

# Adherence to the Mediterranean Diet in Children and Adolescents in the Mediterranean and Continental Regions of Croatia

Sara Sila<sup>1</sup>, Ivana Trivić<sup>1</sup>, Mario Mašić<sup>1</sup>, Lucija Marić<sup>2</sup>, Ana Radunić<sup>1</sup>, Tena Niseteo<sup>1</sup>, Marija Radonić<sup>3</sup>, Iva Hojsak<sup>1,4,5</sup>, Sanja Kolaček<sup>1,5</sup>

<sup>1</sup>Referral Centre for Pediatric Gastroenterology and Nutrition, Children's Hospital Zagreb, Zagreb, Croatia

<sup>2</sup>Croatian Academic Center for Applied Nutritional Science, Zagreb, Croatia

<sup>3</sup>General Hospital Dubrovnik, Dubrovnik, Croatia

<sup>4</sup>University J.J. Strossmayer Osijek, School of Medicine, Osijek, Croatia

<sup>5</sup>School of Medicine, University of Zagreb, Zagreb, Croatia

## ABSTRACT

*Adherence to the Mediterranean diet (MD) has been found beneficial for the prevention and treatment of various chronic non-communicable diseases; however, adherence to MD is declining, especially in the Mediterranean countries. Croatia is characteristic for having both traditionally continental and Mediterranean regions, with distinct dietary features. The aim of this study was to compare difference in adherence to MD and overall dietary intake between children and adolescents from continental and Mediterranean part of Croatia. Participants were randomly recruited children and adolescents (n=838, mean age 9.96 ± 2.09 years) located in continental and Mediterranean parts of Croatia. Three different questionnaires were distributed and collected: general questionnaire (age and gender), the Mediterranean Diet Quality Index for children and adolescents (KIDMED) and 3-day food records (3DFR). Statistical analysis was performed using SPSS 260 (IBM Corporation, Chicago, Illinois, USA) statistical software. P values less than 0.05 were considered significant. Overall, low adherence to MD was evident in 23.1% of participants, while only 15.8% of children and adolescents had good compliance with MD. A significant difference in KIDMED score has been found between the continental (mean score 4.91 ± 2.33) and Mediterranean (mean score 5.57 ± 2.12) part of Croatia (p<0.001), as well as in the intake of energy and some nutrients. Moreover, participants from the Mediterranean part of Croatia had better compliance with D-A-CH recommendations for some nutrients compared to those from the continental part. Although children and adolescents from the Mediterranean part of Croatia had better adherence to MD than those from the continental part, overall, relatively poor adherence to MD was evident for both regions. Therefore, a healthy, balanced diet should be encouraged in both regions, preferably taking into account traditionally consumed and locally available foods.*

**Key words:** child, adolescent, KIDMED index, 3-day food record, Mediterranean diet

## Introduction

Adherence to the Mediterranean diet has been found beneficial for the prevention and treatment of various chronic non-communicable disorders such as obesity<sup>1</sup>, hypertension<sup>2</sup>, metabolic syndrome<sup>1</sup>, etc. However, various studies have already shown that the worldwide trends of adherence to the Mediterranean diet (MD) have been declining steadily since the end of the 20<sup>th</sup> and through the beginning of the 21<sup>st</sup> century.<sup>3</sup> The same trend continues in the second decade of the 21<sup>st</sup> century<sup>4-7</sup>, and it is especially evident in countries where Mediterranean dietary pattern is a part of a traditional heritage.<sup>8</sup>

Trend of declining adherence to MD has been evident in parallel with the shift to a Western dietary pattern, together contributing to the rising incidence of chronic non-communicable diseases.<sup>9</sup> This is particularly important in the light of today's obesity pandemic in children and adolescents,<sup>10</sup> even more so considering that when once established, obesity is very difficult to reverse.<sup>11</sup>

Croatia is characterized by regional differences, mainly separating continental part of Croatia from the Mediterranean part of Croatia. Those two regions, besides being characterized by different climates, also have their distinct features regarding cuisines, dietary behaviors

and lifestyle. Traditionally, Mediterranean part of Croatia is characterized by Mediterranean diet, implying higher intake of vegetables, fruits, legumes, cereals, fish, olive oil, moderate intake of dairy products and low intake of saturated fats and red meat<sup>12</sup>. However, as evident in other countries, it has been shown that the adherence to the traditional MD diet and lifestyle has diminished in Croatia as well<sup>13</sup>. On the contrary, in the continental part of Croatia traditionally consumed meals are based on meat and poultry as well as traditional meat products (sausages, dried meat, ham, bacon), freshwater fish, pickled vegetables and higher amounts of dairy products and refined cereals<sup>14</sup>.

To the best of our knowledge, no study in Croatia has compared adherence to the Mediterranean dietary pattern and nutritional intake of different regions (continental and Mediterranean) in a sample of children and adolescents. Two studies have evaluated adherence to MD, one in children (11–16 years old) and their parents<sup>15</sup>, and the second one in preschool children<sup>16</sup>. However, in both studies the subjects were residing in Split-Dalmatia County, which is located in the Mediterranean part of Croatia, while no data were available for other regions of Croatia.

Therefore, the aim of this study was to evaluate and compare adherence to MD and the quality of overall dietary intake in two groups of children and adolescents, residing in either continental or Mediterranean part of Croatia.

## Subjects and Methods

### Study design

This is a cross-sectional study performed at the Children's Hospital Zagreb, Croatia, as a part of a larger multinational study. Participants were randomly recruited children and adolescents (6 to 14 years old) from selected elementary schools, located in continental (Zagreb and Đakovo) and Mediterranean (Pula, Trogir and Dubrovnik) parts of Croatia. Recruitment of children was performed during 2019 and 2020. The study was approved by the Ministry of Science and Education, Zagreb, Croatia (IRB no: 533-06-19-0002) and by the Ethics Committee Children's Hospital Zagreb (IRB no: 02-23/31-1-18). Permission for the study was obtained from appropriate school authorities; parents were informed about the survey from the school principals, and their written consent was obtained.

School principals /officials, who were in direct contact with potential study participants and their parents, were contacted and educated regarding the study purpose, potential risks and benefits for the participants, and were given detailed instructions on the questionnaires that the participants were required to fill out. Collection of questionnaires was performed until the desired number of questionnaires/participants per school were accumulated.

In total, correctly and completely filled out questionnaires of 838 participants (median age 10 years, 53.8%

female, 66.1% from the continental part of Croatia) were collected and analyzed.

### Questionnaires

For the purpose of this study, three different questionnaires were distributed and collected: a. general questionnaire (age and gender); b. the Mediterranean Diet Quality Index for children and adolescents (KIDMED); c. 3-day food record (3DFR).

Level of adherence to MD was analyzed using KIDMED<sup>17</sup>, previously adapted for the Croatian language and tested for reliability<sup>18</sup>. Children older than 10 years of age were able to fill out the questionnaire alone and/or with the help of their parents. For children younger than 10 years of age, parents were asked to fill out the questionnaires. In brief, the KIDMED consists of 16 questions, each question denoting either +1 (positive connotation with respect to MD) or -1 (negative connotation with respect to MD). The total sum of 16 questions produces KIDMED index (score), ranging from -3 to 12, and classifies participant into three levels of adherence: a) low MD adherence (score  $\leq 3$ ); b) average MD adherence (score 4–7) and c) good MD adherence (score  $\geq 8$ )<sup>17</sup>.

3DFRs were collected for all participants. Children and/or their parents were instructed to enter all consumed foods and drinks in the 3DFR during the 3 non-consecutive days (including one day of the weekend). They were instructed to use kitchen scales to measure the amounts, however, when that was not possible, they were allowed to use household measures such as cups, tablespoons and teaspoons. All household measures were transferred into grams/milliliters or other units by the two educated dietitians. Energy and nutrient intake estimated by the 3DFR were analyzed using PRODI expert 6.9 software<sup>19</sup>. Intake of each nutrient for every participant was compared to the recommended intakes according to the D-A-CH reference values<sup>20</sup>, and percentages of recommended intakes have been evaluated for each participant.

### Statistical analysis

Continuous variables are presented as means  $\pm$  SD and categorical variables as absolute frequencies. The Student's *t* test and the ANOVA were applied to evaluate differences in mean values between different regions and groups of KIDMED adherence. Post-hoc analyses were performed to compare good and average to low KIDMED adherence groups. Statistical analysis was performed using SPSS 260 (IBM Corporation, Chicago, Illinois, USA) statistical software.

## Results

Out of 897 participants, 838 (93.4%) children and adolescents correctly and completely filled the questionnaires and were included in this study. Demographic characteristics, mean KIDMED score and distribution by

KIDMED categories are shown in Table 1. There was no difference in mean age between children from the continental (mean age  $9.98 \pm 2.01$  years) and the Mediterranean part of Croatia (mean age  $9.92 \pm 2.23$  years) ( $p=0.699$ ).

**TABLE 1**

DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE	
	Participants (N=838)
Age (year), X $\pm$ SD	9.96 $\pm$ 2.09
Female, N (%)	451 (53.8)
Continental part, N (%)	554 (66.1)
KIDMED score, X $\pm$ SD	5.13 $\pm$ 2.28
KIDMED category (N=836)	
Low adherence, N (%)	193 (23.1)
Medium adherence, N (%)	511 (61.1)
Good adherence, N (%)	132 (15.8)
Energy intake (kcal), X $\pm$ SD	1485.38 $\pm$ 437.45

A significant difference in KIDMED score, energy intake and intake of some nutrients (proteins, fat, carbohydrates, monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), calcium, potassium, folic acid/folate, vitamin D and dietary fiber) has been found between participants from the continental as opposed to the Mediterranean part of Croatia, as shown in Table 2. Children and adolescents from the Mediterranean part of Croatia also had better compliance with D-A-CH recommendations for some nutrients compared to those from the continental part (Table 2).

There was no difference in KIDMED score between younger (less than 10 years,  $5.06 \pm 2.21$  score) and older (10 to 14 years,  $5.19 \pm 2.34$  score) children ( $p=0.407$ ). Furthermore, no difference in KIDMED score has been found between the female ( $5.06 \pm 2.27$  score) and male ( $5.20 \pm 2.30$  score) participants ( $p=0.367$ ).

Table 3 shows the differences in nutritional intakes depending on the three categories of adherence to the MD. Statistically significant differences have been observed for the intake of SFA (decreases with higher adherence to MD), PUFA (decreases with higher adherence to MD), calcium (increases with higher adherence to MD), potassium (increases with higher adherence to the MD), folic acid/folate (increases with higher adherence to MD) and dietary fiber (increases with higher adherence to MD).

## Discussion and Conclusion

The aim of this study was to evaluate adherence to MD in children and adolescents from Croatia, who are residing in different geographic areas (continental versus Mediterranean). Although there have been many studies on this topic carried out in other Mediterranean countries, and

those studies have already been reviewed for both children and adolescents<sup>21,22</sup> only a few have considered regional (geographic) differences within the same country.<sup>23</sup> Furthermore, to the best of our knowledge no study to this date has considered regional differences in adherence to the MD in children and adolescents in Croatia.

In our study, taking all the results together irrespective of the region of origin, low adherence to the MD was evident in 23.1% of children and adolescents, while good adherence was evident in only 15.8%. For comparison, in Italian adolescents, only 14% of respondents had good adherence to the MD<sup>23</sup>, in Spanish children that was 18.8% in rural and 23.1% in urban areas of southeast of Spain<sup>24</sup>, rising to 21.5% in Greek adolescents<sup>25</sup>, and rising further to 53.3% in Spanish children residing in the province of Valencia.<sup>26</sup> A recent study in preschool children in Croatia has shown that only 6% of children had low and almost 70% had good MD adherence.<sup>16</sup> Authors assumed that such high adherence to the MD can be explained by the fact that nearly all children in that study were attending kindergarten and following institutionalized nutritional recommendations. We could speculate that once children are not exposed to institutionalized regular healthy meals (in Croatia starting from primary school onwards), the quality of their diets deteriorates, as demonstrated in our study. However, to confirm this, we would need to prospectively follow the same children starting from the kindergarten. In another study performed in the Mediterranean part of Croatia<sup>15</sup>, 30% of adolescents had good adherence to MD, compared to only 18% in our study, however, the same authors report that even 45.3% had poor MD adherence, compared to only 14.8% in our study.

As expected, higher proportion of children from the continental part of Croatia had low adherence to MD (27.3%) compared to those from the Mediterranean part of Croatia (14.8%). Similar results were evident for Italian adolescents.<sup>23</sup> Interestingly, participants from the Mediterranean part of Croatia had significantly higher energy intake and intake of all macronutrients, as well as the intake of calcium, potassium, folic acid/folate, vitamin D and dietary fiber, and were more compliant with D-A-CH recommendations. We have further confirmed that the intake of calcium, potassium, folic acid/folate and dietary fiber increases with higher MD adherence. Indeed, previous studies have found significant association between MD adherence and diet adequacy<sup>22</sup>. Unexpectedly, in our study, children and adolescents from the Mediterranean part had lower intake of MUFA and PUFA. This could be explained by the strong public health policy in Croatia which supports overall adherence to MD and especially use of olive oil as the main source of fat in Croatian population. Therefore, we could speculate that in the continental part of Croatia (primarily in the capital city of Croatia, Zagreb), where a higher proportion of highly educated people with better socioeconomic status are located, and who are also more likely to follow dietary recommendations<sup>27</sup>, olive oil was used more often than in other, more rural areas.

**TABLE 2**  
COMPARISON OF AGE, KIDMED SCORE, KIDMED CATEGORY AND DIETARY INTAKE BETWEEN CONTINENTAL AND MEDITERRANEAN PART OF CROATIA

	Continental part (N=554)	Mediterranean part (N=284)	p-value
Age, X±SD	9.98±2.01	9.92±2.23	0.699
KIDMED score, X±SD	4.91±2.33	5.57±2.12	<0.001
KIDMED category:			
Low adherence, N (%)	151 (27.3)	42 (14.8)	
Average adherence, N (%)	321 (58.0)	190 (67.1)	
Good adherence, N (%)	81 (14.6)	51 (18.0)	
Energy intake (kcal), X±SD	1439.44±439.63	1574.98±419.67	<0.001
Protein (g), X±SD	61.75±19.47	65.24±16.31	0.010
Protein % of total EI, X±SD	17.45±3.44	16.87±2.97	0.014
Fat (g), X±SD	52.58±21.85	56.93±19.98	0.005
Fat % of total EI, X±SD	32.33±6.18	32.33±5.83	0.999
Carbohydrates, X±SD	175.83±58.01	193.43±58.80	<0.001
Carbohydrates % of total EI, X±SD	48.74±6.94	49.03±6.10	0.554
SFA (g), X±SD	18.87±8.43	18.23±9.61	0.337
SFA % of total fat intake (%), X±SD	47.21±6.46	50.99±8.25	<0.001
MUFA (g), X±SD	14.92±7.11	13.31±7.54	0.003
MUFA % of total fat intake (%), X±SD	36.75±5.63	35.53±6.57	0.008
PUFA (g), X±SD	6.64±4.70	5.10±3.90	<0.001
PUFA % of total fat intake (%), X±SD	16.04±6.01	13.49±5.12	<0.001
Calcium (g), X±SD	557.83±233.10	679.72±239.89	<0.001
Calcium, (% of recommended), X±SD	55.63±24.80	67.85±25.40	<0.001
Potassium (mg), X±SD	1876.79±670.61	2039.43±663.67	0.001
Potassium, (% of recommended), X±SD	78.20±41.08	86.03±44.33	0.011
Iron (mg), X±SD	7.95±4.82	8.25±4.73	0.399
Iron, (% of recommended), X±SD	69.33±45.09	70.91±40.87	0.622
Folic acid/folate (µg), X±SD	121.36±53.15	132.63±49.64	0.003
Folic acid/folate, (% of recommended), X±SD	57.78±29.81	64.78±31.92	0.002
Vitamin B6 (mg), X±SD	1.19±0.66	1.21±0.49	0.620
Vitamin B6, (% of recommended), X±SD	107.16±71.70	108.81±45.77	0.725
Vitamin A (µg), X±SD	317.12±393.02	341.33±314.57	0.369
Vitamin A, (% of recommended), X±SD	58.18±67.67	65.02±62.01	0.155
Vitamin D (µg), X±SD	1.14±1.95	1.59±2.56	0.010
Vitamin D (% of recommended), X±SD	5.70±9.73	7.93±12.78	0.010
Dietary fiber (g), X±SD	13.09±5.60	14.68±7.75	0.001
Dietary fiber (% of recommended), X±SD	89.38±42.33	100.90±56.82	0.001

EI - energy intake, MUFA- monounsaturated fatty acids, PUFA – polyunsaturated fatty acids, SFA – saturated fatty acids

Moreover, in our sample, intakes of vitamin A and vitamin D were well below recommendations, similar to results of previous studies<sup>28-30</sup>. Such low intake of vitamin D is due to the fact that vitamin D occurs in limited number of rarely consumed foods (egg yolks, oily fish)<sup>31</sup> and, therefore, appropriate intakes are difficult to reach. More-

over, studies have shown that simple dietary counseling is insufficient to normalize vitamin D intake.<sup>28</sup> Therefore, a question of appropriateness of vitamin D supplementation in healthy children and adolescents has been discussed in previous years, however, no consensus has been reached.<sup>32</sup>

**TABLE 3**  
INTAKE OF ENERGY AND VARIOUS NUTRIENTS DEPENDING ON ADHERENCE TO THE MD (KIDMED SCORE CATEGORY)

	Low adherence (N=193)	Average adherence (N=511)	Good adherence (N=132)	p-value
Age (years), X±SD	9.91±2.04	9.95±2.12	10.08±2.05	0.767
Energy intake (kcal), X±SD	1500.09±456.89	1483.49±432.64	1467.72±430.98	0.804
Protein (g), X±SD	61.96±18.09	63.48±18.87	62.15±17.81	0.542
Fat (g), X±SD	57.18±25.75	53.11±19.41	52.93±20.92	0.063
Carbohydrates (g), mean ± SD	184.80±65.85	181.01±57.31	180.04±54.28	0.702
SFA (g), X±SD	20.03±10.54	18.41±8.20	17.62±8.40	0.032**
MUFA (g), X±SD	15.26±7.58	14.16±7.02	13.86±7.82	0.140
PUFA (g), X±SD	7.07±6.12	5.79±3.71	5.98±4.27	0.003*
Calcium (mg), X±SD	520.44±228.29	616.63±238.17	646.40±254.94	<0.001* **
Potassium (mg), X±SD	1809.07±651.43	1946.02±672.27	2058.12±682.39	0.003* **
Iron (mg), X±SD	7.58±2.80	8.07±5.13	8.69±5.65	0.120
Folic acid (µg), X±SD	113.46±43.94	126.11±50.26	138.56±66.11	<0.001* ** ***
Vitamin B6 (mg), X±SD	1.19±0.52	1.20±0.67	1.20±0.44	0.946
Vitamin A (µg), X±SD	296.28±278.50	329.65±409.21	353.34±314.01	0.364
Vitamin D (µg), X±SD	1.06±1.78	1.30±2.25	1.62±2.42	0.075
Dietary fiber (g), X±SD	12.15±4.30	13.84±7.12	14.98±5.97	<0.001* **

MUFA – monounsaturated fatty acids, PUFA – polyunsaturated fatty acids, SFA – saturated fatty acids. Post-hoc analysis: \*p<0.05 for low adherence vs. average adherence group, \*\*p<0.05 for low adherence vs. good adherence group, \*\*\*p<0.05 for average adherence vs. good adherence group

The main limitation of this study is that data on nutritional status and socioeconomic status were not available. Moreover, it should be noted that although detailed instructions on filling out 3DFRs have been given with each questionnaire, some 3DFRs did not contain detailed information on constituents of some meals (most commonly types of fat used for cooking), therefore, type and amount of fat were estimated by the researchers based on the type of a meal and previously used fats by the same participant. Strengths of this study include high number of subjects and inclusion of different regions of Croatia, since Croatia is characteristic for having geographically and historically two distinct areas, with specific dietary features.

In conclusion, compared to other Mediterranean countries, Croatia showed relatively poor adherence to MD, even in regions where MD is a part of traditional heritage.

Nevertheless, children and adolescents from the Mediterranean part of Croatia had higher MD adherence and were more compliant with current nutritional recommendations. However, it should be noted that the diet quality of both regions is still unsatisfactory, therefore a healthy, balanced diet should be encouraged in both regions, preferably taking into account traditionally consumed and locally available foods.

### Acknowledgements

This study is a part of a larger multicenter study (Diet and Functional Gastrointestinal Disorders in children and adolescents in the Mediterranean countries) funded by the European Society of Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) research grant.

### REFERENCES

- VELÁZQUEZ-LÓPEZ L, SANTIAGO-DÍAZ G, NAVA-HERNÁNDEZ J, MUÑOZ-TORRES AV, MEDINA-BRAVO P, TORRES-TAMAYO M, BMC Pediatr, 14 (2014) 175. doi: 10.1186/1471-2431-14-175. — 2. TOLEDO E, HU FB, ESTRUCH R, BUIL-COSIALES P, CORELLA D, SALAS-SALVADÓ J, COVAS MI, ARÓS F, GÓMEZ-GRACIA E, FIOL M, LAPETRA J, SERRA-MAJEM L, PINTOX X, LAMUELA-RAVENTÓS RM, SAEZ G, BULLÓ M, RUIZ-GUTIÉRREZ V, ROS E, SORLI JV, MARTINEZ-GONZALEZ MA, BMC Med, 11 (2013) 207. doi: 10.1186/1741-7015-11-207. — 3. DA SILVA R, BACH-FAIG A, RAIDÓ QUINTANA B, BUCKLAND G, VAZ DE ALMEIDA MD, SERRA-MAJEM L, Public Health Nutr, 12 (2009) 1676. doi: 10.1017/S1368980009990541. — 4. BACH-FAIG A, FUENTES-BOL C, RAMOS D, CARRASCO JL, ROMAN B, BERTOMEU IF, CRISTIÀ E, GELEVA D, SERRA-MAJEM L, Public Health Nutr, 14 (2011) 622. doi: 10.1017/S1368980010002752. — 5. BONACCIO M, DI CASTELNUOVO A, BONANNI A, COSTANZO S, DE LUCIA F, PERSICILLO M, ZITO F,

- DONATI MB, DE GAETANO G, IACOVIELLO L, Nutr Metab Cardiovasc Dis, 24 (2014) 853. doi: 10.1016/j.numecd.2014.02.014. — 6. LEONE A, BATTEZZATI A, DE AMICIS R, DE CARLO G, BERTOLI S, Nutrients, 9 (2017) 734. doi: 10.3390/nu9070734. — 7. LEÓN-MUÑOZ LM, GUALLAR-CASTILLÓN P, GRACIANA, LÓPEZ-GARCÍA E, MESAS AE, AGUILERA MT, BANEGAS JR, RODRÍGUEZ-ARTALEJO F, J Nutr, 142 (2012) 1843. doi: 10.3945/jn.112.164616. — 8. BONACCIO M, BES-RASTROLLO M, DE GAETANO G, IACOVIELLO L. Challenges to the Mediterranean diet at a time of economic crisis, Nutr Metab Cardiovasc Dis, 26 (2016) 1057. doi: 10.1016/j.numecd.2016.07.005. — 9. SOFI F, MACCHI C, ABBATE R, GENSINI GF, CASINI A, Public Health Nutr, 17 (2014) 2769. doi: 10.1017/S1368980013003169. — 10. WORLD HEALTH ORGANIZATION, Consideration of the evidence on childhood obesity for the Commission on Ending Childhood Obesity: report of the ad hoc working group on science and evidence for ending childhood obesity (Geneva, 2016). — 11. AL-KHUDAIRY L, LOVEMAN E, COLQUITT JL, MEAD E, JOHNSON RE, FRASER H, OLAJIDE J, MURPHY M, VELHO RM, O'MALLEY C, AZEVEDO LB, ELLS LJ, METZENDORF MI, REES K, Cochrane Database Syst Rev, 6 (2017) CD012691. doi: 10.1002/14651858.CD012691. — 12. BACH-FAIG A, BERRY EM, LAIRON D, REGUANT J, TRICHOPOULOU A, DERNINI S, MEDINA FX, BATTINO M, BELAHSEN R, MIRANDA G, SERRA-MAJEM L, MEDITERRANEAN DIET FOUNDATION EXPERT GROUP, Public Health Nutr, 14 (2011) 2274. doi: 10.1017/S1368980011002515. — 13. KOLČIĆ I, RELJA A, GELEMANOVIĆ A, MILJKOVIĆ A, BOBAN K, HAYWARD C, RUDAN I, POLAŠEK O, Croat Med J, 57 (2016) 415. doi: 10.3325/cmj.2016.57.415. — 14. BRIŠKI M, JAREC M. Coll Antropol, 38 (2014) 108. — 15. KRESIC G, KENDEL JOVANOVIĆ G, PAVICIC ZEZEJ S, PLEADIN J, LIOVIC N, PLEPEL K, CJFST, 10 (2018) 81. — 16. OBRADOVIC SALCIN L, KARIN Z, MILJANOVIĆ DAMJANOVIĆ V, OSTOJIC M, VRDOLJAK A, GILIC B, SEKULIC D, LANG-MOROVIC M, MARKIC J, SAJBER D, Int J Environ Res Public Health, 16 (2019) 3237. doi: 10.3390/ijerph16183237. — 17. SERRA-MAJEM L, RIBAS L, NGO J, ORTEGA RM, GARCÍA A, PÉREZ-RODRIGO C, ARANCETA J, Public Health Nutr, 7 (2004) 931. doi: 10.1079/phn2004556. — 18. ŠTEFAN L, PROSOLI R, JURANKO D, ČULE M, MILINOVIĆ I, NOVAK D, SPORIŠ G, Nutrients, 9 (2017) 419. doi: 10.3390/nu9040419. — 19. Nutri-science. Prodi, v.6.9., Expert plus software. v.6.9. ed. Stuttgart, Germany: Nutri-science; 2011. — 20. PRENTICE A, BRANCA F, DECSI T, MICHAELSEN KF, FLETCHER RJ, GUESRY P, MANZ F, VIDAILHET M, PANNEMANS D, SAMARTÍN S, Br J Nutr, 92 (2004) 83. doi: 10.1079/bjn20041159. — 21. ROSI A, PAOLELLA G, BIASINI B, SCAZZINA F; SINU WORKING GROUP ON NUTRITIONAL SURVEILLANCE IN ADOLESCENTS, Nutr Metab Cardiovasc Dis, 29 (2019) 544. doi: 10.1016/j.numecd.2019.03.003. — 22. IACCARINO IDELSON P, SCALFI L, VALERIO G, Nutr Metab Cardiovasc Dis, 27 (2017) 283. doi: 10.1016/j.numecd.2017.01.002. — 23. NOALE M, NARDI M, LIMONGI F, SIVIERO P, CAREGARO L, CREPALDI G, MAGGI S, Nutr Res, 34 (2014) 771. doi: 10.1016/j.nutres.2014.08.001. — 24. DOMÉNECH-ASENSI G, SÁNCHEZ-MARTÍNEZ Á, ROS-BERRUEZO G, Nutr Hosp, 31 (2014) 1359. doi:10.3305/nh.2015.31.3.8306. — 25. PAPADAKI S, MAVRIKAKI E, Nutrition, 31 (2015) 345. doi: 10.1016/j.nut.2014.09.003. — 26. NAVARRO-SOLERA M, GONZÁLEZ-CARRASCOSA R, SORIANO JM, Rev Esp Nutr Hum Diet, 18 (2014) 81. doi: https://doi.org/10.14306/renhyd.18.2.65. — 27. ALKERWI A, VERNIER C, SAUVAGEOT N, CRICHTON GE, ELIAS MF, BMJ Open, 5 (2015) e006814. doi: 10.1136/bmjopen-2014-006814. — 28. COSENZA L, PEZZELLA V, NOCERINO R, DI COSTANZO M, CORUZZO A, PASSARELLO A, LEONE L, SAVOIA M, DEL PUENTE A, ESPOSITO A, TERRIN G, BERNI CANANI R, BMC Pediatr, 13 (2013) 86. doi: 10.1186/1471-2431-13-86. — 29. MITSOPOULOU AV, MAGRIPLIS E, DIMAKOPOULOS I, KARAGEORGOU D, BAKOGLIANNI I, MICHA R, MICHAS G, CHOURDAKIS M, NTOUROUPTI T, TSANIKLIDOU SM, ARGYRI K, PANAGIOTAKOS DB, ZAMPELAS A, Public Health Nutr, 12 (2020) 2314. doi: 10.1017/S1368980019000449X. — 30. DIETHELM K, HUYBRECHTS I, MORENO L, DE HENAUW S, MANIOS Y, BEGHIN L, GONZÁLEZ-GROSS M, LE DONNE C, CUENCA-GARCÍA M, CASTILLO MJ, WIDHALM K, PATTERSON E, KERSTING M, Public Health Nutr, 17 (2014) 486. doi: 10.1017/S1368980013000463. — 31. ZHANG R, NAUGHTON DP, Nutr J, 9 (2010) 65. doi: 10.1186/1475-2891-9-65. — 32. TAYLOR SN, Ann Nutr Metab, 76 (2020) 30. doi: 10.1159/000505635.

S. Sila

Referral Centre for Pediatric Gastroenterology and Nutrition, Children's Hospital Zagreb, Klaićeva 16, 10000 Zagreb, Croatia

e-mail: sara.sila0810@gmail.com

## **PRIDRŽAVANJE MEDITERANSKE PREHRANE U DJECE I ADOLESCENATA U MEDITERANSKOM I KONTINENTALNOM DIJELU HRVATSKE**

### **SAŽETAK**

Mediteranska prehrana ima važnu ulogu u prevenciji i liječenju različitih kroničnih nezaraznih bolesti. Međutim, pridržavanje mediteranske prehrane posljednjih godina opada, posebno u mediteranskim zemljama. Hrvatska je karakteristična po tome što ima tradicionalno kontinentalnu i mediteransku regiju, sa specifičnim prehrambenim značajkama. Cilj ovog istraživanja bio je usporediti razlike u pridržavanju mediteranske prehrane te nutritivni unos između djece i adolescenata iz kontinentalnog i mediteranskog dijela Hrvatske. Ispitanici su bili nasumce regrutirana djeca i adolescenti ( $n = 838$ , prosječna dob  $9,96 \pm 2,09$  godina) koji žive u kontinentalnom i mediteranskom dijelu Hrvatske. Svi ispitanici su ispunili tri različita upitnika: opći upitnik (dob i spol), KIDMED upitnik (mediteranski indeks kakvoće prehrane kod djece i adolescenata) i trodnevni dnevnik prehrane. Statistička analiza provedena je pomoću statističkog softvera SPSS 260 (IBM Corporation, Chicago, Illinois, USA). Vrijednosti P manje od 0,05 smatrale su se značajnima. Rezultati su pokazali da se 23,1% ispitanika slabo pridržava mediteranske prehrane, dok se samo 15,8% djece i adolescenata dobro pridržava mediteranske prehrane. Postoji statistički značajna razlika u KIDMED indeksu između kontinentalnog (srednja vrijednost  $4,91 \pm 2,33$ ) i mediteranskog (srednja vrijednost  $5,57 \pm 2,12$ ) dijela Hrvatske ( $p < 0,001$ ), kao i u unosu energije i nekih nutritivnih tvari. Sudionici iz mediteranskog dijela Hrvatske bolje su se pridržavali D-A-CH preporuka za određene nutritivne tvari u usporedbi s onima iz kontinentalnog dijela. Iako su se djeca i adolescenti iz mediteranskog dijela Hrvatske bolje pridržavali mediteranske prehrane nego oni iz kontinentalnog dijela, sveukupno je bilo vidljivo relativno slabo pridržavanje mediteranskoj prehrani za obje regije. Stoga je potrebno u obje regije poticati zdravu, uravnoteženu prehranu, po mogućnosti uzimajući u obzir tradicionalnu i lokalno dostupnu hranu.

