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Adolescents' Health Literacy of Dementia Modifiable Risk Factors in Predominantly Rural Savinjska Region, Slovenia

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ABSTRACT

Objectives: Without information on health literacy of dementia variable risk factors, it is difficult to set a strategy for an education in this field. The purpose of the study was to determine whether adolescents in predominantly rural regions are aware of the dementia variable risk factors and if dementia is discussed in secondary school.

Methods: In a total cohort of 1,128 adolescents (aged 14–19) from secondary schools in Slovenia, four-hundred and sixty-four were educated in predominantly rural Savinjska region. They completed a series of questions that assessed their modifiable dementia risk factors knowledge and where they obtained information on dementia. Descriptive analysis and chi-square test were performed, comparing differences between Savinjska region and all Slovenian regions.

Results: Respondents from predominantly rural area (n = 464) did not differ in their knowledge of dementia and the risk factors for it (p>0.05). Out of 14 dementia knowledge questions and of six modifiable dementia risk factors questions, respondents answered more than two thirds correctly. In contrast is finding that 84.7 % of total respondents and 82.5 % of respondents from Savinjska region wrongly believe that memory impairment with age is normal. However, interesting finding resulted, namely students from the predominantly rural region talked less about dementia in school classes than others (p<0.05).

Conclusions: To reduce the risk of dementia gaps in the adolescent's health literacy must be taken into account. Considering that adolescents are already forming an opinion on modifiable risk factors for the later development of dementia, more effort is needed to embed dementia understanding in the light of its prevention in the secondary school curriculum.

Keywords

Dementia knowledge, Modifiable risk factors, Adolescents, Predominantly rural area.

Introduction

Taking into account that old age is one of the biggest non-modifiable risk factors for dementia, in Slovenia the overall numbers of people with dementia will almost double from 34,137 in 2018 to 65,892 in 2050 [1]. According to Nomenclature of Territorial Units for Statistics or NUTS, three of Slovenian statistical regions are intermediate regions (15-50% of the population lives in rural municipalities or 50-85% of the population lives in urban municipalities), and nine of them are predominantly rural (more than 50% of the population lives in rural municipalities or less than 50% of the population in urban municipalities) [2,3]. The Savinjska region is predominantly rural region, and Slovenian third largest region in terms of size with 12.4% of the Slovenian population. In 2019, Slovenia had a population of 2.089.310 in twelve statistical regions with 113,973 adolescents aged 14 to 19, of whom 12.2% (14,051) lived in the Savinjska region [2].

Dementia is an overall term for a set of symptoms that is caused by disorders affecting the brain. Symptoms may include memory loss and difficulties with thinking, problem-solving or language, that are severe enough to reduce a person's ability to perform everyday activities. A person with dementia may also experience changes in mood or behaviour. These dementia symptoms are irreversible, which means that any loss of abilities cannot come back. Dementia is not a single specific disease, it results from a variety of diseases and injuries that primarily or secondarily affect the brain. Many diseases can cause dementia, Alzheimer's disease may contribute to 60-70% of cases [4]. Fact that memory aggravation isn't normal part of aging is important for early diagnosis of dementia. No less important is the fact that some treatable conditions can produce symptoms similar to dementia (vitamin deficiencies, alcohol misuse, thyroid disease, sleep disorders, or mental illness such as depression) [4].

Gerritzen et al., Swafer and Kontos et al. warned that people with dementia often experience social isolation and stigmatization [5-7]. Chang and Hsu are convinced that the public should be educated on knowledge and friendly attitudes towards dementia [8]. To the elderly children and grandchildren are the most important support providers in the case general weakness or illness [9]. These play a slightly larger role in the elderly from rural areas. Nagode et al. found that the elderly living in Slovenian rural and predominantly rural environments have a higher share of relatives among support providers than those living in the city [9].

By reviewing the literature of intergenerational dementia programs Gerritzen et al. found that bringing generations together can be mutually beneficial in reducing social isolation of people with dementia [5]. They also concluded that successful elements of intergenerational dementia programs must include dementia education to increase knowledge, positive attitudes and empathy among younger people [5]. On the other hand, it is no less important that adolescents are aware of the variable risk factors for developing dementia as much as possible [10,11].

WHO defines adolescents as individuals in the 10-19 years age group with experiencing similar biological, cognitive and psychosocial developmental processes [10]. Adolescents experience advances in cognitive abilities, and they are also achieving greater autonomy. These changes make adolescence an appropriate time to begin thinking about health literacy interventions. Improving health literacy at an early age has a direct impact on health literacy later in life as adolescents are acquiring knowledge and setting behavior patterns they will carry with them as they transition into adulthood [12]. More recently, the definition of health literacy has expanded to take on a health promotion perspective. Health-literate adolescents can help a person with dementia to live a dignified life in a friendly social environment. Health literacy is commonly defined as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions that will allow health-enhancing actions at the individual, social, and environmental levels [12-15]. Digital health literacy is not so much about finding health-related

information as about knowing where to find it and whether we know how to find relevant and useful information in the resources available to us [16]. Adolescents are proficient in the Internet, but the digital world is only accessible to those who have access to the Internet. Currently, all rural areas in Europe do not have access to the Internet. Therefore, Europe and the Member States including Slovenia need to make large-scale investments to ensure that everyone has access to the Internet so that everyone can benefit from development [16].

During the last two decades, several studies have shown a relationship between the development of dementia with lifestylerelated risk factors, such as physical inactivity, tobacco use, unhealthy diets and harmful use of alcohol [12-18]. Avoiding these risk factors already in adolescence is important for the reducing the likelihood of developing dementia [10,11]. This could be achieved through health literacy on dementia prevention in adolescence. The National Institute of Public Health in Slovenia participates regularly in health promoting schools in Slovenia [19]. In these schools, individual health skills and action competencies are promoted through the curriculum such as through school health education and through activities that develop knowledge and skills which enables students to build competencies and take action related to health, well-being and educational attainment [19]. However, it is not known what proportion of health promotion is meant to prevention of dementia.

Massey et al. defined information seeking as the ability to seek out and critically evaluate relevant and appropriate information used to inform decisions [13]. Adolescents described both passive and active ways in which they access information on health. Passive information was described as materials received from health providers, whereas active forms were described as information accessed over the internet or by other means outside of the clinical setting [13]. Adolescents are frequent users of mass media and other technology to access health information and are a target group for many health-related educational interventions.

For the elderly living in Slovenian rural areas, the predominant type of social support network is the family network, which also includes adolescent grandchildren [9]. Without information on adolescents' health literacy of dementia facts and its modifiable risk factors, it is difficult to set a strategy for an education in this field. In Slovenia there is a lack of research on knowledge of dementia and the modifiable factors for it among rural adolescents, and we also do not know the sources of information on dementia that they would like to use.

One of the largest Slovenian voluntary non-government associations for the help at dementia is the Association of the Western Styrian Region for the Help at Dementia "Forget me not" Šentjur, abbreviated Forget me not Šentjur, which has its headquarters in the Savinjska region [20]. The mission of the association is to raise awareness and disseminate information to help relatives cope with the problems of dementia. In collaboration with professionals and reliable experts, it conducts most of the informal education on dementia in a predominantly rural Savinjska region. The current study was conducted in cooperation with Forget me not Šentjur (in Slovenian: Spominčica Šentjur).

It is not known whether the relationship between knowledge about dementia and modifiable dementia risk factors among adolescents varies by region of schooling. The purpose of the study was to determine whether adolescents in predominantly rural regions are familiar with basic data on dementia and dementia variable risk factors, if dementia is discussed in secondary school, and which sources of information on dementia they would like to use. This study used data collected from adolescents of non-health related secondary schools in Slovenia in 2019. We wanted to compare the adolescents' knowledge of dementia and its modifiable risk factors and desired resources of education between rural and all regions in Slovenia.

Method

Research objective

The aim of the research was to obtain data on the knowledge of dementia among Slovenian non-health related students, and to recognize possible differences in knowledge between students attending secondary school in predominantly rural or intermediate region [3]. In order to make the comparison as objective as possible, we excluded health care secondary school students from the sample, as they are more familiar with the facts about dementia than students from other secondary schools.

Research design

The study is based on the descriptive and causal non-experimental method. The research was conducted by the online questionnaire (1ka) which was available from 25 September 2019 to 2 December 2019. The participants were informed that the data would be used for research purposes only, and the main objective of the study was explained.

Sample

The basic sample was represented by students of Slovenian non-health related secondary schools from all twelve Slovenian statistical regions (Graph 1) [2].

The final sample consisted of 1,128 respondents who completed the survey accordingly (63% of those 1,812 students who responded to the invitation to address the survey).

Fifty secondary schools from all twelve Slovenian statistical regions were invited to participate. Authors of the present article first contacted the principal of each secondary school over the phone, explained the project and obtained his/her agreement for acceptance and distribution of the links to online questionnaires. After agreement, the online questionnaires were distributed to students from the secretariat of each school. Based on the data on the region and type of secondary school we can conclude that students from at least 20 secondary schools responded. The exact number cannot be determined, as the questionnaire did not include

questions on the name of the school due to anonymity.

Instruments

We created a structured online questionnaire divided into three sections. The first part includes measurement of dementia-related knowledge by a 14-item true/false and knowledge about dementia risk factors by 6-item true/false claims. Questionnaire based on a revised version of the questionnaires used by Celdran et al., Annear et al., Glynn et al. and Baker et al., and supplemented based on secondary school educators [20-23]. The construct validity of the instrument was confirmed by three independent experts in the field of health education, school education and law. This questionnaire assesses the respondent's factual knowledge about dementia; Table 4. Total scores were calculated by summing the number of correct answers, and this composite was used in the present analyses.

The second part of the questionnaire contained an indication of the sources used and desired sources for future education about dementia. The last part refered to the demographic data of respondents, namely gender, age, type of high school attended by the respondent, connection with a relative with dementia and the region of residence and region of schooling. With the first part we were looking for the knowledge about dementia, and the second part was constructed to identify students' interest in acquiring knowledge about dementia.

Data Analysis

The results were presented in the form of frequencies and percentages, in the bivariate analysis we used only nonparametric tests (Mann-Whitney U test, Kruskall Walis test, hi-square test, Spearman rank correlation coefficient). When the assumptions for performing the hi-square test were not met, we used the Kullback 2Î-test (Likelihood ratio) instead of the hi-square statistic. In the bivariate analysis, only valid answers were considered. The total variable knowledge of dementia and modifiable dementia risk factors that occurs in the analysis was compiled by summing up the individual correct answers (20 possible answers). The correct answer was evaluated with one point, the incorrect with zero points.

Ethical considerations

Permission for the study was granted by the local education department and head teachers of the school involved in the study. All students were provided with an information sheet for themselves and their parents informing them of the purpose of the study, their right not to participate and to withdraw at any time, and assuring them that all questionnaires returned would be anonymous.

Results

The results are presented in three parts. In the first part, we determined knowledge of dementia by different demographic variables. In the second part, we checked the knowledge of dementia and modifiable dementia risk factors according to the region of schooling. In the third part, we examined which resources students used to gain knowledge about dementia and which resources they

would like to use in the future according to region of schooling.

Knowledge of dementia by different demographic variables

On average, students scored 14.30 points out of a possible 20. Distribution of the common variable knowledge of dementia deviated from the normal distribution, so we used nonparametric tests (Kolmogorov-Smirnov and Shapiro-Wilk) for comparisons and correlations between the variables.

Table 1: Basic	data on schools	attended by	respondents	in the	survey (N	
= 1,128)						

		I	I %0
	No answer	13	1,2%
D	SVS	201	17,8%
Respondents are	SPS	140	12,4%
euucateu at.	PGS	79	7,0%
	GGS	695	61,6%
No a Pom Podi Kor	No answer	18	1,6%
	Pomurska **	36	3,2%
	Podravska **	14	1,2%
	Koroška **	95	8,4%
	Savinjska **	464	41,1%
Region where	Zasavska **	8	0,7%
respondents attend	Posavska **	80	7,1%
school:	Jugovzhodna Slovenija**	2	0,2%
	Osrednjeslovenska*	168	14,9%
	Gorenjska*	66	5,9%
	Primorsko-notranjska **	41	3,6%
	Goriška **	135	12,0%
	Obalno-kraška *	1	0,1%

*intermediate region; ** predominantly rural region

N: Number of respondents; f = Frequency; f % = Frequency percentage; SVS = Secondary vocational school; SPS = Secondary professional school; PGS = Professional grammar school; GGS = General grammar school.



Graph 1: Statistical regions of Slovenia [2].

Fable 2:	Basic	data	on	the sam	ple	(N =	1.128).	
1 1010	Duble	autu	011	the bain	Pre-	(+ 1	1,120,	

		f	f %
	No answer	10	0,9 %
Gender	Female	770	68,3 %
	Male	348	30,9 %
	No answer	24	2,1 %
	14	58	5,1 %
	15	416	36,9 %
Age (years)	16	280	24,8 %
	17	182	16,1 %
	18	156	13,8 %
	19	12	1,1 %
	No answer	14	1,2%
Residence	Intermediate region	375	33,2 %
	Predominantly rural region	739	65,5 %

N = Number of respondents; f = Frequency; f % = Frequency percentage.

Table 1 and 2 show that 1,128 students participated in the study from all Slovenian regions (Graph 1). Most respondents were from general grammar schools (695 or 61.6%) and the least students from professional grammar schools (79 or 7.0%). From secondary vocational schools there were 201 students (17.8%) and from secondary professional schools 140 (12.4%) students. The sample included more girls (68.3%) than boys (30.9%) and more students residing in predominantly rural areas (65.5%) than in intermediate regions (33.2%). Their age ranged from 14 to 19 years, most of them were aged 15 (36.9%) and 16 (24.8%), at least 19 years (1.1%).



Graph 2: The age of students and knowledge about dementia. **KW test:** Chi-Square=25,211 / p=0,000/ The difference in mean values between groups is statistically significant (p <0.05). ZNANJE= KNOWLEDGE; Starost v letih = Age in years.

From graph 2 is evident that the age of students and knowledge about dementia are positively correlated, so we can conclude that older students know more about dementia, but the correlation is weak (Spearman rho = 0.148).

Table 3 shows that a statistically significantly higher level of knowledge about dementia was shown by students who have a relative with dementia (M = 14.67, SD = 2.44, p = 0.002), girls (M = 14.63, SD = 2.36, p = 0.000) and students of professional grammar schools (M = 14.73, SD = 2.63, p = 0.000) and general grammar schools (M = 14, 64, SD = 2.46, p = 0.000).

		n	М	SD	MW U / KW	p value
Relative with	Yes	335	14,67	2,44	116482 500	0.002
dementia*	No	789	14,14	2,60	110482,500	0,002
Condor*	Female	770	14,63	2,36	106070.000	0.000
Gender	Male	348	13,63	2,82	100979,000	0,000
Region of	Intermediate	375	14,17	2,49	120017.000	0.096
residency	Predominantly rural	739	14,40	2,58	129917,000	0,080
	SVS	201	13,53	2,69		
Education at	SPS	140	13,63	2,33	42 (27	0.000
school	PGS	79	14,73	2,63	43,027	0,000
	GGS	695	14,64	2,46		
	Predominantly rural (East - North Slovenia)	145	14,30	2,41		
	Predominantly rural (Savinjska region)*	464	14,58	2,42		
Region of schooling	Predominantly rural (East-South Slovenia)	90	13,37	2,88	61,983	0,000
	Intermediate (Central and West Slovenia) *	168	15,32	2,25		
	Predominantly rural (West-South Slovenia)	243	13,51	2,61		

 Table 3: Dementia knowledge by different demographic variables.

*The difference between the groups is statistically significant at the characteristic level p < 0.05, the cells are shaded, where the average score deviates upwards from the total result;

M = Mean-value; SD = Standard deviation; MW U /KW = Mann-Whitney U test /Kruskall Walis test; SVS = Secondary vocational school; SPS = Secondary professional school; PGS = Professional grammar school; GGS = General grammar school.

Furthermore, table 3 shows that most respondents were from general grammar schools (695 or 61.6%) and the least students from professional grammar schools (79 or 7.0%). From secondary vocational schools there were 201 students (17.8%) and from secondary professional schools 140 (12.4%) students. The sample included more girls (68.3%) than boys (30.9%), and more students from predominantly rural areas (65.5%) than from intermediate areas (33.2%).





MW test: MW U= 129917,000 / p=0,086/ The difference in mean values between the groups is not statistically significant (p> 0.05). ZNANJE = KNOWLEDGE; Kraj stalnega prebivališča? = Residency; mesto = intermediate region; podeželje = predominantly rural region.

Graph 3 shows that there are no statistically significant differences in the knowledge of dementia between students residing in predominantly rural areas and those residing in an intermediate region (p>0.05).

Graph 4 shows that according to the data on the region of schooling, students from the intermediate region (M = 15.32, SD = 2.25,) and students from the Savinjska region (M = 14.58, SD = 2.42) have significant higher level of dementia-related knowledge (p = 0.000).



Graph 4: Region of schooling and knowledge of dementia.

KW test: Chi-Square=61,983 / p=0,000 / The difference in mean values between the groups is statistically significant (p <0.05). ZNANJE = KNOWLEDGE;

Regija, v kateri obiskuje srednjo šolo = The region in which student attends secondary school;

Intermediare regions: Osrednjeslovenska regija z Gorenjsko regijo (we did not consider the Obalno-kraška region because only one student from this region responded); Predominantly rural regions: other regions.

Knowledge of dementia and dementia risk factors according to the region of schooling

Table 4: The knowledge of dementia and modifiable dementia risk factors according to the region of schooling.

Claims regarding dementia	Total sample (N=1,128)				
	f	f %	f	f %	
It is disease of brain.	1,099	97.4	448	96.6	NS
It appears as memory loss.	1,125	98.9	463	99.8	NS
It manifests as a loss of orientation.	612	53.8	255	55.0	NS
It manifests as hearing loss.	52	4.6	21	4.5	NS
It appears as a loss of speech.	261	23.0	124	26.7	NS
It appears as a loss of planning.	408	35.9	177	38.1	NS
It appears as a loss of mental ability.	573	50.4	241	51.9	NS
It appears as a loss of recognition.	803	70.6	349	75.2	NS
It appears as an inappropriate behaviour.	476	41.9	207	44.6	NS

It is increasing after the age of 65.	1,082	95.9	446	96.1	NS
With age, memory aggravation is normal.	955	84.7	383	82.5	NS
It is contagious.	21	1.9	7	1.5	NS
Alzheimer's disease is most common cause of dementia.	791	70.1	342	73.7	NS
Person with dementia can live at home.	883	78.3	383	82.5	NS
Dementia risk is reduced through physical activity.	958	84.9	399	86.0	NS
Dementia risk is reduced by alcohol drinking.	45	4.0	14	3.0	NS
Appropriate body weight reduces dementia risk.	779	69.1	334	72.0	NS
Smoking reduces the risk of dementia.	46	4.1	19	4.1	NS
Dementia risk is reduced by eating healthy food.	992	87.9	409	88.1	NS
The risk of dementia is reduced by reducing the use of computer games and social networks.	788	69.9	317	68.3	NS

Note. NS = non significant. The difference between the groups is statistically significant at the characteristic level p < 0.05; N = number of respondents.

Table 4 shows that the comparison of shares did not show statistically significant differences in the results between all respondents and those from the Savinjska region (p>0.05).

All participants and those attending school in the Savinjska region were most successful in answering that dementia appears as memory loss (98.9% vs 99.8%), that it isn't contagious (98.1 vs 98.5%), that it is disease of brain (97.4% vs 96.6%), and that it is increasing after the age of 65 (95.9% vs 96.1%). In addition, all participants and those attending school in the Savinjska region were aware of the claims that alcohol drinking (96% vs 97%) and smoking (95.9% vs 95.9%) are risk factors for development dementia. On the other hand, barely two-thirds of all participants and those attending school in the Savinjska region agreed with the claims that an appropriate body weight (69.1% vs 72.0%) and reducing the use of computer games and social network (69.1% vs 72.0%) reduce dementia risk, respectively.

Further, as much as 84.7 % of all respondents and 82.5 % of those who attended school in the Savinjska region wrongly agreed that memory impairment is normal with age. In addition, less than half of all respondents and respondents who attended school in the Savinjska region correctly recognized the statements that dementia manifests itself as loss of speech (23.0 % vs 26.7 %), planning (35.9 % vs 38.1%), and of an appropriate behaviour (41.9 % vs 44.6 %).

Already used and future resources for gaining knowledge about dementia

Table 5: Do you talk about dementia in school class?

	The whole sample		Savinjska regija			
	f	f %	f	f %		
No answer	4	0.4%	3	0.6%		
Yes	123	10.9%	33	7.1%		
No	1001	88.7%	428	92.2%		
Total	1128	100.0%	464	100.0%		
Hi-square statistic = $5.277 / p = 0.022 / Comparison of proportions showed$						

Int J Psychiatr Res, 2021

a statistically significant difference in the results (p < 0.05), shaded cell is where the proportion of responses deviates upwards from the total score. N = number of respondents; f = frequency; f % = frequency percentage

According to the answers of the students in the table 5, most students stated that they don't talk about dementia at school. This was stated by 92.2% of respondents studying in predominantly rural Savinjska region and by 88.7% of all respondents (p<0.05).

Table 6: From which sources respondents received information on dementia.

Sources of information used	To (N=1	otal 1128)	Savinjska region (N=464)		
(Content-related categories)	f	f %	f	f %	
Parents or grandparents	629	55.8%	267	57.5 %	
School teachers	188	16.7%	84	18.1 %	
Television shows	103	9.1%	45	9.7 %	
Other relatives	65	5.8%	31	6.7 %	
Friends, classmates	80	7.1%	30	6.5 %	
Adults, in the retirement home	69	6.1%	25	5.4 %	
Health, pharmacy workers	38	3.4%	15	3.2 %	
Websites	44	3.9%	12	2.6 %	
Books, magazines, jokes, lectures	29	2.6%	10	2.2 %	
Films, theater performances	19	1.7%	10	2.2 %	
I don't know	60	5.3%	16	3.4 %	
No answer	67	5.9%	26	5.6 %	

N = Number of respondents; f = Frequency; f % = Frequency percentage.

Table 6 shows that some respondents indicated answers that fall into several content-related categories, so a larger number of answers could belong to an individual respondent.

Most respondents obtained information from their parents or grandparents (55.8 % vs 57.5 %), a little less than a fifth from teachers (16.7% vs 18.1 %), almost a tenth from television shows (9.1 % vs 9.7 %), and only 3.9 % vs 2.6 % from websites (Table 10). The comparison of regional proportions did not show statistically significant differences in the results between all respondents and respondents at school in Savinjska region (p> 0.05).

The sources for further education on dementia suggested by the students are shown in table 7. An open-ended question, in which the answers were classified into content-related categories, some of them listed answers that fall into several categories, so a larger number of answers is possible for one respondent.

Table 7: From which sources would respondents like to obtain information on dementia.

Desirable future sources of information (Content-related categories)		1128)	Savinjska region (N=4640)		
	f	f %	f	f %	
Websites	783	69.4%	316	68.1 %	
Doctors, in the health center, in the hospital	256	22.7%	99	21.3 %	
Books, textbooks, magazines, newspapers, info points	229	20.3%	89	19.2 %	
In school lessons	176	15.6%	69	14.9 %	
Informal lectures, Forget-me-not associations	40	3.5%	18	3.9 %	
Parents, other relatives	39	3.5%	14	3.0 %	
People with dementia, their relatives	29	2.6%	15	3.2 %	

In the retairement home	27	2.4%	10	2.2 %
TV shows, radio, movies	24	2.1%	6	1.3 %
Psychologist, social worker	15	1.3%	6	1.3 %
Friends, adults	8	0.7%	2	0.4 %
I don't know	17	1.5%	6	1.3 %
No answer	68	6.0%	29	6.3 %

The comparison of proportions did not show statistically significant differences in the results (p>0.05).

N = Number of respondents; f = Frequency; f % = Frequency percentage.

Table 7 shows that some respondents indicated answers that fall into several content-related categories, so a larger number of answers could belong to an individual respondent. Nearly threequarters of all respondents (69.4 %) and of respondents at school in the Savinjska region (68.1 %) wants to obtain information on the websites, a little more than a fifth, however, in health professionals (22.7 % vs 21.3 %), a poor fifth from the printed literature (20.3 % vs 19. 2 %). Only 15.6 % of all respondents and only 14.9 % of respondents studying in the Savinjska region would obtain information in school lessons. Barely 3.5% of all respondents and 3.9% of respondents studying in the Savinjska region would receive information about dementia in the Forgetme-not association.

Discusion

The current study was one of the first to examine knowledge about dementia and modifiable dementia risk factors in secondary schoolbased sample of adolescents, with a focus on regional disparities.

Knowledge of dementia by different demographic variables

Based on the findings of the present research, we can conclude that the knowledge about dementia among adolescent studying in Slovenia regions is quite good both in predominantly rural areas and intermediate areas. According to residence or region of education among students living in a predominantly rural region and all students the groups did not differ statistically significantly (p>0.05).

Generally, a statistically significantly higher level of knowledge about dementia was shown by students who have a relative with dementia (p = 0.002), girls (p = 0.000) and students of professional grammar schools (p = 0.000) and general grammar schools (p = 0.000). According to the data on the region of schooling, students from the intermediate region and students from the Savinjska region have significant higher level of dementia-related knowledge compared with students from other regions (p = 0.000).

As there has been some research targeting dementia knowledge among adolescents, our findings could be compared and/or explained based on previous studies.

From the given results we found that the knowledge of the facts about dementia among Slovenian adolescents is good compared to peers from other countries, as they had an average of 72.5 % correct answers (14.5 out of 20 possible answers), and Korean and English adolescents are correct answered half of the questions asked about knowledge of dementia [26,27].

Finding that 84.7% of all respondents and 82.5% of those attending school in predominantly rural region consider forgetfulness to be a normal part of old age, the research identifies problems in their understanding of dementia and provides a basis for further research. The first step we need to take is to make young society aware in general that forgetfulness is not a normal companion of age. Namely, if we accept forgetfulness as something that is normal and usually expected in old age, then the elderly with initial dementia will not receive appropriate treatment and timely treatment [28].

The knowledge of dementia and modifiable dementia risk factors according to the region of schooling

We found that the majority of Slovenian adolescents and of those attending secondary school in Savinjska region (p>0.05) are aware of measures to reduce the risk of dementia. This is probably due to the fact that most students attend healthy schools, where they are systematically informed about health promotion measures [19]. The promotion of health in the school environment in Slovenia has been carried out systematically since 1993 through the Slovenian Network of Healthy Schools, in which they try to maintain and improve the health of their students, teachers and parents through systematic work [19]. The most common contents that Healthy Schools include through classes promote mental health, healthy eating, healthy lifestyle in general, physical activity, ecology, health education. These contents are consistent with WHO recommendations that treating hypertension and other vascular risk factors, promoting a healthy diet, and physical and mental activity can potentially reduce the incidence of dementia [11].

When checking whether respondents know that eating healthy food, maintenance appropriate body weight, and physical activity reduces the risk of dementia, statistically significant differences were not found between all respondents and those from Savinjska region. That adolescents are also aware of other measures to reduce the risk of dementia can be confirmed, as the findings are in line with the latest guidelines of the World Health Organization, which warn that we can reduce the risk of dementia by regular physical activity, avoid smoking and drinking harmful alcohol, maintenance appropriate body weight, eating a balanced healthy diet, and maintaining normal blood pressure, cholesterol, and blood sugar [11]. The current study found similar considerations, as the majority of all respondents and respondents at school in Savinjska region agreed that the risk of dementia is reduced by: regular physical activity (84.9% vs 86.0 %), eating healthy food (87.9% vs 88.1%), non-smoking (95.9% vs 95.9%) and nonalcohol consumption (96.0% vs 97.0%). It is worrying, however, that barely two-thirds (69.1% vs 72.0%) of all respondents and respondents at school in Savinjska region believe that maintaining an appropriate body weight reduces the risk of dementia. This is an indication to emphasize the fact that there is a correlation between healthy eating and dementia in educating young people about dementia. Today, we live in a "fattening environment" that is, in an environment in which a person is exposed to many possibilities of excessive energy intake and at the same time insufficient consumption. The research group of the Pediatric Clinic in Ljubljana, Slovenia collected and analyzed data on children in transition to secondary school (average age 15.4 years) in 2004, 2009 and 2014. They found that in the period 2004-2009, the proportion of overweight and obesity increased, especially in boys, and stabilized in both sexes between 2009 and 2014 [29].

It is worrying, however, that only two-thirds of all respondents and those at schools in Savinjska region (69.9% vs 68.3) know that there is a risk of later dementia of excessive use of computer games and social networks.

Already used and future resources of gaining knowledge about dementia

When rural and urban society and its needs change due to the increased incidence of dementia, the education of adolescents must be carried out by experts in various fields in both formal and non-formal education. Given the widespread use of digital media, their content should, to a greater extent, include interesting education on dementia and options for preventing the occurrence of dementia by pursuing a healthy lifestyle from childhood and adolescence onwards. In order to bring adolescents in a rural and urban environment even closer to a healthy lifestyle, Internet content should include more health literacy for dementia. In favor of the use of Internet education also speaks the fact that slightly over a quarter (28%) of adolescents like school a lot [19]. On the other hand, improved knowledge about the digital media and better awareness of the use of modern technology are the only way to equip pediatricians with proper knowledge to give parents and educators clear advice on safe use of modern technologies among adolescents. Pediatritians are namely those, who should empower and encourage adolescents and their families to improve health literacy and active lifestyle [30].

The analysis of the collected data shows that students have different opinions about the variable risk factors for the development of dementia. The study also shows that the secondary school of nonmedical specialization is insufficiently included in education on dementia in both intermediate and predominantly rural regions as it captures in both barely a fifth of the students.

Limitations

It is important to consider the limitations and strengths of the study. An important strength is that we collected relevant data from nationally-representative samples of adolescents from age groups relevant for establishing dementia-related knowledge. The questionnaires were filled in anonymously and with assurances of confidentiality. A limitation of our study is that the survey response rate fluctuated greatly in different regions, with the response from two regions being extremely low. These findings therefore need to be confirmed in studies with large size of the study group. Our research is based on the dementia knowledge only among students from non-health related secondary schools. A study which includes students both from health-related and non-health related secondary schools would have strengthened the findings, allowed the deeply investigation and comparison of both groups, and this is our plan for future research.

Conclusion

Individual health skills and action competencies can be promoted through the curriculum such as through school health education and through activities that develop knowledge and skills which enables rural students to build competencies and take action related to health, well-being and educational attainment. Because most of them want to find relevant information online, teachers could improve their digital health literacy on dementia by directing them to find relevant websites. Improving health literacy of modifiable dementia risk factors could further encourage adolescents to take care of their health and guide them to think about the quality of their lives in old age.

Ethical approval was not necessary as only anonymous data of respondents who voluntary participated in the survey were used. The study has been performed in accordance with the declaration of Helsinki and approved by the headmasters of participating secondary schools.

The authors declare that no conflicts of interest exist.

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