physician Empathy (JSPE) and Jefferson Scale of Empathy- Student version (JSE-S) have been used for more than ten years in several settings to measure empathy, not only among undergraduate and graduate students, but also in practicing physicians (27-31). For the purpose of this study, the JSE-S, which is a 20-item scale designed to measure empathy in the context of patient care and the doctor-patient relationship (28), was administered to examine self-reported empathy levels in students (11). It only takes a few minutes to complete. Students rated their level of empathy for each item on a seven-point Likert scale (1 - strongly disagree, 7 - strongly agree), with higher scores indicating higher levels of empathy. Ten of the items in the JSE-S are positively worded while the other ten are negatively worded, to decrease the confounding effect of the 'acquiescence response style,' i.e. the tendency to constantly agree or disagree (yea-, naysayers). The possible score range is 20–140: the higher the mean score, the higher the self-reported empathy level (28).

A short demographic questionnaire about age, gender and year of study was also included.

2.3 Data Analysis

SPSS (IBM SPSS Statistics version 22 for Windows) was used for data storage, tabulation and the generation of descriptive and inferential statistics. The means and standard deviations (SDs) were used to summarize the demographic data. Independent-sample Student's t-tests and one-way analyses of variance were used to compare the differences between gender and years of study. All tests were two-tailed, with the results considered statistically significant if the P-value was <0.05.

Following the idea of Tavakol and co-workers (31), a principal component analysis (PCA) was performed to explore the factor structure and the associations between the observed variables (items) and the latent variables (factors). The exploratory nature of the PCA was chosen, as the underlying components of the JSP-S have not yet been thoroughly investigated for Slovenia. An Oblimin rotation with Kaisers' criteria was used to better understand the dimensionality of the JSE-S. Only those factors with eigenvalues of ≥ 1.25 were retained, and items with a loading of ≥ |0.40| were required for the interpretation of the factor structure. Cronbach's alpha coefficient of > 0.70 was considered as acceptable reliability in determining the internal consistency of the scale.

3 RESULTS

3.1 Gender, Study Year and Scoring of Participants on the JSE-S

The first year students were 19.2 ± 1.9 years old and the sixth year students were 24.9 ± 1.1 years old. The total study sample size consisted of 845 students, most of whom were females (580 (68.6%)); of them 327 (72.2%) were in the first year and 253 (61.7%) in the sixth year. Of males, there were 30.4% ($n_{2012/13}$ = 71) and 25.1% ($n_{2013/14}$ = 55) in first year and 34.3% ($n_{2012/13}$ = 74) and 36.9% ($n_{2013/14}$ = 65) in the last year, respectively.

There were no differences between the groups in the proportion of female students (x^2 = 7.463, p = 0.059). More characteristics are presented in Table 1.

Table 1. JSE-S total scores in the four groups of students.

	N_{tot} (response rate (%))	N_{women} (%)	$JSE\text{-}S_{total}$ (M ± SD)	$JSE\text{-}S_{women}$ (M ± SD)	$JSE\text{-}S_{men}$ (M ± SD)	*P**
1st year students $_{2012/13}$	234 (89.0)	163 (69.6)	106.25 ± 12.21	109.47 ± 11.79	102.70 ± 14.00	p=0.001
1st year students $_{2013/14}$	219 (83.6)	164 (74.9)	110.10 ± 10.79	112.13 ± 10.89	107.95 ± 11.43	p=0.016
p*			p<0.001	p=0.013	p=0.025	
6th year students $_{2012/13}$	216 (97.3)	142 (65.7)	108.64 ± 12.56	110.07 ± 12.14	106.20 ± 12.91	p=0.031
6th year students $_{2013/14}$	176 (98.0)	111 (63.1)	106.62 ± 13.34	108.80 ± 12.13	102.84 ± 14.55	p=0.007
*P**			p=0.124	p=0.468	p=0.296	

* Student's t-test

There were differences in the total score of JSE-S between female and male students (t = 3.652, p=0.001). Female students achieved higher JSE-S scores in all groups. There was no difference in the JSE-S scores between first and sixth year students, between female and male students, and male first and sixth year students in the academic year 2012/3, (t= 0.768, p = 0.443; t = 0.442, p = 0.673; t = 0.337, p = 0.737 respectively). There was a difference in the JSE-S scores between the first and sixth year students in the academic year 2013/14 (t = 2.247, p = 0.025), yet none when female (t=1.463, p=0.145) and male (t = 0.937, p = 0.351) students' scores were tested separately.

3.2 Results of Confirmatory Factor Analysis

The three-factor JSE-S was confirmed, with JSE-S giving somewhat better results for the final year medical students, with a higher proportion of explained variation for F1 and F2. The results are presented in Table 2.

Table 2. Confirmatory factor analysis for two generations of first and final year medical students.

	EV_{total} (%)	EV_{F1} (%)	EV_{F2} (%)	EV_{F3} (%)	Cronbach's α	N
First year students $_{2012/13}$	38.600	23.913	6.753	7.936	0.790	234
First year students $_{2013/14}$	36.983	21.798	7.786	7. 399	0.776	219
Sixth year students $_{2012/13}$	45.824	29.849	8.934	7.041	0.789	216
Sixth year students $_{2013/14}$	41.314	24.817	8.880	7.617	0.767	176

EV (%): % of explained variance, F: factor

F1 – Perspective Taking, F2 – Standing in the Patient`s Shoes, F3 – Compassionate Care

Items with a loading of ≥ |0.40| were included in the factor analysis with an Oblimin rotation (eigenvalue ≥ 1.25) for each group of students. The results are presented in Table 3. In all four groups of students, the item with a loading of < |0.40| was #18. In both groups of sixth year students, items #1 and #5 loaded to less than |0.40| and were excluded from further analysis. The proportion of explained variance with the reduced number of items (from 16 to 18) was higher in all groups of students (Table 3), compared to the proportion of explained variance in the 20-item scale (Table 2). The internal consistency was better for the reduced-item scale (Cronbach's α = 0.813 vs. 0.790 in first year students$_{2012/13}$, Cronbach's α = 0.774 vs. 0.776 in first year students$_{2013/14}$, Cronbach's α = 0.806 vs. 0.789 in sixth year students$_{2012/13}$, Cronbach's α = 0.785 vs.0.767 in sixth year students$_{2013/14}$), indicating that the scales demonstrate adequate scale reliability.

Table 3. Factors with Items loading ≥ |0.40| (PCA, Oblimin rotation (eigenvalue ≥ 1.25)) for each group of students.

Item		First year students$_{2012/13}$	First year students$_{2013/14}$	Sixth year students$_{2012/13}$	Sixth year students$_{2013/14}$
1	Physicians' 'understanding of their patients' feelings and the feelings of their patients' families does not influence medical or surgical treatment.	-0.513	0.417	/	/
2	Patients feel better when their physicians understand their feelings.	0.623	/	0.614	0.413
3	It is difficult for a physician to view things from the patient`s perspective.	0.836	0.763	0.785	0.791
4	Understanding body language is as important as verbal communication in physician-patient relationships.	0.429	0.455	0.578	0.616
5	A physician's sense of humour contributes to a better clinical outcome.	/	0.452	0.492	/
6	Because people are different, it is difficult to see things from the patient`s perspective.	0.815	0.725	0.781	0.809
7	Attention to patients' emotions is not important in history-taking.	-0.510	0.587	0.589	/
8	Attentiveness to patients' personal experiences does not influence treatment outcomes.	-0.581	0.474	0.667	0.582
9	Physicians should try to stand in their patients' shoes when providing care to them.	0.613	0.709	0.538	0.702
10	Patients value a physician's understanding of their feelings which is therapeutic in its own right.	0.444	0.524	0.549	0.517
11	Patients' illnesses can be cured only by medical or surgical treatment; therefore, physicians' emotional ties with their patients do not have a significant influence on medical or surgical treatment.	-0.528	0.605	0.759	-0.552
12	Asking patients about what is happening in their personal lives is not helpful in understanding their physical complaints.	-0.573	0.726	0.718	-0.782
13	Physicians should try to understand what is going on in their patients' minds by paying attention to their non-verbal cues and body language.	0.562	0.677	0.619	0.533
14	I believe that emotion has no place in the treatment of medical illness.	-0.619	0.491	0.660	-0.782
15	Empathy is a therapeutic skill, without which the physician's success is limited.	0.633	0.635	0.705	0.583
16	Physicians' understanding of the emotional status of their patients, as well as that of their families, is one important component of the physician-patient relationship.	0.683	0.588	0.527	0.676
17	Physicians should try to think like their patients in order to render better care.	0.698	0.731	0.559	0.616
18	Physicians should not allow themselves to be influenced by strong personal bonds between their patients and their family members.	/	/	/	/
19	I do not enjoy reading non-medical literature or the arts.	-0.572	/	0.480	-0.476
20	I believe that empathy is an important therapeutic factor in medical treatment.	0.684	0.561	0.730	0.719
N(items)		18	17	18	16
EV (%)		42.527	41.759	44.648	48.905

/: items loading < |0.40|, EV (%): % of explained variance with reduced number of items

In Table 4, the loadings of the items in the factor analysis performed in all groups of students are presented.

Table 4. A comparison of items loading to the particular factors in first and final year medical students.

	First year students$_{2012/13}$		First year students$_{2013/14}$		Sixth year students$_{2012/13}$		Sixth year students$_{2013/14}$	
	Item #	Loading	Item #	Loading	Item #	Loading	Item #	Loading
F1	2	0.623	1	0.417	7	0.589	2	0.413
F1	4	0.429	4	0.455	8	0.667	4	0.616
F1	9	0.613	5	0.452	**10**	**0.549**	9	0.702
F1	**10**	**0.444**	9	0.709	11	0.759	**10**	**0.517**
F1	**13**	**0.562**	**10**	**0.534**	12	0.718	12	-0.782
F1	**15**	**0.633**	**13**	**0.677**	**13**	**0.619**	**13**	**0.533**
F1	**16**	**0.683**	**15**	**0.724**	14	0.660	**15**	**0.583**
F1	17	0.698	**16**	**0.588**	**15**	**0.705**	**16**	**0.676**
F1	**20**	**0.684**	17	0.721	**16**	**0.527**	17	0.616
F1			**20**	**0.561**	19	0.480	**20**	**0.719**
F1					**20**	**0.730**		
F2	**3**	**0.836**	**3**	**0.763**	**3**	**0.785**	**3**	**0.719**
F2	**6**	**0.815**	**6**	**0.725**	**6**	**0.781**	**6**	**0.809**
F3	1	-0.513	7	0.587	2	0.441	8	0.582
F3	7	-0.510	8	0.474	4	0.525	11	-0.552
F3	8	-0.581	11	0.605	5	0.437	12	-0.782
F3	11	-0.528	12	0.726	9	0.526	14	-0.782
F3	14	-0.619	14	0.491	17	-0.560	19	-0.476
F3	17	0.698						
F3	19	-0.572						

F1 – Perspective Taking, F2 – Standing in the Patient`s Shoes, F3 – Compassionate Care

Only seven items were identified as loading to the same factor, i.e. items #3, #6, #10, #13, #15, #16 and #20 (bolded in Table 4). Perspective Taking (F1) was loaded with the following items: *#10 Patients value a physician's understanding of their feelings, which is therapeutic in its own right. #13 Physicians should try to understand what is going on in their patients' minds by paying attention to their non-verbal cues and body language. #15 Empathy is a therapeutic skill without which the physician's success is limited. #16 Physicians' understanding of the emotional status of their patients, as well as that of their families, is one important component of the physician-patient relationship. #20 I believe that empathy is an important therapeutic factor in medical treatment. The remaining two items (#3 It is difficult for a physician to view things from the patient`s perspective. #6 Because people are different, it is difficult to see things from the patient`s perspective.)* loaded to Standing in the Patient`s Shoes (F2). No items loaded to Compassionate Care (F3) and this was true in all groups of students.

In Table 5, the scoring on the JSE-S scale containing items identified in all four groups of students (7-item scale) is presented. Statistically significant differences between male and female JSE-S scores were identified.

Table 5. Scoring on JSE-S scale containing items identified in all four groups of students (7-item scale).

	First year students$_{2012/13}$	First year students$_{2013/14}$	p	Sixth year students$_{2012/13}$	Sixth year students$_{2013/14}$	p*
JSE-S$_{total}$ (M ± SD)	37.69 ± 5.45	38.69 ± 4.90	0.043	37.23 ± 5.50	36.05 ± 6.04	0.045
JSE-S$_{women}$ (M ± SD)	38.40 ± 5.10	39.17 ± 4.85	0.167	37.98 ± 5.49	37.04 ± 5.65	0.218
JSE-S$_{men}$ (M ± SD)	36.04 ± 5.92	37.04 ± 4.85	0.313	35.90 ± 5.18	34.33 ± 6.35	0.119
p*	0.002	0.005		0.008	0.004	

EV (%): % of explained variance with reduced number of items

* Student's t-test

When a factor analysis of the 7-item scale was performed, the percentages of explained variance were higher in all groups. Only two factors were extracted, Perspective Taking (F1) and Standing in the Patient`s Shoes (F2). These results are presented in Table 6.

Table 6. Confirmatory factor analysis for two generations of first and final year medical students.

	EV$_{total}$ (%)	EV$_{F1}$ (%)	EV$_{F2}$ (%)	Cronbach's α	N
First year students$_{2012/13}$	57.463	37.463	19.754	0.692	234
First year students$_{2013/14}$	54.849	34.730	20.119	0.465	219
Sixth year students$_{2012/13}$	59.409	37.186	22.223	0.634	216
Sixth year students$_{2013/14}$	63.758	41.936	21.822	0.733	176

EV (%): % of explained variance, F: factor

F1 – Perspective Taking, F2 – Standing in the Patient`s Shoes

Comparing the 18-item scale (Table 3) with the 7-item scale, the proportion of explained variance in first year students$_{2012/13}$ was 57.22% vs. 42.53%, and in sixth year students$_{2012/13}$ it was even higher, i.e. 59.41% vs. 44.65%. Comparing the 17-item scale analysis in the first year students$_{2013/14}$ with the 7-item scale (Table 5), there was 54.85% vs. 41.76% of explained variance, while comparing the 16-item scale analysis in sixth year students$_{2013/14}$ with the 7-item scale, 63.76% vs. 48.90% of the total variance was explained. However, the internal consistency (Cronbach's α) was below 0.70 in all groups, except for sixth year students$_{2013/14}$ (Table 6).

4 DISCUSSION

This study provided revalidation of the JSE-S and results regarding empathic attitudes in undergraduate medical students. By assessing the JSE-S scores in two groups of first and sixth year medical students, and comparing the JSE-S scores in male and female students, the study provided novel findings, with empathy levels in both first year and final year medical students (Table 1) comparable to other authors (21, 31, 33).

4.1 JSE-S Scores in the First and Final Year Students

Contrary to several other authors, who stated that empathic attitudes decrease as the level of medical education increases (15, 32), in this study, the students in their final year had similar JSE-S scores to students in first year. Although there was difference in JSE-S scores between the first and sixth year students in the academic year 2013/14, there were none when female and male students` scores were tested separately (Table 1). This is close to the results obtained in Japanese and Korean medical students (33, 34). The aforementioned difference in JSE-S scores between the first and sixth year students,

and also the difference between the two groups of first year students (Table 1), might be due to coincidence, and thus needs to be verified in further research. Similar JSE-S scores recorded in both groups of senior medical students in this study could be a result of cohort effects (35).

There are several pre-existing factors to be taken into consideration with the first year students. Van Ryn and co-workers (36) examined the individual predictors of first semester medical students' attitudes toward the value of physician empathy in clinical encounters, and found students varied in their attitudes towards the value of physician empathy when they start medical school, and that prior attitudes and knowledge have a strong effect on current learning. Therefore, there are innumerable factors that might have contributed to our results (Table 1), such as experiences during student placements and mentoring during the study process, which our study failed to examine, as well as other possible influencing factors and personal traits, so our study is limited for generalizing its findings in this domain. It would be of the utmost importance for medical educators in Slovenia to systematically examine the threat of erosion of empathy towards the final study year as reported by others (6, 15, 32, 37-39), at a time when the curriculum is shifting toward patient-care activities where empathy is essential. Klemenc-Ketiš and Vrečko (40), in their study on perceptions of professionalism by 1st and 5th year medical students at the Faculty of Medicine in Maribor, reported students of both study years recognising empathy as one of the components of professionalism, yet first-year students expressed a very pragmatic attitude towards the empathic behaviour, whilst fifth-year students were concerned about how to cope with too much empathy, perceiving physicians as more self-centred.
It is important to emphasize that also contextual factors might have affected the results in the first and final year students. Hemmerdinger and co-workers reported the psychometric properties of a test changing according to the context in which it was used (11). In our study, the JSE-S could have behaved differently with the final year medical students if they perceived the results as powerful in affecting their career chances, as opposed to junior medical students.

4.2 JSE-S Scores in Female and Male Students

Consistent with many international studies (14, 21, 27, 35, 41), in our study, female students were found to have higher JSE-S scores than their male peers (Table 1, Table 5). Explanation for these results might be in the traditional and evolutionary role of women as caregivers (27), with females being more perceptive to emotions or males taking a more rational rather than emotive approach (14). Authors of Professionalism Assessment Scale, based on undergraduate medical students' perceptions of, and attitudes towards, professionalism, a newly developed self-assessment tool in Slovenia, in their validation report, also warned results should be interpreted with care, due to gender bias related to self-assed empathic attitudes (42).

4.3 JSE-S Three Factor Model

Further analysis showed that the hypothesised three-factor model of the JSE-S structure fitted the study year differences between medical students (Table 2), while the reduced number of items scale (Table 3) fitted even better, with a higher proportion of explained variance in most cases, i.e. in first year students$_{2012/13}$ 38.60% vs. 42.53%, in first year students$_{2013/14}$ 36.98% vs. 41.76%, sixth year students$_{2012/13}$ 45.82% vs. 44.65% and in sixth year students2013/14 41.31% vs. 48.90%.

An additional comparison aiming to identify those JSE-S items which loaded to a particular factor (F1: Perspective Taking, F2: Standing in the Patient`s shoes, F3: Compassionate Care) in all groups of students (Table 4) resulted in a factor analysis of the7-item scale (Table 5, Table 6). In this study, only seven JSE-S items were shown to load to JSE-S factors in all four groups of students (Table 4, Table 6); of them, five loaded to Perspective Taking (F1) and two loaded to Standing in the Patient`s Shoes (F2), both being cognitive dimensions, at least in these authors' understanding. Quince and co-workers (43) reported that affective empathy in medical students slightly but significantly declined in both the undergraduate and clinical phases, though cognitive empathy was unchanged, while neither affective nor cognitive empathy changed among females. Given that, the results from this study (Table 1, Table 5) suggesting that empathic attitudes did not decrease during the study process, could also be explained.

Students lacking real-life experience in clinical settings had probably not experienced in-depth caring and compassion. Their JSE-S scores mainly reflect Perspective Taking (F1) and Standing in the Patients' Shoes (F2), while Compassionate Care, as an affective dimension (F3), explained the smallest proportion of total variance in each group (Table 2). Moreover, when analysing the content of the concordant seven items in all the groups of students (Table 4), they express (social) attitudes, defined as 'enduring, learned predispositions to behave in a consistent way toward a given class of objects, or a persistent mental and/or neural state of readiness to react to a certain class of objects, not as they are, but as they are conceived to be' (44). Therefore, it would be fair to conclude that when reducing the number of JSE-S scale items and explaining the higher proportion of variance (Table 5, Table 6), we assessed attitudes and not empathy, defined as the 'individual's objective and insightful awareness of the feelings and behaviour of another

person, which includes caring, and is the demonstration of an awareness of and a concern for the good of others' (45) in medical students. As such, in our opinion, these assessments (the JSE-S scores) reflect and are closer to values, i.e. 'abstract standards or empirical variables in social life which are believed to be important and/or desirable' (46) than they are to emotions, i.e. 'affective states which can be experienced and have arousing and motivational properties' (47).

One of the strengths of this study is that it included an appropriate sample size, which represents 89.0%, 83.6% 97.3% and 98.0% of the population of first year students$_{2012/13}$, first year students$_{2013/14}$, sixth year students$_{2012/13}$ and sixth year students$_{2013/14}$, respectively (Table 1). Our research is the first of its kind in Slovenia and assessed multiple variables, such as age, gender and year of education.

Based on the results of this study, we should be somewhat restrained about the measurement of the multi-dimensional concept of empathy, given that JSE-S measure solely empathic attitudes in medical students. Therefore, our suggestion would be to use 16-items scale and JSE-S total score as a measure of empathic attitude in medical students in further research. Items #1, 5, 18 and 19 are to be left out of the scoring.

4.4 Implications for Future Research

It would be valuable to carry out a prospective study, in which students would be followed annually, from the beginning of their first year until graduation, to give a true representation of any changes in empathic attitudes. Ideally, future study design should also include post-qualification measurements, with other variables, such as cultural background, and specialty preferences included.

4.5 Limitations to the Study

There were several limitations to our research. The study was cross-sectional with two consecutive data collection periods (May 2013 and May 2014), and the nature of the study enabled the authors to examine empathy levels in first and final year medical students. However, we were unable to control clinical placement experience, or the level of empathy training, or assessment they had received.

Additionally, self-reported measures, such as the JSE-S version, have respondent bias and, in no way, reflect what might occur in actual clinical practice. Only patient-perceived empathy has been shown to be significantly related to patient outcomes (32, 38). Another limitation of self-reported data worth mentioning is the limited validity of the findings, as the respondents, for various reasons, might have under- or overestimated the practice of empathy, with the person's own self-perception influencing their choices while filling out the questionnaire; consequently, this may vary from the actual behaviour that is implemented in their everyday interactions. A methodological problem frequently associated with the use of self-report measures, which may have been evident in the present study, is an inability to determine the extent to which the responses accurately reflect the respondents' experiences and expectations of their empathy, due to social desirability and inaccurate recall. Therefore, in clinical settings, it appears best to use a patient-perceived empathy scale to measure physician empathy in practice.

5 CONCLUSIONS

In our opinion, the JSE-S scores recorded in the four groups of students mostly reflect their attitudes and not empathy in its multidimensional meaning. Future assessments need to be based on JSE-S 16-items scale with total scores as a measure of cognitive dimension of empathy. Further research is also needed to determine whether our results are related to cultural peculiarities, the adaptation of the scale, or sampling.

ABBREVIATIONS

EV (%): % of explained variance

F1 – Perspective Taking, F2 – Standing in the Patient`s Shoes, F3 – Compassionate Care

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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ETHICAL APPROVAL

The research protocol was approved by the Commission of the Republic of Slovenia for Medical Ethics, decision number 143/02/11, on January 31, 2011.

AUTHORS' CONTRIBUTIONS

MPS conceived the study, carried out the execution of the study and performed data analysis. PS helped to plan the study and drafted the manuscript. Both authors read and approved the final manuscript.

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We give some detailed instructions in the continuation.

Manuscript should be written in Word for Windows word processor. Contribution should be typed with double-spaced with margins of at least 25 mm.

Original scientific articles should be divided into following headings: 1 Introduction, 2 Methods, 3 Results, 4 Discussion and 5 Conclusions (this is also the structure of the abstract). Other types of articles and review articles can be designed differently, but the division in headings and subheadings should be clearly evident from the size of characters in the titles. Headings and subheadings should be numbered decadally by standard SIST ISO 2145 and SIST ISO 690 (e. g. 1, 1.1, 1.1.1 etc.).

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Required lenght for editorial is 250 to 700 words; for letter to the editor, report and book review 250 to 1250 words; for research article 2000 to 4500 words.

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ABSTRACT AND KEY WORDS

The abstract of the original scientific article should be structured (Introduction, Methods, Results, Conclusions) and of no more than 250 words (Slovenian language abstracts are limited to 400 words), the abstracts of other articles should be unstructured and of no more than 150 words. The abstract should summarize the content and not only enumerate the essential parts of the work. Avoid abbreviations. Abstract should be written in third person. The abstract of a original scientific article should state the purpose of the investigation, basic procedures, main findings together with their statistical significance, and principal conclusions. 3 - 10 key words should be cited for the purpose of indexing. Terms from the MeSH - Medical Subject Headings listed in Index Medicus should be used. The abstract should normally be written in one paragraph, only exceptionally in several. The author propose the type of the article, but the final decision is adopted by the editor on the base of the suggestions of the professional reviewers.

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Should be in accordance with International System of Units (SI).

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NAVODILA AVTORJEM

Revija: **Zdravstveno varstvo (ZV)** ISSN 0351-0026 (tiskana izdaja) / **Slovenian Journal of Public Health (SJPH)** ISSN 1854-2476 (elektronska izdaja)

Navodila so v skladu z Uniform Requirements for Manuscripts Submitted to Biomedical Journals. Popolna navodila so objavljena v N Engl J Med 1997; 336: 309-15 in v Ann Intern Med 1997; 126: 36-47 in na spletni strani http://www.icmje.org.

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CONFLICTS OF INTEREST (The authors declare that no conflicts of interest exist.)

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Naslov, ključne besede in izvleček se oddajajo dvojezično v angleščini in v slovenščini v strukturirana polja. Posebno polje za zapis v drugem jeziku obstaja le za izvleček, preostale podatke vnesite v obeh jezikih v ustrezno isto polje. Prvi izvleček je vselej v angleškem jeziku (do 250 besed - sistem vam besede sproti šteje), drugi pa v slovenskem jeziku (razširjen izvleček - do 400 besed).

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Naslov v angleškem in slovenskem jeziku naj bo kratek in natančen, opisen in ne trdilen (povedi v naslovih niso dopustne). Navedena naj bodo imena piscev z natančnimi akademskimi in strokovnimi naslovi ter popoln naslov ustanove, inštituta ali klinike, kjer je delo nastalo. Avtorji morajo izpolnjevati pogoje za avtorstvo. Prispevati morajo k zasnovi in oblikovanju oz. analizi in interpretaciji podatkov, rokopis morajo intelektualno zasnovati oz. ga kritično pregledati, strinjati se morajo s končno različico rokopisa. Samo zbiranje podatkov ne zadostuje za avtorstvo.

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Naj bodo v skladu z mednarodnim sistemom enot (SI).

KRATICE IN OKRAJŠAVE

Kraticam in okrajšavam se izogibajte, izjema so mednarodno veljavne oznake merskih enot. V naslovih in izvlečku naj ne bo kratic. Na mestu, kjer se kratica prvič pojavi v besedilu, naj bo izraz, ki ga nadomešča, polno izpisan, v nadaljnjem besedilu uporabljano kratico navajajte v oklepaju.

UREDNIŠKO DELO

Prispelo gradivo z javnozdravstveno tematiko posreduje uredništvo po tehnični brezhibnosti v strokovno recenzijo trem mednarodno priznanim strokovnjakom. Recenzijski postopek je dvojno slep. Po končanem uredniškem delu vrnemo prispevek korespondenčnemu avtorju, da popravke odobri in upošteva. Popravljen čistopis vrne v uredništvo po spletni aplikaciji Editorial Manager. Sledi jezikovna lektura, katere stroške krije založnik. Med redakcijskim postopkom je zagotovljena tajnost vsebine prispevka. Avtor dobi v pogled tudi prve, t. i. krtačne odtise, vendar na tej stopnji upoštevamo samo še popravke tiskarskih napak. Krtačne odtise je treba vrniti v treh dneh, sicer menimo, da avtor nima pripomb.

V uredništvu se trudimo za čim hitrejši uredniški postopek. Avtorji se morajo držati rokov, ki jih dobijo v dopisih, sicer se lahko zgodi, da bo članek odstranjen iz postopka.

Morebitne pritožbe avtorjev obravnava uredniški odbor revije.

Za objavo članka prenese avtor avtorske pravice na Nacionalni inštitut za javno zdravje kot založnika revije (podpiše Izjavo o avtorstvu in avtorskih pravicah). Kršenje avtorskih in drugih sorodnih pravic je kaznivo.

Prispevkov ne honoriramo in tudi ne zaračunavamo stroškov uredniškega postopka.

Avtor dobi izvod tiskane revije, v kateri je objavljen njegov članek.