Prevalence and Risk Factors of Acne Among Adolescents in Kosovska Mitrovica: a Cross-Sectional Study

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Abstract

Background/Aim: Acne can occur in people of all ages, but mostly affects the population at puberty. Given the high prevalence and large impact that acne has on young people, the aim of this study was to assess adolescents' knowledge about factors that improve or worsen the clinical picture of acne, as well as to evaluate the sources used to obtain information on acne.

Methods: This cross-sectional study was conducted on a sample of 460 high school pupils from the Medical School and Gymnasium in Kosovska Mitrovica. A self-administrated questionnaire was used. Univariate and multivariate logistic regressions were used to model the association between gender (males/females) or presence of acne (no/yes) and potential exacerbating and ameliorating factors, as well as sources of information.

Results: 36.7 % of the respondents were male and 63.3 % were female. 48.9 % of high school pupils confirmed that they had acne. The main factors that worsen the condition of acne, were irregular face washing (88.7 %), hormones (87.0 %), fatty foods (80.9 %) and sweets (79.3 %). The majority of respondents believed that the intake of more water (83.9 %), cosmetic treatment (77.8 %), dietary changes (75.9 %), holiday (54.1 %) and sunbathing (39.3 %) affect improving acne. Taking more water (OR = 1.77; 95 % CI = 1.01-3.11) as a factor in improving acne was significantly more common in girls, while boys more often believed that sunbathing (OR = 0.62; 95 % CI = 0.41-0.94) and weight loss (OR = 0.53; 95 % CI = 0.32-0.88) affect the improvement of acne. The most important sources of information about acne were the Internet (73.0 %) followed by parents (62.6 %), friends (54.1 %), and a doctor (42.8 %).

Conclusion: Acne was more common in women and those with a positive family history. The presence of misconceptions among young people regarding the factors that improve or worsen the condition of acne indicates the need for additional education.

Key words: Acne vulgaris; Prevalence; Risk factors; Adolescent; Serbia.

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Introduction

Acne vulgaris is recognised as a common multifactorial chronic skin disease. The condition leads to negative psychosocial consequences in patients, increases the risk of developing depression and anxiety and impacts the quality of life overall.[1-3] In addition, sensitive period of life, such as adolescence and young adulthood, contributes to creating psychological trauma, inferiority complex, insecurities and psychological suffering.[4] Acne is the 8th most prevalent disease and impacts 9.4 % of the world population.[5] Acne can affect all age groups, but it is most commonly found in adolescents, up to 95 %.[6] In European population aged 15-27, average prevalence reaches 57.8 %, with the highest prevalence (65.8 %) in group aged 15-17.[7] According to results of the study performed

in Serbia in 2019[8] acne was self-reported in 57.7 % of surveyed pupils. On time information about acne is a precondition for planning, program tailoring and treatment of this disease. The actual cause of acne is unknown, but there are factors contributing to acne development, such as genetic, lifestyle and environmental factors.[9, 10] Identification of factors that cause acne is beneficial in treatment of the disease.[11] Patients with acne often have poor knowledge about their condition and turn to various sources of information and in most cases came across myths and misconceptions.[12] Most patients wait sometimes more than a year before turning to a doctor for help and during that period they look for information about acne treatment mainly from the media, the Internet and parents and friends, which is inadequate and also represents a lack of education.[13, 14]

The aim of this study was to determine the prevalence of acne among adolescents, as well as, to assess their information and knowledge about acne exacerbating and ameliorating factors. Also, differences between male and female pupils were analysed.

Methods

This cross-sectional study was conducted on a sample of 460 high school pupils (first to fourth graders) from the Medical School and Gymnasium in Kosovska Mitrovica. The data were collected in April – June period of 2021. Researchers obtained approval from the principals of both schools to conduct the study and the data were collected in the break between classes. Participation was voluntary and anonymous. It was explained to the high school pupils that their anonymity is guaranteed, that their identity is impossible to reveal and that the data will be available only to the researchers, exclusively for scientific purposes.

Data collection
All pupils were asked to fill in a self-administered questionnaire which included questions on age, sex, presence of acne, seeking medical help, perceived acne aggravating or triggering factors (15 questions), perceived acne ameliorating factors (8 questions) and sources of information about acne (7 questions). All questions, except those on age and sex, were dichotomous with: "yes" and

"no" answers. It took pupils 6 minutes in average to complete the questionnaire.

Statistical analysis
Categorical variables were presented as counts and percentages while continuous variable age was expressed as mean ± standard deviation. Comparisons between girls and boys were evaluated using Chi-square test. Univariate and multivariate logistic regression was used to model the association between gender (males/females) or presence of acne (no/yes) and potential exacerbating and ameliorating factors, as well as sources of information. Univariate analyses were performed first, followed by multivariate analyses adjusted for gender or the presence of acne where appropriate. Results were presented as odds ratios (OR) with 95 % confidence intervals (CI). Statistical analysis was performed with the Statistical Package for the Social Sciences, SPSS version 19.0 (SPSS Inc., Chicago, IL, USA). The level of statistical significance in all tests was $p < 0.05$.

Results

A total of 460 pupils were included in the current study, 36.7 % boys and 63.3 % girls. The mean age of pupils was 16.55 ± 1.05 (range 15–19) and 31.1 % were 17 years old. Acne was self-reported in 225 (48.9 %) pupils, out of which 88 (39.1 %) were boys and 137 (60.9 %) girls. 60 % of respondents with acne also had positive family history.

Self-perceived factors which can cause or aggravate acne in surveyed pupils are presented in Tables 1 and 2.

The main factors that aggravate acne, reported by pupils were inadequate face wash (88.7 %), hormones (87.0 %), greasy food (80.9 %) and sweets (79.3 %). Most respondents also belived that stress (78.0 %), makeup (73.0 %) and sweating (64.1 %) can aggravate acne (Table 1). Girls more frequently than boys reported that stress (OR = 2.95; 95 % CI = 1.76-4.96), hormones (OR = 2.12; 95 % CI = 1.15-3.90) and sweating (OR = 1.64; 95 % CI = 1.06-2.59) can worsen acne, while boys more frequently believed that exercise (OR = 0.37; 95 % CI = 0.21-0.67) can worsen the condition of acne (Table 1).

■ Milić and Janković. Scr Med 2022 Sep;53(3):187-95.

189

Table 1: Self-perceived acne risk or aggravating factors among pupils according to sex

Factor	Total N (%) (N = 460)	Sex N (%)		Univariate logistic regression analysis			Multivariate logistic regression analysis*		
		Boys (169)	Girls (291)	OR	95 % CI	P	OR	95 % CI	P
Hormones	400 (87.0)	134 (79.3)	266 (91.4)	2.779	1.598 - 4.834	0.000	2.122	1.153 - 3.904	0.016
Stress	359 (78.0)	109 (64.5)	250 (85.9)	3.356	2.126 - 5.298	0.000	2.952	1.758 - 4.955	0.000
Greasy food	372 (80.9)	136 (80.5)	236 (81.1)	1.041	0.644 - 1.683	0.869	0.737	0.419 - 1.295	0.288
Sweets	365 (79.3)	125 (74.0)	240 (82.5)	1.656	1.048 - 2.618	0.031	1.525	0.989 - 2.591	0.119
Dairy	162 (35.2)	54 (32.0)	108 (37.1)	1.257	0.841 - 1.878	0.264	1.227	0.772 - 1.951	0.387
Sweating	295 (64.1)	96 (56.8)	199 (68.4)	1.645	1.111 - 2.434	0.013	1.654	1.057 - 2.587	0.028
Exercise	69 (15.0)	35 (20.7)	34 (11.7)	0.507	0.302 - 0.849	0.010	0.374	0.208 - 0.673	0.001
Sun exposure	71 (15.4)	21 (12.4)	50 (17.2)	1.462	0.844 - 2.532	0.175	1.356	0.735 - 2.501	0.329
Less sleep hours	198 (43.0)	67 (39.6)	131 (45.0)	1.246	0.848 - 1.832	0.262	0.918	0.575 - 1.467	0.720
Inadequate face wash	408 (88.7)	143 (84.6)	265 (91.1)	1.853	1.037 - 3.311	0.037	1.052	0.529 - 2.094	0.884
Smoking	179 (38.9)	61 (36.1)	118 (40.5)	1.208	0.816 - 1.786	0.345	0.862	0.503 - 1.476	0.587
Alcohol	152 (33.0)	50 (29.6)	102 (35.1)	1.264	0.853 - 1.933	0.230	1.005	0.571 - 1.768	0.987
Coffee	80 (17.4)	28 (16.6)	52 (17.9)	1.096	0.662 - 1.814	0.723	1.020	0.555 - 1.875	0.948
Cosmetics/makeup	336 (73.0)	110 (65.1)	226 (77.7)	1.865	1.226 - 2.837	0.004	1.396	0.867 - 2.246	0.170

Adjusted for the presence of acne; OR: odds ratio; CI: confidence interval

Table 2: Self-perceived acne risk or aggravating factors among pupils according to the presence of acne

Factor	Total N (%) (N = 460)	Acne presence N (%)		Univariate logistic regression analysis			Multivariate logistic regression analysis*		
		No (N = 235)	Yes (N = 225)	OR	95 % CI	P	OR	95 % CI	P
Hormones	400 (87.0)	205 (87.2)	195 (86.7)	0.951	0.553 - 1.637	0.857	0.867	0.484 - 1.552	0.630
Stress	359 (78.0)	185 (78.7)	174 (77.3)	0.922	0.593 - 1.434	0.719	0.813	0.492 - 1.342	0.418
Greasy food	372 (80.9)	185 (78.7)	187 (83.1)	1.330	0.833 - 2.124	0.233	1.120	0.671 - 1.871	0.664
Sweets	365 (79.3)	179 (76.2)	186 (82.7)	1.492	0.944 - 2.357	0.086	1.294	0.785 - 2.133	0.312
Dairy	162 (35.2)	75 (31.9)	87 (38.7)	1.345	0.916 - 1.974	0.130	1.207	0.793 - 1.837	0.379
Sweating	295 (64.1)	152 (64.7)	143 (63.6)	0.952	0.650 - 1.394	0.801	0.873	0.576 - 1.325	0.524
Exercise	69 (15.0)	33 (14.0)	36 (16.0)	1.166	0.699 - 1.946	0.557	1.093	0.624 - 1.915	0.756
Sun exposure	71 (15.4)	35 (14.9)	36 (16.0)	1.088	0.656 - 1.805	0.743	1.019	0.596 - 1.743	0.944
Less sleep hours	198 (43.0)	93 (39.6)	105 (46.7)	1.336	0.923 - 1.934	0.125	1.327	0.867 - 2.030	0.193
Inadequate face wash	408 (88.7)	203 (86.4)	205 (91.1)	1.616	0.894 - 2.919	0.112	1.677	0.872 - 3.224	0.121
Smoking	179 (38.9)	92 (39.1)	87 (38.7)	0.980	0.673 - 1.426	0.916	0.788	0.481 - 1.289	0.342
Alcohol	152 (33.0)	74 (31.5)	78 (34.7)	1.154	0.783 - 1.703	0.469	1.182	0.702 - 1.991	0.529
Coffee	80 (17.4)	39 (16.6)	41 (18.2)	1.120	0.691 - 1.814	0.646	0.961	0.551 - 1.676	0.888
Cosmetics/makeup	336 (73.0)	166 (70.6)	170 (75.6)	1.285	0.849 - 1.943	0.235	1.254	0.799 - 1.968	0.325

Adjusted for sex; OR: odds ratio; CI: confidence intervals

There was no statistically significant difference between pupils with and without acne in the perceived factors that aggravate acne (Table 2).

Self-perceived factors which ameliorate acne in surveyed pupils are presented in Tables 3 and 4.

The majority of respondents believed that increased water consumption (83.9 %) and cosmetic treatment (77.8 %) can improve the condition of acne (Table 3). The other most prevalent acne ameliorating factors were a diet change (75.9 %), school holidays (54.1 %) and sun exposure (39.3 %). Girls more frequently than boys reported cosmetic treatment (OR = 2.22; 95 % CI = 1.41-3.50) and increased water consumption (OR = 1.77; 95 % CI = 1.01-3.11) as acne ameliorating factors, while boys more frequently believed in the benefit of sun exposure (OR = 0.62; 95 % CI = 0.41-0.94) and weight loss (OR = 0.53; 95 % CI = 0.32-0.88) (Table 3). There was no statistically significant difference between pupils with and without acne in the perceived factors that ameliorate acne (Table 4).

Table 3: Self-perceived acne ameliorating factors among pupils according to sex

Factor	Total N (%) (N = 460)	Sex N (%)		Univariate logistic regression analysis			Multivariate logistic regression analysis*		
		Boys (169)	Girls (291)	OR	95 % CI	P	OR	95 % CI	P
Cosmetic treatment	349 (75.9)	110 (65.1)	239 (82.1)	2.465	1.594 - 3.812	0.000	2.219	1.406 - 3.501	0.001
Diet change†	358 (77.8)	124 (73.4)	234 (80.4)	1.490	0.952 - 2.330	0.081	1.312	0.809 - 2.127	0.272
Gaining weight	25 (5.4)	17 (10.1)	8 (2.7)	0.253	0.107 - 0.599	0.002	0.389	0.145 - 1.046	0.061
Losing weight	88 (19.1)	41 (24.3)	47 (16.2)	0.601	0.376 - 0.962	0.034	0.533	0.321 - 0.884	0.015
Water hydrate	386 (83.9)	131 (77.5)	255 (87.6)	2.055	1.244 - 3.395	0.005	1.774	1.012 - 3.109	0.045
Sun exposure	181 (39.3)	78 (46.2)	103 (35.4)	0.639	0.434 - 0.941	0.023	0.620	0.411 - 0.936	0.023
Smoking	20 (4.3)	13 (7.7)	7 (2.4)	0.296	0.116 - 0.757	0.011	0.735	0.238 - 2.270	0.593
School holidays	249 (54.1)	82 (48.5)	167 (57.4)	1.429	0.976 - 2.091	0.066	1.355	0.896 - 2.049	0.150

Adjusted for the presence of acne; †toward healthier food choices; OR: odds ratio; CI: confidence interval

Table 4: Self-perceived acne ameliorating factors among pupils according to the presence of acne

Factor	Total N (%) (N = 460)	Acne presence N (%)		Univariate logistic regression analysis			Multivariate logistic regression analysis*		
		No (N = 235)	Yes (N = 225)	OR	95 % CI	P	OR	95 % CI	P
Cosmetic treatment	349 (75.9)	182 (77.4)	167 (74.2)	0.838	0.547 - 1.286	0.419	0.811	0.518 - 1.269	0.359
Diet change†	358 (77.8)	178 (75.7)	180 (80.0)	1.281	0.823 - 1.994	0.273	1.241	0.782 - 1.970	0.360
Gaining weight	25 (5.4)	18 (7.7)	7 (3.1)	0.387	0.158 - 0.946	0.037	0.445	0.166 - 1.190	0.107
Losing weight	88 (19.1)	47 (20.0)	41 (18.2)	0.891	0.560 - 1.420	0.628	0.906	0.556 - 1.476	0.693
Water hydrate	386 (83.9)	197 (83.8)	189 (84.0)	1.013	0.616 - 1.666	0.960	0.893	0.518 - 1.540	0.685
Sun exposure	181 (39.3)	86 (36.6)	95 (42.2)	1.266	0.870 - 1.842	0.217	1.302	0.884 - 1.919	0.182
Smoking	20 (4.3)	15 (6.4)	5 (2.2)	0.333	0.119 - 0.933	0.036	0.396	0.126 - 1.247	0.114
School holidays	249 (54.1)	133 (56.6)	116 (51.6)	0.816	0.565 - 1.178	0.278	0.788	0.536 - 1.159	0.226

Adjusted for sex; †toward healthier food choices; OR: odds ratio; CI: confidence interval

Table 5: Source of information about acne among pupils according to sex;

Variable	Total N (%) (N = 460)	Sex N (%)		Univariate logistic regression analysis			Multivariate logistic regression analysis*		
		Boys (169)	Girls (291)	OR	95 % CI	P	OR	95 % CI	P
Parents	288 (62.6)	109 (64.5)	179 (61.5)	0.880	0.593 - 1.304	0.524	0.714	0.467 - 1.093	0.121
Doctor	197 (42.8)	71 (42.0)	126 (43.3)	1.054	0.718 - 1.547	0.788	1.132	0.734 - 1.745	0.576
Pharmacist	110 (23.9)	34 (20.1)	76 (26.1)	1.404	0.888 - 2.219	0.147	1.331	0.790 - 2.242	0.282
Friends	249 (54.1)	75 (44.4)	174 (59.8)	1.864	1.270 - 2.735	0.001	1.636	1.075 - 2.492	0.022
Internet	336 (73.0)	104 (61.5)	232 (79.7)	2.458	1.612 - 3.746	0.000	2.460	1.539 - 3.934	0.000
TV	188 (40.9)	67 (39.6)	121 (41.6)	1.084	0.736 - 1.595	0.684	0.559	0.354 - 0.883	0.013
Magazines	118 (25.7)	25 (14.8)	93 (32.0)	2.705	1.656 - 4.420	0.000	2.515	1.458 - 4.337	0.001

Adjusted for the presence of acne; OR: odds ratio; CI: confidence interval

Table 6: Source of information about acne among pupils according to the presence of acne

Variable	Total N (%) (N = 460)	Acne presence N (%)		Univariate logistic regression analysis			Multivariate logistic regression analysis*		
		No (N = 235)	Yes (N = 225)	OR	95 % CI	P	OR	95 % CI	P
Parents	288 (62.6)	138 (58.7)	150 (66.7)	1.406	0.962 - 2.055	0.079	1.290	0.867 - 1.918	0.209
Doctor	197 (42.8)	88 (37.4)	109 (48.4)	1.570	1.082 - 2.276	0.017	1.416	0.945 - 2.123	0.092
Pharmacist	110 (23.9)	49 (20.9)	61 (27.1)	1.412	0.918 - 2.172	0.116	1.385	0.859 - 2.234	0.181
Friends	249 (54.1)	122 (51.9)	127 (56.4)	1.200	0.831 - 1.733	0.330	1.250	0.836 - 1.870	0.276
Internet	336 (73.0)	166 (70.6)	170 (75.6)	1.285	0.849 - 1.943	0.235	1.545	0.975 - 2.449	0.064
TV	188 (40.9)	101 (43.0)	87 (38.7)	0.836	0.576 - 1.214	0.347	0.787	0.512 - 1.209	0.275
Magazines	118 (25.7)	70 (29.8)	48 (21.3)	0.639	0.418 - 0.977	0.039	0.598	0.369 - 0.970	0.037

Adjusted for sex; OR: odds ratio; CI: confidence interval

■ Milić and Janković. Scr Med 2022 Sep;53(3):187-95.

191

In the present study the most frequent source of information about acne was the Internet (73.0 %), followed by parents (62.6 %), friends (54.1 %) and a doctor (42.8 %) (Table 5 and 6). Girls more frequently than boys reported magazine (OR = 2.52; 95 % CI = 1.46-4.34), the Internet (OR = 2.46; 95 % CI = 1.54-3.93) and friends (OR = 1.64; 95 % CI = 1.08-2.49), while boys more frequently reported TV (OR = 0.56; 95 % CI = 0.35-0.88) as a source of information (Table 5). The magazines (OR = 0.60; 95 % CI = 0.37-0.97) were more frequently reported by pupils without acne compared to those with acne (Table 6).

Discussion

In this study, 48.9 % pupils reported acne. Overall prevalence is in accordance with the results from numerous studies conducted worldwide.[15-17] Acne prevalence is a bit higher in some European countries.[18-20] The highest prevalence is noted in Brazilian study where 96 % of pupils aged 10-17 reported acne.[21] According to the results of the present study, acne was more commonly found in females compared to males (60.9 % vs 39.1 %), which correlates with other studies' results.[22-24] There are also studies where the percentage of male and female respondents suffering from acne is very similar,[7, 25] as well as studies where the prevalence of acne among male adolescents is significantly higher compared to female adolescents.[26-28]

Surveyed participants considered inadequate face washing, hormones, greasy food, increased sweets consumption, stress, makeup and sweating as leading acne aggravating factors, which is in accordance with findings from other studies that examined the knowledge about acne among adolescents.[29, 30] The study results confirmed that girls more frequently report stress, hormones and sweating while boys more often report exercising as factors that can worsen acne, which is consistent with the results from a Serbian study.[8] Over one-half of Serbian boys believed sweating and exercising worsen acne whereas girls reported stress, sweets consumption, greasy food, sun exposure and sleep deprivation as aggravating factors.[8] In Montenegrin study[16] girls more often reported genetics, stress, sweets consumption, improper face washing and makeup as acne aggravating factors. In a study by Rigopoulos et al,[29] girls more frequently considered diet change as an acne contributing factor.

The relationship between diet and acne has been observed to a large extent and lower acne prevalence was noted in underdeveloped countries where low calorie diet is present compared to developed countries with the highest prevalence where the diet is characterised by high glycaemic load and high calories.[11]

Greasy food can also worsen acne condition by releasing fatty acids from triglycerides which triggers acne development.[31] Higher BMI is associated with high glycaemic overload which increases glucose and insulin concentration and induces Insulin growth factor IGF-1 synthesis.[32-34] Several studies showed that high chocolate intake is an important aggravating factor for acne,[7, 35] but there is also a study that did not discover any association.[36] According to a study conducted by Vongraviopapa and Asamocnonda daily intake of 25 grams of chocolate contributes to acne presentation.[37] Meta-analysis of observational studies[35] confirmed a relationship between dairy consumption and acne. Regardless of type and quantity of dairy products or milk, there is a significantly high risk for appearance of acne because of hormone or sugar presence in a milk.[38]

Stress is certainly one of the risk factors that also affects the worsening of already existing acne.[39] A study performed among adolescents in Northeast China,[17] reported depression and stress as the main risk factors. Halvorsen et al[40] in their study which included 3,777 adolescents found an association between increased stress and the severity of acne. Chiu et al,[41] as well as respondents from India,[42] reported worsening of acne condition during exam period. Stress induces the local expression of neuropeptides that may represent a pathogenic step for the development of acne.[43]

In this study the majority of subjects (87 %) reported hormones as aggravating factors for acne and girls blamed hormones twice as more compared to boys. Several studies confirmed hormones (androgens) as a key role in the pathogenesis of acne.[43-45] Increased androgen activity causes sebum build-up inside the pilosebaceous unit which represents a suitable environment for acne development.[46]

Sweating potentially increases risk of acne.[47] Nakano et al[48] discovered changes in sweat content in acne patients, that is, detected decreased dermcidin expression, peptide active against *Propionibacterium acnes*, which provides undisturbed growth of the bacteria.

There is still a lack of evidence regarding improper facial hygiene as an acne aggravating factor.[49, 50] In this study, 73 % of the respondents believed that makeup triggers acne, with similar results obtained in other studies.[51-53] Even 90 % of respondents used some kind of makeup product, according to research from Sri Lanka.[52] Levin[54] noted that inadequate skin care can modify the protective role of the skin, leading to sebum production changes and microbiome balance disturbances.

Regarding the results of this study, sun exposure as a risk factor that worsens the condition of acne was mentioned by only 15.4 % of respondents, which is consistent with the results of the Serbian study (13.4 %),[8] as well as the Montenegrin study,[16] where that percentage was slightly higher and equals 20.8 %. In research performed by Engel et al,[55] sun exposure was associated with worsening condition of acne. In one Indian study[56] 26 % of participants confirmed it while in Khunger and Kumara's research,[57] 33.2 % of patients declared worsening of the acne condition after sun exposure. Korean study[58] discovered that UVB radiation leads to inflammatory cytokines expression in sebocytes, which was also confirmed by Suh et al.[59] A hot environment can stimulate sweat and sebum production, increase hydration level and transepidermal water loss and lower skin pH.[60]

There is no clear evidence of the relationship between smoking and acne prevalence. Particular studies showed a connection between smoking status and severe acne conditions, as well as significantly higher prevalence in smokers compared to non-smokers.[61, 62] However, some studies found lower acne prevalence in smokers.[63, 64] A French study performed by Wolkenstein et al[64] conducted on adolescents and young adults showed that smoking more than 10 cigarettes a day was highly associated with having no acne.

Inadequate sleep duration as a risk factor was reported by 43 % of participants in this study, whereas 47 % of Montenegrin respondents confirmed it.[16] The lack of sleep triggered acne in 10 % of Serbian pupils[8] while Al-Hoqaila discovered that 40.2 % of men had acne exacerbation as a result of improper sleep.[65]

The majority of respondents in the presented study (77.8 %) stated that a change in diet is one of the factors that potentially affects the condition of acne. This was also proven in the study by Claudel et al,[66] where a diet consisting of vegetables and fish has a potentially beneficial effect. Omega-3 fatty acids found in fish and high fibre content in fruits and vegetables can reduce acne risk by decreasing IGF-1 levels.[67]

Concerning the results of this study, taking more water was recognised by the respondents as an important factor that leads to the improvement of the acne condition and approximately 84 % of them shared this opinion. Girls had this attitude significantly more often than boys. The results are in line with the results of the Montenegrin study [16] in which 77.6 % of respondents believed that drinking more water affects acne remission.

A total of 76 % of participants in this study declared cosmetic treatment as effective for the improvement of skin condition and girls believed in the benefits of the treatment two times more than boys. The results are consistent with a study from Montenegro[16] with 80.4 %, whereas Chilicka et al[68] observed improved life quality in patients with acne who received cosmetic treatment.

In this research, 54 % of respondents believed being out of school leads to acne improvement, while 62 % of Montenegrin participants shared that opinion.[16] Other authors considered school holidays as ameliorating factor by minimising anxiety and incorporating healthier habits.[8, 16]

Although most of the studies confirmed sun tanning as an acne triggering factor because of its carcinogenic effect,[69] this results showed that 39.3 % of respondents believe it improves the condition, which is in accordance with other studies.[8, 16] In addition, some studies showed that boys significantly more frequently declare sun tanning as a factor for acne improvement.[8, 10, 16]

In the present study 19 % of respondents stated that losing weight leads to acne improvement, compared to 28.8 % in a Montenegrin study.[16] Di Landro et al[36] discovered that people with lower BMI have a significantly lower risk of developing acne.

Regarding sources of information about acne, the Internet (73.0 %), parents (62.6 %), friends (54.1 %) and medical professionals (42.8 %) were considered the most important ones. Girls mostly learned facts about the acne condition from magazines and the Internet, while boys acquired knowledge mostly from the television. Saudi Ara-

■ Milić and Janković. Scr Med 2022 Sep;53(3):187-95.

193

bic boys[70] stated that the most popular sources are mass media (47.7 %), friends (45.6 %) and magazines (28 %), whereas Turkish students[71] considered physicians (35 %), Internet (28.3 %), friends (19.1 %) and pharmacists (14 %) as valuable sources. Majority of pupils in Lithuania,[72] aged 7-19 learned about the disease thanks to parents (76.3 %), magazines (35.5 %) and friends (29.3 %). The results of this study showed that a doctor was consulted in 42.8 % of cases, which is consistent with the results of studies by Al-Natour,[70] Delarue et al[73] and a Greek study,[29] where one third of respondents consulted a doctor. The most popular source of information in the study by Djurović et al[16] was the Internet and parents, while in the study by Yorulmaz and Yalcin,[12] the most frequently used source of information were dermatologists, the Internet and social media.

According to our knowledge, this is the first study on the prevalence of acne and the awareness of young people about acne and its risk factors in Kosovo and Metohija. The advantage of the study is reflected in the fact that the research was conducted on a representative sample of high school pupils from Kosovska Mitrovica, as well as the fact that the response rate was high.

However, certain limitations should be mentioned. The survey did not include high school pupils from other cities of Kosovo and Metohija, so the results cannot be generalised. Then, the limitation also refers to the objectivity of the answers obtained through the survey because it includes questions on sensitive topics and there is a possibility that the answers obtained do not fully reflect the attitudes of the respondents. One of the limitations could be the small age range (15-19) of the pupils surveyed in this study.

Despite all the shortcomings of this study, the obtained results can serve as an indicator of the level of awareness of high school pupils in Kosovska Mitrovica about acne and indicate the need for their education about this skin disease.

Conclusion

Acne was more common in women and those with a positive family history. The presence of misconceptions among young people regarding the factors that improve or worsen the condition of acne indicates the need for additional education.

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194

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195

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