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RELATIONS OF ORAL CARE AND DIETARY HABITS OF STUDENTS WITH LONG-TERM PARTICIPATION IN SPORT

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(Original scientific paper)

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Abstract

The aim of this study was to determine the relations between oral hygiene and dietary habits in students with long-term participation in sport. Questionnaires of oral health activity (OHAQ, Aranza, Milavić & Galić, 2016) and certain dietary habits were applied on a sample which included 658 male and female participants, students at the University of Split, Croatia. Female students had more desirable oral hygiene behavior and certain dietary habits than male students. There were no differences between male and female participants regarding the frequency of consumption of alcoholic beverages and smoking, and all students reported more frequent consumption of alcoholic beverages in comparison to smoking and, there were no significant differences in the level of oral hygiene habits and certain dietary-consumer habits between groups of students which have participated in long-term organized sports activities and those which have not. The obtained results indicate that kinesiologists and coaches have a very small impact on adoption and development of oral hygiene and certain dietary-consumer habits of adolescents.

Key words: *university students, oral hygiene, OHAQ questionnaire, smoking, consumption of alcoholic beverages*

Introduction

Adequate oral hygiene is extremely important for health of teeth and parodont. Only regular and adequate oral hygiene practices can lead to satisfactory plaque control and prevent plaque-associated diseases: dental caries, gingivitis and periodontitis (Badovinac et al., 2013). Oral health is an important component of general health and has a number of psychosocial impacts on the quality of life.

Nutrition plays a great role in oral health (González A.M., González B.A. & González E., 2013). As soon as the first tooth erupts, its maturation (calcium incorporation) continues, and both diet composition and food consistency come to the fore. Mechanical effect of food on the teeth is manifested in its abrasive effect on the chewing surfaces, which in turn reduces retention of impurities. Moreover, such food requires stronger chewing, which has a beneficial impact on jaw development and salivation, and considerably reduces the effect of the acids created in the mouth, which directly results in decreased tooth caries incidence. The modern way of life (practice of eating "while standing", "fast food") is just one of the reasons why, although aware of the importance of good nutrition, we eat poorly.

Al-Hussaini et al. (2003) conducted a study on a sample of 410 students at the Kuwait University Health Sciences Centre, with the aim of determining the extent of dental health knowledge, oral hygiene habits and attitudes towards dental health. The results showed that 64.6% of students believed that the main reason for tooth decay is inadequate toothbrushing. Only 19.3% of students believed sugar can cause caries. Moreover, 50% of students did not know if sugar-free drinks were harmful to their teeth, and 29.5% of them did not know the measures for preventing gingival bleeding.

Doctors of dental medicine play a significant role in dental and oral health protection (Bertolami, 2001) and have an important task in improving the level of health education, and that is why during their studies, knowledge and attitudes about oral health are important for prevention, control and treatment of dental diseases (Formicola et al., 2008).

Dental students are highly motivated in maintaining their dental health (Cortes et al., 2009), due to better informedness and greater knowledge about oral health behavior (Rong, Wang & Yip, 2006).

Oral hygiene education is a precondition for health hygiene habits, whereas the relation between knowledge and behavior is very weak (Pellizzer et al., 2007). On a subject sample which included 302 male and female Croatian students, mean age 17±0.5 years, it was estimated that different demographic and social factors affect oral health, and therefore its improvement is more affected by the level of professional care than by patient's knowledge. The authors believe that persons who accept this knowledge, will also adopt preventive measures of personal hygiene.

High perception of oral health, and low perception of oral disease were estimated on a population of young people aged 18 to 28 years in Croatia (Špalj, 2005).

Similar data regarding oral hygiene habits were obtained in Turkey (Peker & Alkurt, 2009), Israel (Brook et al., 1996), and Kuwait (Al-Ansari, Honkala E. & Honkala S., 2003).

Better results were obtained in industrialized European countries (Italy, Austria, Germany, France) (Kuusela et al., 1997), Switzerland (Kronenberg et al., 2001), Spain (Cortes et al., 2002), Greece and Japan (Polychronopoulou & Kawamura, 2005), and Scandinavian countries Norway (Astrøm, 2002) and Denmark (Vigild & Schwarz, 2001).

Study conducted on 267 Turkish dental students showed a significant difference of improvement of oral hygiene behavior and oral hygiene habits with the increase of education level, and dental health protection was better in female as opposed to male students, i.e., better in non-smokers in comparison to smokers (Peker & Alkurt, 2009).

Knowledge, attitudes and habits related to oral health that were tested on a sample of 132 college students in Israel show that their knowledge comes from dental medicine doctors, parents and media, and only 20.6% was learned through formal education in school (Brook et al., 1996).

Study conducted on Swiss high-school graduates about oral health behavior, knowledge and informedness showed that acquisition of knowledge is based on continuous repetition. Systematic monitoring and repeated instruction on dental hygiene during education is necessary (Kronenberg et al., 2001). A very low level of oral health was found in American adolescents from rural areas who visited doctor of dental medicine rarely, mostly because of financial issues, ignorance about the importance of oral health or fear of pain. They visited doctor of dental medicine mostly for esthetic intervention on their teeth (Dodd et al., 2014).

In meta-analysis about oral health among Greek dental students there were significant differences reported in frequency of dental check-ups in last few decades. The frequency of dental check-ups increased from 39% of students in 1981 to 80% in 2010 (Mamai-Homata, Koletsi-Kounari & Margaritis, 2016). Similar results were reported for Belgian dental students between 1989 and 1994, showing better understanding of the importance of regular dental check-ups (Van Nieuwenhuysen, Carvalho & D'Hoore, 1998).

In a study investigating oral hygiene activities (Aranza et al, 2016) in Croatian students from the University of Split, 4 scales of satisfactory metric characteristics were constructed which measure oral health activity dimensions, and which can show the direction for integration and planning of the activities and coordination of efforts for projecting future dental education. Furthermore, gender differences were found among the subjects. Female students had significantly higher results in almost all measures in which significant differences in relation to male students were determined. Furthermore, female students brush their teeth more regularly than their male colleagues, they have a basic approach to oral hygiene, and they use dental floss and have preventive check-ups at dental medicine doctors more often. Female participants who reported more frequent incidence of tooth pain, used basic oral health activities less, and they less frequently practiced toothbrushing or dental floss. On the other hand, more frequent use of dental floss lead to decreased incidence of tooth pain.

To achieve optimal sports performance, young athletes require good oral health in order to reduce the risk of pain, inflammation and infection, and therefore the use of painkillers and antibiotics. Increased intake and frequency of consuming carbohydrate-rich foods in athletes, and consumption of energy dinks which contain high levels of acids and sugar can contribute to development of caries in athletes, as well as dental erosion caused by acids in the mouth.

A doctor of dental medicine should encourage an athlete to consult an experienced sports dietitian to ensure the principles of sports diet are adequately applied for the type, frequency and duration of exercise in relation to oral health of individual athlete (Broad & Rye, 2015).

Due to mouth breathing, many athletes experience dryness and decreased salivation, i.e., the amount of saliva in the mouth. They should drink water to quench their thirst and get hydrated as often as possible and in small sips, and to limit the consumption of sugar-sweetened beverages (Mobley, 2003).

Aside from parents and school teachers, sports coaches are often the persons who considerably shape adolescents' behavior. Sports coaches work with young athletes on a regular basis and for a long period of time. In doing so, they are responsible not only for acquisition of skills of a certain sport, but also for overall development of adolescents, as well as adoption of proper hygiene-dietary behaviors. It would be reasonable to assume that long-term participation in sport, with continuous impact of educated expert coaching staff, could "produce" significant changes of behavior in adolescents, especially in the area of certain "health" behaviors and adoption of adequate hygiene habits.

The aim of this study was to determine the relations between oral hygiene and dietary habits of students with long-term participation in sport.

Methods

The subject sample included 658 participants, mean age 21.33±2.61 years, 66.72% of which were female and 33.28% were male students from 9 faculties of the University of Split, Croatia. Body mass index (BMI) of female participants was 21.06±2.12, whereas that of male participants was 23.48±2.26.

Data used in this study were gathered in a broader research investigating oral hygiene and dietary behaviors of students of the University, and can be divided as follows: measures of oral hygiene activity, measured by the OHAQ questionnaire by Aranza, Milavic, and Galic (2016); measures of certain dietary and consumer habits of students connected to oral health, variable of previous long-term participation in organized sports activity.

Scales of oral hygiene activity measured basic oral health activity, orientation to doctor of dental medicine, regularity of toothbrushing and use of dental floss in students. By very short scales of certain dietary habits, the frequency of eating candy and frequency of eating late in the evening were measured. Only one item per measure was used to determine frequency of smoking and frequency of consumption of alcoholic beverages.

The long-term participation in organized sports activity variable was determined by a question in the general questionnaire in which students were required to answer the question whether they have participated in some sport for three or more years.

The Ethics Committee of the University of Split, Department for Health Studies, approved the project and all materials of this study. The questionnaire was applied in regular class groups and students participated in this study on a voluntary and anonymous basis. Less than 1% of the overall sample was excluded from the statistical data analysis, mainly because the participants had not answered a great number of items of the questionnaire.

Basic metric characteristics of the scales of oral hygiene activity and certain dietary habits measures were determined on the overall subject sample.

Student T-test was applied to determine possible gender differences between groups of students with previous long-term participation in sport and those without previous long-term participation in sport.

Results and Discussion

Basic metric characteristics and basic descriptive indicators of measures used in this study are presented in Table 1.

By analyzing Table 1, it can be seen that the scales have satisfactory metric characteristics, which allows further application of parametric statistical procedures. The results of students' *oral hygiene activity* show a moderately high level of *regularity of toothbrushing* and practice of *basic oral health activity*, moderate *orientation to DMD* and low frequency of *use of dental floss*. Students' results also show they *eat candy* frequently, and very rarely *eat late in the evening*. Students more frequently consume *alcoholic beverages*, as opposed to *smoking cigarettes*.

Differences in results of *dietary habits* according to gender are also presented in Table 2.

By analyzing Table 2, significant differences between male and female participants can be seen in all measures of *oral hygiene activity*, and all measures of *oral hygiene activity* were more frequently applied, and more desirable, by female participants in comparison to male participants. The measured dietary habits were more distinct and more desirable in the female sample in comparison to the male sample. Female students ate candy less frequently, as well as food late in the evening, as opposed to their male colleagues.

Table1. Descriptive indicators and basic metric characteristics of variables of students' oral hygiene and dietary habits

VARIABLE	AM	SD	M	CRONBACH 'SALFA	D * (K-S test)	MIN	MAX	SKEW	KURT
BASIC OH ACT.	3.50	0.73	3.50	0.64	0.087*	1.33	5.00	0.73	0.13
ORIENT. TO DMD	2.93	0.94	3.00	0.68	0.087*	1.00	5.00	0.94	0.23
REG.TOOTHBRUSHING	3.56	0.96	3.67	0.68	0.118*	1.00	5.00	0.96	-0.40
USE OF DENT. FLOSS	2.35	1.24	2.00	0.81	0.148*	1.00	5.00	1.24	0.61
CANDY	3.08	1.13	3.00	0.68	0.088*	1.00	5.00	-0.05	-0.80
E_NIGHT	4.12	1.00	4.50	0.65	0.238*	1.00	5.00	-0.98	0.07
SMOKING	3.58	1.64	5.00	-	0.312*	1.00	5.00	-0.58	-1.34
ALCHOCOL	2.54	1.41	2.00	-	0.195*	1.00	5.00	0.44	-1.10

Legend: AM – arithmetic mean; SD – standard deviation; M – median; CRONBACH'S ALPHA – coefficient of internal consistency; D – coefficient of the K-S test; * – significance of coefficient of the K-S test; SKEW – measure of asymmetry of distribution; KURT – measure of peakedness of distribution.

Table 2. Differences in results of *dietary habits* according to gender

VARIABLE	FEMALE STUDENTS (N=439)		MALE STUDENTS (N=219)		t-test	P
	AM	SD	AM	SD		
BASIC OH ACT.	3.62	0.74	3.27	0.66	6.01***	0.000
ORIENT. TO DMD	3.00	0.96	2.78	0.89	2.82**	0.005
REG.TOOTHBRUSHING	3.73	0.92	3.22	0.96	6.65***	0.000
USE OF DENT. FLOSS	2.52	1.28	2.00	1.08	5.15***	0.000
CANDY	3.17	1.13	2.90	1.12	2.92**	0.004
E_NIGHT	4.19	0.99	3.98	1.00	2.54*	0.011
SMOKING	3.57	1.66	3.60	1.61	-0.19	0.85
ALCHOCOL	2.57	1.41	2.47	1.42	0.85	0.40

Legend: AM – arithmetic mean; SD – standard deviation; * – statistically significant at the level $p<0.05$: ** – statistically significant at the level $p<0.01$; *** – statistically significant at the level $p<0.001$.

Frequency of smoking and consumption of alcoholic beverages was the same in both subject samples. By further review, it has been established that 51.03 % female and 49.77% male students did not smoke, and only 14.12 % female and 13.70% male students did not consume alcoholic beverages.

The results of this study indicated high prevalence of addictive substances use in the adolescent population included in the study. More than half of the participants smoke every day or sometimes, male students on average consume more cigarettes and smoke more frequently. High percentage of participants consume alcoholic beverages, male students do it more frequently and on weekends, whereas female students consume alcoholic beverages on special occasions or never get drunk. Regarding the type of alcoholic beverage, male students more often drink beer, whereas female students drink hard liquor.

Greblo & Šegregur (2009), on a sample of adolescents from Rijeka, Croatia, found significant differences between genders in the prevalence of risk behaviors, including smoking and consumption of alcoholic beverages. More than half of the participants in their study smoke every day or sometimes, male students on average consume more cigarettes and smoke more frequently. High percentage of participants consume alcoholic beverages, male students do it more frequently and on weekends, whereas female students consume alcoholic beverages on special occasions or never get drunk. Regarding the type of alcoholic beverage, male students more often drink beer, whereas female students drink hard liquor.

In France, the prevalence of smoking among students was 32% for male and 35% for female population (Steptoe et al., 2002) whereas USA data from 1999 show prevalence of 28% for both sexes (Rigotti, Lee & Wechsler, 2000).

A study conducted on student population from University of Beograd, Serbia, showed that 68% of students consumes alcoholic beverages sometimes, about 13% drink once a week, and almost 2% drink every day (Pekmezović et al., 2011.

Harvard scientists conducted a research on university student population in the USA on two occasions, during 1993 and 1997, and came to the conclusion that USA students have the highest level of risk behavior compared to any other category in the world (Wechsler et al., 1998).

As for Europe, research conducted on student population from seven European countries showed that the highest number of students who never consume alcoholic beverages or sometimes consume alcoholic beverages was found in Turkey (73% male and 88% female students), whereas the lowest values were reported in Denmark (8% male and 15% female students) (Stock et al., 2009).

Among students of the University of Zagreb, School of Medicine, about 17% of them have never consumed alcoholic beverages (Trkulja et al., 2003).

Among Spanish students, the percentage of those who consumed alcoholic beverages more than once a week was 49% for male and 64% for female students, whereas among Bulgarian students, the percentage was 46% for male and 28% for female students (Wechsler et al., 1998).

Due to the gender differences found among the participants of this study in measures of *oral hygiene activity* and measures of *certain dietary habits*, all statistical analyses applied later were conducted separately for the male and the female subsample.

Prior to determining the differences in the level of the measured variables between the groups of students with long-term participation in sport and those without long-term participation in sport, it had been determined that there were no significant differences in BMI between those two groups, in neither the female nor the male subsample.

Table 3 Differences in results of oral hygiene and dietary habits according to long-term participation in sport

VARIABLE	FEMALE						MALE					
	WITHOUT PARTICIPATION IN SPORT (N=229)		LONG-TERM PARTICIPATION IN SPORT (N=209)		t-test	P	WITHOUT PARTICIPATION IN SPORT (N=56)		LONG-TERM PARTICIPATION IN SPORT (N=163)		t-test	P
	AM	SD	AM	SD			AM	SD	AM	SD		
BASIC OH ACT.	3.65	0.72	3.59	0.76	0.86	0.39	3.33	0.70	3.25	0.65	0.78	0.44
ORIENT. TO DMD	2.97	0.96	3.03	0.96	-0.67	0.50	2.87	0.95	2.75	0.88	0.85	0.40
REG.TOOTHBRUSHING	3.65	0.90	3.81	0.94	-1.84	0.07	3.38	0.97	3.16	0.95	1.49	0.14
USE OF DENT. FLOSS	2.48	1.24	2.57	1.32	-0.72	0.47	2.01	1.09	2.00	1.08	0.04	0.97
CANDY	3.19	1.15	3.16	1.13	0.34	0.74	2.94	1.25	2.89	1.07	0.28	0.78
E_NIGHT	4.09	1.03	4.30	0.93	-2.16*	0.03	3.84	1.00	4.03	1.00	-1.25	0.21
SMOKING	3.59	1.64	3.57	1.67	0.10	0.92	3.70	1.51	3.56	1.64	0.53	0.60
ALCHOCOL	2.58	1.43	2.56	1.39	0.12	0.90	2.64	1.48	2.42	1.39	1.03	0.30

Legend: AM – arithmetic mean; SD – standard deviation; * – statistically significant at the level $p<0.05$.

In the female subsample, only one significant difference between the groups of students with and without long-term participation in sport was found, in the *eating late in the evening* variable. Female participants with long-term participation in sport less frequently ate late in the evening, in comparison to those without long-term participation in sport.

Moreover, there was a noticeable tendency of female students with long-term participation in sport for more frequent and regular toothbrushing. In all other variables, there were no significant differences. It would be justified to assume that long-term participation in sport at early age in female students lead to adoption of a more desirable dietary habit, and therefore to a higher level of awareness of *eating late in the evening*. In the male subsample, there were no significant differences found between groups of male students with long-term participation in sport in comparison to those without long-term participation in sport.

Generally, the obtained results indicate a very small "impact" of long-term participation in sport to oral hygiene activity and certain dietary-consumer habits of students. This shows that kinesiologists and coaches, and those persons who carry out organized sports activities, have a very small impact on adoption and development of oral hygiene and certain dietary-consumer habits in adolescents.

It is possible that adolescents develop these behaviors and habits at an early age, in the environment of their primary family or wider social community, so it is not even possible for kinesiologists-coaches to change the already firm attitudes, behaviors and habits.

This study has some limitations regarding the quality of the measures used, therefore it is recommended for future research to determine all forms of dietary habits in detail, but also to precisely determine the duration of participation in sport and the type of sport (individual-team; contact-non-contact, etc.) in adolescence. Furthermore, with the aim of determining at what point adolescents acquire and adopt certain

behaviors and habits, it is recommended for a similar research to be repeated on younger adolescents, e.g., primary and/or secondary school students.

Conclusion

In general, there were no significant differences found in the level of oral hygiene and certain dietary-consumer habits between students with and those without long-term and organized participation in sports activities. Such behaviors and habits are beyond "impact" of kinesiologists – sports coaches, possibly for two reasons: firstly, it is possible that kinesiologists – sports coaches do not teach desirable oral hygiene and certain dietary-consumer habits to children and adolescents at all; secondly, it is possible that adolescents have adopted such attitudes, behaviors and habits earlier so kinesiologists – sports coaches cannot change the adopted attitudes, behaviors and habits. In any case, it is the authors' opinion that kinesiologists – sports coaches should become more engaged in teaching and adoption of desirable oral hygiene and dietary behaviors and habits in adolescents or at least in adoption of certain dietary-consumer habits, especially those related to consumption of tobacco cigarettes and alcoholic beverages. Furthermore, kinesiologists – sports coaches should also become more engaged in stress management of adolescents they coach, in order to reduce their "need" for unconstructive behavior in coping with stress, behaviors such as consumption of cigarettes and alcoholic beverages. It would be advisable for sports federations to include expert nutritionists and experts for oral health prevention into the regular system of licensing and education of sports coaches, so they could help coaches' education, and thus indirectly create preconditions for, and allow, adoption of desired habits and behaviors of adolescents.

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