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IZVORNI ČLANAK / ORIGINAL ARTICLE

Suplementi u prehrani zdravstvenih djelatnika tijekom pandemije COVID-19

Food supplements in healthcare professionals' diet during COVID-19 pandemic

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Sažetak

Cilj: Cilj provedenog istraživanja bio je ispitati utjecaj pandemije COVID-19 na učestalost potrošnje suplemenata u prehrani zdravstvenih radnika.

Ispitanici i metode: Ispitivanje je provedeno tijekom prosinca 2020. i siječnja 2021. godine na području grada Zagreba, a obuhvatilo je 279 zdravstvenih djelatnika DZ Centar (liječnici, medicinske sestre / medicinski tehničari, farmaceuti). Podaci su prikupljani putem upitnika prilagođenog potrebama ovog istraživanja. Razlike između skupine koja je imala promjenu u uzimanju suplementacije u odnosu na skupinu koja nije imala promjenu u uzimanju suplementacije tijekom pandemije COVID-19 analizirane su χ2 testom. Sve P vrijednosti manje od 0,05 smatrane su značajnima.

Rezultati: Dobiveni rezultati ukazuju na značajnu naviku konzumiranja nekih dodataka prehrani među zdravstvenim djelatnicima, a pojava pandemije COVID-19 utjecala je na trećinu ispitanika da započnu s uzimanjem suplementa (11,5 %) ili da ih uzimaju više i češće nego prije pandemije (21,9 %). Od vitamina, tijekom pandemije COVID-19 među zdravstvenim djelatnicima, povećala se upotreba vitamina C (P = 0,001), vitamina D (P = 0,001) te kompleksa B vitamina (P = 0,048). Najveće povećanje odnosilo se na učestalost uzimanja vitamina D gdje se svakodnevno uzimanje povećalo 3,63 puta. Značajne razlike u uzimanju minerala, proteina i aminokiselina između skupine koja je imala promjenu u uzimanju suplementacije u odnosu na skupinu koja nije imala promjenu odnosile su se na uzimanje magnezija i cinka (P < 0,001). Od ostalih dodataka prehrani značajno se povećao unos beta-glukana (P < 0,001), ginko bilobe (P = 0,012), kolagena (P = 0,038) te homeopatskih pripravaka (P = 0,006).

Zaključak: Pandemija COVID-19 značajno je utjecala na povećani unos dodataka prehrani kod zdravstvenih djelatnika. Na temelju najnovijih znanstvenih spoznaja i preporuka o prehrani za vrijeme COVID-19 trebalo bi više pažnje usmjeriti na principe pravilne prehrane te dnevne potrebe za vitaminima, mineralima, proteinima i antioksidansima zadovoljiti konzumacijom namirnica iz različitih kategorija hrane, a u slučajevima povećanog rizika od bolesti COVID-19 ili deficita pojedinih nutrijenata upotrebljavati i suplemente.

Ključne riječi: zdravstveni djelatnici, suplementi, COVID-19

Kratak naslov: Suplementi u prehrani zdravstvenih djelatnika i COVID-19

Abstract

Aim: The study aims to investigate the impact of the COVID-19 pandemic on the frequency of healthcare professionals' food supplement consumption.

Subjects and Methods: The study was conducted in December 2020 and January 2021 in the City of Zagreb and comprised a total of 279 healthcare professionals (physicians, nurses/technicians, pharmacists) affiliated with the HC "Center". Data were collected via a questionnaire adapted to the study's purposes. Differences between the group which changed its food supplementation consumption during the COVID-19 pandemic and the group that did not change it were tested using the χ2 test. P-values beneath 0.05 were deemed statistically significant.

Results: The results reveal the consumption of some food supplements to be a fairly strong habit among healthcare professionals. COVID-19 pandemic urged one third of them to start taking food supplements (11.5%) or to increase the amount and frequency of their use (21.9%). As for vitamins, during the pandemic healthcare professionals have taken more C (P=0.001), D (P=0.001), and B complex vitamins (P=0.048). The major increase was seen with the D vitamin, whose daily consumption rose by 3.63. Significant differences in the consumption of minerals, proteins, and amino acids, noticeable between the group that changed its food supplementation habits and the one that did not change, arose primarily due to the changes in magnesium and zinc intake (P<0.001). On top of that, a significant rise in beta-glucan (P<0.001), ginkgo biloba (P=0.012), collagen (P=0.038), and homeopathic preparations' intake was documented (P=0.006).

Conclusion: COVID-19 pandemic significantly impacts food supplements' use among healthcare professionals. Based on the current knowledge and dietary recommendations, during the pandemic, the focus should be shifted to healthy diet principles. Daily vitamin, mineral, protein, and antioxidant needs should be satisfied through a variety of foods. In case of an increased risk of COVID-19 disease or deficiency of certain nutrients, food supplements should be introduced, too.

Keywords: healthcare professionals, food supplements, COVID-19

Running head: Food supplementation in healthcare professionals and COVID-19

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Uvod

Dodaci prehrani pripravci su proizvedeni iz koncentriranih izvora hranjivih tvari ili drugih tvari s hranjivim ili fiziološ-

Introduction

Food supplements are preparations produced from concentrated nutrient sources or other substances having a

kim učinkom kojima je svrha dodatno obogatiti uobičajenu prehranu u cilju održavanja zdravlja [1].

Globalno tržište dodataka prehrani u 2020. godini procijenjeno je na 140,3 milijarde dolara te su projekcije da će godišnja stopa rasta u razdoblju od 2021. do 2028. godine biti 8,6 %. Najveći udio čine vitamini (31,4 %), biljni preparati, minerali, te proteini, aminokiseline i kreatin. Neki od čimbenika koji utječu na veliko tržište i porast tijekom godina su: veća svijest ljudi o važnosti zdravlja, pogotovo u današnjem užurbanom načinu života; veći broj starijeg stanovništva; veći interes za zdraviju prehranu, posebice radne populacije s ciljem prevencije bolesti te popularnost teretana i različitih fitness centara. Pojavom pandemije COVID-19 interes za suplemente u prehrani još više se povećava s ciljem prevencije i liječenja infekcije sa SARS-CoV-2. [2 – 4] pri čemu dolazi do izražaja velik utjecaj medija i društvenih mreža [5].

Optimalna prehrana može unaprijediti zdravstveno stanje, smanjiti rizik od oboljenja i morbiditet povezan s bolesti COVID-19. Vitamini i minerali iz prehrane mogu doprinijeti jačanju imunološkog sustava, što je iznimno važno u vrijeme pandemije. Te preporuke ukazuju na važnost dostatnog unosa vitamina C, vitamina B6, vitamina B12, folata, vitamina A i D, cinka, željeza i selena. Stoga se preporučuje uravnotežena i dobro izbalansirana prehrana koja uključuje svježe i neprerađene namirnice, izbjegavanje šećera, masti i soli uz primjerenu tjelesnu aktivnost, dovoljno sna i izbjegavanje stresa [6 – 8].

Zdravstveni djelatnici koji rade na području unaprjeđenja zdravlja, sprječavanja bolesti, liječenja ili rehabilitacije često su izloženi povećanim naporima i nemogućnosti primjene dobro izbalansiranih obroka. Pojavom pandemije COVID-19 pred medicinsko osoblje postavljen je novi izazov. U tim okolnostima posebno je važno voditi brigu o imunološkom sustavu s obzirom na činjenicu da se dio vala zaraze počeo širiti naročito zimi kad su izraženiji deficiti pojedinih mikronutrijenata.

Stoga je i cilj ovog istraživanja ispitati utjecaj pandemije COVID-19 na učestalost potrošnje suplemenata u prehrani zdravstvenih radnika.

Ispitanici i metode

Ispitivanje je provedeno tijekom prosinca 2020. i siječnja 2021. godine na području grada Zagreba, a obuhvatilo je 279 zdravstvenih djelatnika DZ Centar. Podaci su prikupljani putem anonimnog upitnika [9] prilagođenog potrebama ovog istraživanja. Prvi dio upitnika odnosio se na sociodemografske karakteristike ispitanika te pitanja o samoprocjeni prehrambenih navika, tjelesnoj kondiciji i učestalosti fizičke aktivnosti. Učestalost konzumacije pojedinih suplemenata definirana je kao svakodnevna, 4 – 6 puta tjedno, jedanput tjedno i nikada.

Prevalencija uzimanja pojedinih suplemenata prikazana je kroz apsolutne vrijednosti te odgovarajuće postotne udjele. Razlike između skupine koja je imala promjenu u uzimanju suplementacije (N = 93) u odnosu na skupinu koja nije imala promjenu u uzimanju suplementacije tijekom pandemije COVID-19 (N = 186) analizirane su $\chi 2$ testom. Sve P

nutritional or physiological effect, which aim at further enrichment of normal diet to maintain good health [1].

In 2020, the global food supplement market was estimated at 140.3 billion dollars, with a projected annual increase of 8.6% within the 2021-2028 timeframe. The most substantial proportion of these supplements is represented by vitamins (31.4%), followed by herbal preparations, minerals, proteins, amino acids, and creatin. Some of the factors influencing such a large market and the increase in use witnessed over the years are increased awareness about the importance of health, especially in the context of modern "rush through life", an increasing proportion of the elderly, increasing interest in healthier diet, particularly that of the labour force to the end of disease prevention, and increasing popularity of gyms and various fitness centres. The onset of the COVID-19 pandemic has increased the interest in food supplements even more, in hope of prevention and curing of SARS-CoV-2 infection [2-4], which is to be attributed to the influence of media and social networks, as well [5].

An optimal diet can improve health and reduce the risk of diseases and COVID-19- associated morbidity rate. Dietary vitamins and minerals may contribute to the reinforcement of the immune system, which is most important in this time of the pandemic. These recommendations highlight the importance of sufficient intake of C, B6, and B12 vitamins, folates, A and D vitamins, zinc, iron, and selenium. It is, therefore, recommendable to stick to a well-balanced diet that includes fresh and unprocessed foodstuffs and avoids sugar, fat, and salt intake, but encourages an appropriate physical activity, a lot of sleep, and stress avoidance [6-8].

Healthcare professionals engaged in several fields dealing with health improvement, disease prevention, therapy, and rehabilitation, that is to say, occupying different work posts, are often overstrained and deprived of well-balanced meals. The emergence of the COVID-19 pandemic represents a novel challenge healthcare professionals have to cope with. Under these circumstances, it is significant to take care of the immune status, given the fact that the pandemic began to spread widely in the winter period when certain micronutrient deficiencies are more striking and more common.

Accordingly, this study aims to investigate the impact of the COVID-19 pandemic on the frequency of supplement use in healthcare professionals' diet.

Subjects and Methods

The study was carried out in December 2020 and January 2021 in the City of Zagreb and comprised a total of 279 healthcare professionals affiliated with the HC "Centar". The data were collected using an anonymous questionnaire [9] adapted for the needs of this research. The first part of the questionnaire contained sociodemographic features of the respondents and posed questions about self-appraisal of dietary habits, physical fitness, and physical activity frequency. The frequency of food supplements consumption was defined as "daily", "4-6 times a week", "once a week" or "none".

Prevalence rates of individual food supplements were expressed as absolute figures and matching percentage shares. Differences between the group that changed its food supplement intake pattern during the COVID-19 pan-

vrijednosti manje od 0,05 smatrane su značajnima. U analizi i grafičkom prikazu koristila se programska podrška IBM SPSS Statistics for Windows, verzija 25.0.

Rezultati

U istraživanje je uključeno ukupno 279 zdravstvenih djelatnika od kojih je 215 (77,1 %) bilo ženskog spola, dok je ispod 30 godina starosti bilo 58 (20,8 %) ispitanika. Srednju stručnu spremu imalo je 113 (40,5 %) ispitanika, dok je broj medicinskih sestara iznosio 148 (53,0 %). Od ostalih zdravstvenih djelatnika, nakon medicinskih sestara, najbrojniji su bili liječnici, njih 64 (22,9 %). Zdrave prehrambene navike prema vlastitoj procjeni imalo je 125 (44,8 %) ispitanika te je većina ispitanika, njih 173 (62,0 %), bila u normalnom rasponu indeksa tjelesne mase (18,5 – 24,9 kg/m^2). Lošu kondiciju imala su 43 (15,4 %) ispitanika, a intenzivnu učestalost tjelesne aktivnosti (svakodnevno ili više puta tjedno > 90min) njih 47 (16,8 %).

demic (N=93) and the group that did not introduce that change (N=186) were analysed using the χ2 test. P/values of less than 0.05 were considered significant. The software supporting the analysis and graphical display was IBM SPSS Statistics for Windows, version 25.0.

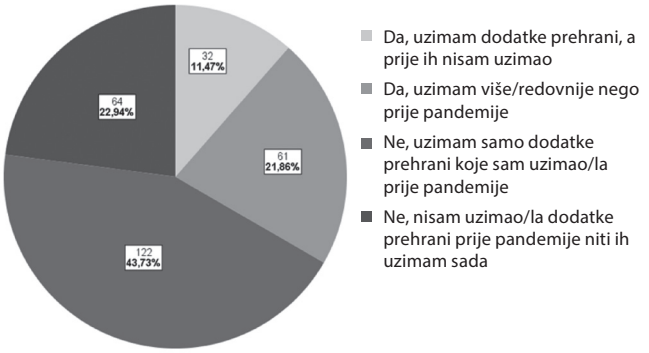
Results

The study comprised a total of 279 healthcare professionals, out of which 215 (77.1%) of the female gender, with 58 (20.8%) respondents under the age of 30. A total of 113 (40.5%) were vocational school graduates, while the number of nurses/technicians equalled 148 (53.0%). Aside from nurses/technicians, the most represented examinee group were physicians (64:22.9%). Healthy dietary habits were self-reported by 125 (44.8%) examinees, while the majority of subjects – 173 (62.0%) – fell within the normal body mass index range (18.5-24.9 kg/m^2). Forty-three subjects (15.4%) were in poor physical shape, while 47 examinees

Table [1] Sociodemographic features of respondents and differences between the group that changed its food supplementation habits during COVID-19 pandemic and the group that failed to do so: χ2 test

		THE IMPACT OF COVID-19 PANDEMIC ON FOOD SUPPLEMENT CONSUMPTION				P
		Yes		No		
		N	%	N	%	
GENDER	Male	16	17.2 %	48	25.8 %	0.131
	Female	77	82.8 %	138	74.2 %	
AGE	<30	14	15.1 %	44	23.7 %	0.001
	31-40	15	16.1 %	60	32.3 %	
	41-50	36	38.7 %	46	24.7 %	
	>50	28	30.1 %	36	19.4 %	
LEVEL OF EDUCATION	High school	45	48.4 %	68	36.6 %	0.160
	Vocational school graduates	23	24.7 %	52	28.0 %	
	College graduates	25	26.9 %	66	35.5 %	
PROFESSION	Physician	16	17.2 %	48	25.8 %	0.205
	Nurse/Medical technician	57	61.3 %	91	48.9 %	
	Pharmacist	5	5.4 %	16	8.6 %	
	The others	15	16.1 %	31	16.7 %	
EATING HABITS	Healthy	43	46.2 %	82	44.1 %	0.348
	Unhealthy	18	19.4 %	26	14.0 %	
	I do not think about it	32	34.4 %	78	41.9 %	
BODY MASS INDEX	< 18.5 kg/m^2	2	2.2 %	5	2.7 %	0.058
	18.5 – 24.9 kg/m^2	50	53.8 %	123	66.1 %	
	25.0 – 29.9 kg/m^2	30	32.3 %	50	26.9 %	
	> 30 kg/m^2	11	11.8 %	8	4.3 %	
FITNESS LEVEL	Excellent	5	5.4 %	43	23.1 %	0.001
	Good	31	33.3 %	51	27.4 %	
	Satisfactory	39	41.9 %	67	36.0 %	
	Poor	18	19.4 %	25	13.4 %	
FREQUENCY AND DURATION PHYSICAL ACTIVITY	Rarely /Never	44	47.3 %	66	35.5 %	0.017
	Moderately	41	44.1 %	81	43.5 %	
	Intensively	8	8.6 %	39	21.0 %	

Raspodjela odgovora o utjecaju COVID-19 pandemije na uzimanje suplementacije kod zdravstvenih djelatnika prikazana je Slikom 1. Jedna trećina zdravstvenih djelatnika, odnosno 93 (33,3 %), odgovorila je da je COVID-19 pandemija utjecala na svakodnevno uzimanje suplementacije. Također su se podijelili tako da jedna trećina (njih 32) uzima dodatke prehrani, a prije pandemije ih nije uzimala, dok njih 61 uzima više i/ili redovitije u odnosu na vrijeme prije pandemije.



Slika 1. Raspodjela odgovora o utjecaju COVID-19 pandemije na uzimanje suplementacije kod zdravstvenih djelatnika (N = 279)

(16.8%) claimed to be frequently and intensely active (daily or >90min several times a week).

The distribution of answers to the question about the impact of the COVID-19 pandemic on food supplement intake in healthcare professionals is illustrated in Figure 1. One third of healthcare professionals, 93 of them (33.3%), claimed that COVID-19 affected their daily food supplement intake, and were divided as follows: one third of the latter (32) currently takes food supplements which they have never taken before, while 61 of them have increased their consumption in terms of quantity and/or frequency as compared to the pre-pandemic era.

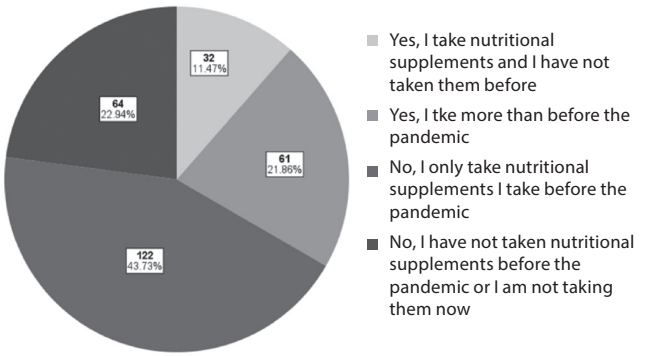


Figure 1. Distribution of answers to the question about the impact of COVID-19 pandemic on food supplementation intake patterns in healthcare professionals (N=279)

Tablica 1. prikazuje sociodemografske karakteristike ispitanika i njihove razlike s obzirom na skupinu koja je imala promjenu u uzimanju suplementacije i na skupinu koja nije imala promjenu u uzimanju suplementacije tijekom pandemije COVID-19. Stariji ispitanici značajno češće pripadaju skupini koja je imala promjenu u uzimanju suplementacije tijekom pandemije COVID-19 (P = 0,001) kao i oni s lošijom kondicijom (P = 0,001), odnosno ispitanici koji nemaju intenzivnu razinu tjelesne aktivnosti (P = 0,017). Od vitamina se tijekom pandemije COVID-19 među zdravstvenim djelatnicima povećala upotreba vitamina C (P = 0,001), vitamina D (P = 0,001) te kompleksa B vitamina (P = 0,048). Najveće povećanje odnosilo se na učestalost uzimanja vitamina D gdje se svakodnevno uzimanje povećalo 3,63 puta (Tablica 2).

Značajne razlike u uzimanju minerala, proteina i aminokiselina između skupine koja je imala promjenu u uzimanju suplementacije u odnosu na skupinu koja nije imala promjenu u uzimanju suplementacije tijekom pandemije COVID-19 odnosile su se na uzimanje magnezija i cinka (P < 0,001) (Tablica 3). Od ostalih dodataka prehrani značajno se povećao unos beta-glukana (P < 0,001), ginko bilobe (P = 0,012), kolagena (P = 0,038) te homeopatskih pripravaka (P = 0,006) (Tablica 4).

Table 1 shows the sociodemographic characteristics of the respondents and the differences between the group that changed its food supplement intake pattern during the COVID-19 pandemic and the group that failed to do so. Older respondents mostly fall within the group that changed its food supplementation pattern during the pandemic (P=0.001). The same applies to respondents in poorer physical shape (P=0.001) and those who do not exercise intensely (P=0.017). As for the vitamin intake, during the COVID-19 pandemic healthcare professionals have increased their C vitamin (P=0.001), D vitamin (P=0.001), and B complex vitamin intake (P=0.048). The most substantial increase is noticeable with the vitamin D daily intake that rose 3.63 times (Table 2).

Significant differences in mineral, protein, and amino acids' intake between the group that changed its food supplementation pattern during the pandemic and the group that failed to do so, were attributable to changes in magnesium and zinc intake (P<0.001) (Table 3). As for other food supplements, a significant intake rise was seen with beta-glucan (P<0.001), ginkgo biloba (P=0.012), collagen (P=0.038), and homeopathic preparations (P=0.006) (Table 4).

Table [2] Differences in vitamin intake between the group that changed its food supplementation habits during COVID-19 pandemic and the group that failed to do so: $\chi 2$ test

		THE IMPACT OF COVID-19 PANDEMIC ON FOOD SUPPLEMENT CONSUMPTION				P
		Yes		No		
		N	%	N	%	
MULTIVITAMINS	Never	63	67.7 %	135	72.6 %	0.811
	Once a week	3	3.2 %	6	3.2 %	
	4-6 times a week	8	8.6 %	14	7.5 %	
	Every day	19	20.4 %	31	16.7 %	
VITAMIN A	Never	92	98.9 %	185	99.5 %	0.556
	Once a week	0	0.0 %	1	0.5 %	
	4-6 times a week	0	0.0 %	0	0.0 %	
	Every day	1	1.1 %	0	0.0 %	
VITAMIN C	Never	61	65.6 %	151	81.2 %	0.001
	Once a week	2	2.2 %	7	3.8 %	
	4-6 times a week	11	11.8 %	19	10.2 %	
	Every day	19	20.4 %	9	4.8 %	
VITAMIN D	Never	22	23.7 %	143	76.9 %	0.001
	Once a week	2	2.2 %	3	1.6 %	
	4-6 times a week	20	21.5 %	13	7.0 %	
	Every day	49	52.7 %	27	14.5 %	
VITAMIN E	Never	90	96.8 %	184	98.9 %	0.241
	Once a week	2	2.2 %	1	0.5 %	
	4-6 times a week	0	0.0 %	1	0.5 %	
	Every day	1	1.1 %	0	0.0 %	
BETA-CAROTENE	Never	88	94.6 %	181	97.3 %	0.259
	Once a week	3	3.2 %	1	0.5 %	
	4-6 times a week	1	1.1 %	2	1.1 %	
	Every day	1	1.1 %	2	1.1 %	
B-COMPLEX SUPPLEMENT	Never	82	88.2 %	178	95.7 %	0.048
	Once a week	0	0.0 %	1	0.5 %	
	4-6 times a week	6	6.5 %	3	1.6 %	
	Every day	5	5.4 %	4	2.2 %	
B9	Never	91	97.8 %	182	97.8 %	1.000
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	1	1.1 %	2	1.1 %	
	Every day	1	1.1 %	2	1.1 %	
B12	Never	92	98.9 %	182	97.8 %	1.000
	Once a week	1	1.1 %	3	1.6 %	
	4-6 times a week	0	0.0 %	1	0.5 %	
	Every day	0	0.0 %	0	0.0 %	

Table [3] Differences in mineral, protein and amino acids' intake between the group that changed its food supplementation habits during COVID-19 pandemic and the group that failed to do so: $\chi 2$ test

		THE IMPACT OF COVID-19 PANDEMIC ON FOOD SUPPLEMENT CONSUMPTION				P
		Yes		No		
		N	%	N	%	
CALCIUM	Never	89	95.7 %	178	95.7 %	0.491
	Once a week	2	2.2 %	7	3.8 %	
	4-6 times a week	1	1.1 %	1	0.5 %	
	Every day	1	1.1 %	0	0.0 %	
IRON	Never	83	89.2 %	174	93.5 %	0.267
	Once a week	2	2.2 %	1	0.5 %	
	4-6 times a week	1	1.1 %	4	2.2 %	
	Every day	7	7.5 %	7	3.8 %	
MAGNESIUM	Never	63	67.7 %	161	86.6 %	<0.001
	Once a week	7	7.5 %	5	2.7 %	
	4-6 times a week	15	16.1 %	18	9.7 %	
	Every day	8	8.6 %	2	1.1 %	
ZINC	Never	73	78.5 %	180	96.8 %	<0.001
	Once a week	4	4.3 %	2	1.1 %	
	4-6 times a week	13	14.0 %	3	1.6 %	
	Every day	3	3.2 %	1	0.5 %	
POTASSIUM	Never	84	90.3 %	177	95.2 %	0.232
	Once a week	1	1.1 %	0	0.0 %	
	4-6 times a week	1	1.1 %	1	0.5 %	
	Every day	7	7.5 %	8	4.3 %	
SELENIUM	Never	91	97.8 %	185	99.5 %	0.258
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	0	0.0 %	0	0.0 %	
	Every day	2	2.2 %	1	0.5 %	
PROTEIN	Never	83	89.2 %	162	87.1 %	0.889
	Once a week	1	1.1 %	5	2.7 %	
	4-6 times a week	6	6.5 %	14	7.5 %	
	Every day	3	3.2 %	5	2.7 %	
AMINO ACID MIXTURES	Never	89	95.7 %	172	92.5 %	0.604
	Once a week	1	1.1 %	1	0.5 %	
	4-6 times a week	2	2.2 %	8	4.3 %	
	Every day	1	1.1 %	5	2.7 %	
BCAA	Never	91	97.8 %	182	97.8 %	1.000
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	2	2.2 %	3	1.6 %	
	Every day	0	0.0 %	1	0.5 %	
GLUTAMINE	Never	90	96.8 %	179	96.2 %	0.563
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	3	3.2 %	4	2.2 %	
	Every day	0	0.0 %	3	1.6 %	

Table [4] Differences in the intake of other food supplements between the group that changed its food supplementation habits during COVID-19 pandemic and the group that failed to do so: $\chi 2$ test

		THE IMPACT OF COVID-19 PANDEMIC ON FOOD SUPPLEMENT CONSUMPTION				P
		Yes		No		
		N	%	N	%	
CREATINE	Never	92	98.9 %	181	97.3 %	0.778
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	1	1.1 %	4	2.2 %	
	Every day	0	0.0 %	1	0.5 %	
CAFFEINE	Never	87	93.5 %	176	94.6 %	0.907
	Once a week	1	1.1 %	3	1.6 %	
	4-6 times a week	4	4.3 %	6	3.2 %	
	Every day	1	1.1 %	1	0.5 %	
BETA-GLUCAN	Never	80	86.0 %	182	97.8 %	<0.001
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	7	7.5 %	3	1.6 %	
	Every day	6	6.5 %	1	0.5 %	
COQ10 (Co-Enzyme Q10)	Never	90	96.8 %	182	97.8 %	0.267
	Once a week	2	2.2 %	0	0.0 %	
	4-6 times a week	0	0.0 %	1	0.5 %	
	Every day	1	1.1 %	3	1.6 %	
OMEGA-3	Never	82	88.2 %	170	91.4 %	0.420
	Once a week	1	1.1 %	1	0.5 %	
	4-6 times a week	5	5.4 %	4	2.2 %	
	Every day	5	5.4 %	11	5.9 %	
GINKGO BILOBA	Never	89	95.7 %	186	100.0%	0.012
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	3	3.2 %	0	0.0 %	
	Every day	1	1.1 %	0	0.0 %	
GINSENG	Never	91	97.8 %	184	98.9 %	0.606
	Once a week	1	1.1 %	1	0.5 %	
	4-6 times a week	1	1.1 %	0	0.0 %	
	Every day	0	0.0 %	1	0.5 %	
GUARANA	Never	92	98.9 %	182	97.8 %	1.000
	Once a week	0	0.0 %	0	0.0 %	
	4-6 times a week	1	1.1 %	3	1.6 %	
	Every day	0	0.0 %	1	0.5 %	
L-CARNITINE	Never	90	96.8 %	176	94.6 %	0.921
	Once a week	0	0.0 %	1	0.5 %	
	4-6 times a week	3	3.2 %	7	3.8 %	
	Every day	0	0.0 %	2	1.1 %	
ROYAL JELLY	Never	85	91.4 %	178	95.7 %	0.159
	Once a week	3	3.2 %	2	1.1 %	
	4-6 times a week	2	2.2 %	5	2.7 %	
	Every day	3	3.2 %	1	0.5 %	
MELATONIN	Never	90	96.8 %	182	97.8 %	0.823
	Once a week	1	1.1 %	2	1.1 %	
	4-6 times a week	2	2.2 %	2	1.1 %	
	Every day	0	0.0 %	0	0.0 %	

COLLAGEN	Never	78	83.9 %	174	93.5 %	0.038
	Once a week	1	1.1 %	0	0.0 %	
	4-6 times a week	7	7.5 %	6	3.2 %	
	Every day	7	7.5 %	6	3.2 %	
HOMEOPATHIC PREPARATIONS	Never	82	88.2 %	179	96.2 %	0.006
	Once a week	3	3.2 %	4	2.2 %	
	4-6 times a week	7	7.5 %	1	0.5 %	
	Every day	1	1.1 %	2	1.1 %	

Rasprava

Komplementarna i alternativna terapija globalno postaju sve popularnije. Pojavom pandemije COVID-19 interes za suplemente prehrani, funkcionalnom hranom i biljnim pripravcima još je izraženiji u nadi da bi mogli biti učinkoviti u prevenciji i liječenju te bolesti [10].

To potvrđuje i naše istraživanje provedeno među zdravstvenim djelatnicima koje ukazuje na značajnu naviku konzumiranja dodataka prehrani, odnosno više od tri četvrtine ispitanika (77 %) uzima neku vrstu suplementa. Pri tome je na trećinu ispitanika pojava pandemije COVID-19 utjecala da započnu s uzimanjem suplemenata (11,5 %) ili da ih uzimaju više i češće nego prije pandemije (21,9 %).

Analizirajući sociodemografska obilježja ispitanika i njihove razlike s obzirom na promjenu u uzimanju suplementacije i onih koji nisu mijenjali navike za vrijeme COVID-19 pandemije, utvrđeno je da su stariji ispitanici i oni s lošijom kondicijom, odnosno sa smanjenom tjelesnom aktivnošću, imali značajne promjene u uzimanju suplemenata. Tijekom pandemije COVID-19 zdravstveni djelatnici značajno su povećali potrošnju vitamina C i kompleksa vitamina B dok je najveća povećana potrošnja, čak više od tri puta, utvrđena za vitamin D. Od minerala se bilježi značajno povećanje unosa magnezija i cinka. Također, ispitanici su povećali unos i drugih suplemenata: beta-glukana, ginko bilobe, kolagena i homeopatskih pripravaka.

Vrlo malo je provedenih istraživanja među zdravstvenim djelatnicima o njihovim prehrambenim navikama uključujući dodatke prehrani, a ona koja su provedena uglavnom se odnose na istraživanja provedena u Americi. Tako Dickinson i sur. [11] ukazuju na to da 72 % liječnika i 89 % medicinskih sestara kao dio opće populacije konzumiraju dodatke prehrani redovito, povremeno ili sezonski. Također, istraživanje provedeno prije pojave pandemije COVID-19 među američkim liječnicima kardiolozima, dermatolozima i ortopedima potvrđuje da, osim što sami uzimaju suplemente prehrani, preporučuju ih i svojim pacijentima [12].

Pojavom pandemije COVID-19 istraživanja su usmjerena na načine prevladavanja tog izvanrednog stanja te povećanje imuniteta organizma. Neka istraživanja pokazuju da bi suplementacija prehrane s vitaminima A, B, C i vitaminom D, te mineralima poput selena, cinka i željeza, ali i omega-3 te melatonina, mogla imati ulogu u liječenju COVID-19 pacijenata, ali i u prevenciji infekcija gornjeg respiratornog

Discussion

The global popularity of complementary and alternative therapies is increasing. The onset of the COVID-19 pandemic gave rise to the interest in food supplements, functional diet, and herbal preparations that are more wanted in hope that they might be efficient in the prevention and treatment of the disease [10].

The aforementioned was confirmed by our study carried out among healthcare professionals, who have a marked habit of taking food supplements; in fact, this was the case in more than three quarters of our examinees (77%). One third of the latter started taking food supplements under the influence of the COVID-19 pandemic or have increased their intake for the very same reason (21.9%).

The analysis of sociodemographic features of our respondents and the differences between those who changed their food supplementation habits during the COVID-19 pandemic and those who did not, revealed that major changes in food supplementation habits occurred among older respondents, respondents in poorer physical shape and respondents not keen on physical activity. During the pandemic, healthcare professionals have significantly increased their vitamin C and B complex consumption (over three times in the case of D vitamin) and their consumption of magnesium and zinc. Other supplements (beta-glucan, ginkgo biloba, collagen, and homeopathic preparations) have also been taken in larger quantities.

Studies on dietary habits of healthcare professionals, food supplementation included, are scarce and mostly conducted in the US. Dickinson et al. [11] reported that 72% of physicians and 89% of nurses consume food supplements on a regular, time-to-time, or seasonal basis. A study conducted among American cardiologists, dermatologists, and orthopaedics prior to the COVID-19 pandemic showed that they started to take food supplements, but also tend to increasingly recommend them to their patients [12].

The COVID-19 pandemic has prompted research on how to overcome this emergency and strengthen immunity. Some of the research has suggested that food supplementation in terms of A, B, C, and D vitamin and minerals such as selenium, zinc, and iron, together with omega-3 and melatonin, could play a role in COVID-19 treatment, and even more importantly, in the prevention of upper respiratory tract infections [6, 13, 14]. The most recent study involving

sustava [6, 13, 14]. Najnovija studija provedena na gotovo 450 000 ispitanika ukazuje na značajnu povezanost upotrebe suplemenata multivitamina, vitamina D, probiotika, omega-3 masnih kiselina i nižeg rizika za razvoj bolesti COVID-19 kod žena, ali ne i kod muškaraca [15].

Istraživanje provedeno među zdravstvenim djelatnicima nutricionistima u Turskoj pokazuje da se, kao i u našem istraživanju, povećao broj ispitanika (14 %) koji su počeli uzimati suplemente za vrijeme pandemije COVID-19 [10].

Pérez-Rodrigo i sur. [16] ukazuju na značajan unos suplemenata vitamina i minerala za vrijeme pandemije COVID-19 i *„lockdown-a"* u Španjolskoj i to naročito kod žena i osoba u dobi od 35 do 54. godine. Kao i u našoj studiji, najčešće se upotrebljavaju multivitamini, vitamin D, vitamin C i vitamin B12, a od minerala cink, željezo i selen. Od ostalih dodataka prehrani navodi se i konzumacija pivskog kvasca, vlakana, omega-3 višestruko nezasićenih masnih kiselina i kolagena. U isto vrijeme istraživanje provedeno u Kini za vrijeme pandemije COVID-19 potvrđuje da više od trećine (37,7 %) ispitanika konzumira suplemente vitamina C, probiotike te druge dodatke prehrani [17].

Stupanj edukacije i socioekonomski čimbenici utječu na prehrambene navike pri čemu niže obrazovane i slabije plaćene osobe imaju lošije navike u prehrani koje se manifestiraju u smanjenoj konzumaciji voća i povrća, a povećanoj konzumaciji proizvoda bogatim šećerima, mastima i soli. [18, 19]. Jedno od rijetkih istraživanja provedeno u Republici Hrvatskoj među medicinskim sestrama pokazalo je da njih samo 7 % preferira mediteransku prehranu koja predstavlja model zdrave prehrane [20], a drugo istraživanje ukazalo je na smanjeni unos lisnatog povrća u prehrani [21].

U našem istraživanju ispitanici su zdravstveni djelatnici različitih stupnjeva obrazovanja sa srednjom, višom te visokom stručnom spremom s odgovarajućim prihodima. Sukladno njihovoj edukaciji te kontinuiranom praćenju znanstvene i stručne literature, ali i s obzirom na prije iskazane loše prehrambene navike medicinskih sestara / tehničara [20, 21], pojavom pandemije CVOID-19 dio zdravstvenih djelatnika počeo je ili povećao unos određenih suplemenata.

Zaključak

Pandemija COVID-19 utjecala je na trećinu ispitanika da započnu ili povećaju unos određenih dodataka prehrani. Na temelju najnovijih znanstvenih spoznaja i preporuka o prehrani za vrijeme COVID-19 trebalo bi više pažnje usmjeriti na principe pravilne prehrane te dnevne potrebe za vitaminima, mineralima, proteinima i antioksidansima zadovoljiti konzumacijom namirnica iz različitih kategorija hrane, a u slučajevima povećanog rizika od bolesti COVID-19 ili deficita pojedinih nutrijenata, upotrebljavati i određene suplemente.

Nema sukoba interesa

nearly 450,000 participants has demonstrated a significant relationship between the consumption of food supplements (multivitamins, D vitamin, probiotics, omega-3 fatty acids) and COVID-19 risk reduction, but only in women, not in men [15].

Same as our study, the study carried out among healthcare professionals-nutritionists in Turkey has revealed the increase in the number of participants who started taking food supplements during the pandemic (14 %) [10].

Pérez-Rodrigo et al. [16] highlight the significant supplement (vitamin and mineral) intake during the COVID-19 pandemic and Spanish lockdown, in particular in women and persons aged 35-54. Same as our study, the most frequently consumed food supplements were multivitamins and D, C, and B12 vitamin D, vitamin C, and vitamin B12, while the most often taken minerals are zinc, iron, and selenium. As for other food supplements, the consumption of brewer's yeast, omega-3 polyunsaturated fatty acids and collagen has been mentioned, too. At the same time, a Chinese study conducted during the pandemic, suggests that over one third of respondents (37.7%) consume supplements such as vitamin C, probiotics and so forth [17].

Dietary habits are influenced by the level of education and socioeconomic factors. Less educated and underpaid persons have poorer dietary habits, noticeable in decreased fruit and vegetable consumption and increased intake of foodstuffs rich in sugar, fats, and salt [18, 19]. One of the rare studies carried out in Croatia in a group of nurses showed that only 7% of them prefer the Mediterranean diet as a role model of a healthy diet [20], while another research showed a decreased dietary intake of leafed vegetables [21].

The examinees comprised by our study are healthcare professionals varying in their level of education (vocational school graduates, college graduates, higher school graduates) and income. Because of their education and continuous following scientific and professional literature sources, but also given their priory reported poor dietary habits [20, 21], it can be seen that many healthcare professionals have started or increased their food supplementation intake under the influence of the COVID-19 pandemic.

Conclusion

The COVID-19 pandemic has prompted one third of our subjects to start taking and take more food supplements. Based on the latest scientific knowledge and dietary recommendations in times of pandemic, more attention should be focused on healthy diet principles and daily vitamin, mineral, protein, and antioxidant agents' demand, which should be fulfilled by various food consumption. In case of an increased COVID-19 risk or nutrient deficiencies, certain food supplementation would be in order.

The authors declare no conflicts of interest.

Literatura / References

[1] Ministarstvo zdravlja. Pravilnik o dodacima prehrani. Narodne Novine 126/13. Dostupno: na: https://narodne-novine.nn.hr/clanci/sluzbeni/2013_10_126_2740.html. Pristupljeno: 25. 4. 2021.

[2] Barnes K, Ball L, Desbrow B, Alsharairi N, Ahmed, F. Consumption and reasons for use of dietary supplements in an Australian university population. Nutrition. 2016; 32: 524–30.

[3] Dickinson A, Blatman J, El-Dash N, Franco JC. Consumer usage and reasons for using dietary supplements: Report of a series of surveys. J Am Coll Nutr. 2014; 33: 176–82.

[4] Grand View Research (GVR): Dietary Supplements Market Size, Share & Trends Analysis Report by Ingredient (Vitamins, Minerals), By Form, By Application, By End User, By Distribution Channel, and Segment Forecasts, 2021 – 2028. GVR, 2020. Dostupno na: https://www.grandviewresearch.com/industry-analysis/dietary-supplements-market . Pristupljeno: 6. 4.2021.

[5] Adams KK, Baker WL, Sobieraj DM. Myth Busters: dietary supplements and COVID-19. Ann Pharmacother. 2020; 54: 820–6.

[6] Coelho-Ravagnani CdF, Flavia Campos Corgosinho FC, Sanches FLFZ, Prado CMM, Laviano A, Mota JF. Dietary recommendations during the COVID-19 pandemic. Nutr Rev. 2021; 9 (4): 382–93.

[7] World Health Organization Regional Office for the Eastern Mediterranean website. Nutrition advice for adults during the COVID-19 outbreak. Dostupno na: http://www.emro.who.int/nutrition/nutrition-infocus/nutrition-advice-for-adults-during-thecovid- 19-outbreak.html. Pristupljeno: 25. 4. 2021.

[8] The European Food Information Council (EUFIC). Food and coronavirus (COVID-19): what you need to know. Dostupno na: https://www.eufic.org/en/food-safety/article/food-and-coronavirus-covid-19-what-you-need-to-know. Updated 3 November 2020. Pristupljeno: 25. 4. 2021.

[9] Lieberman HR, Stavinoha TB, McGraw SM, White A, Hadden LS and Marriott BP. Use of dietary supplements among active-duty US Army soldiers. Am J Clin Nutr 2010; 92: 985–95.

[10] Kamarli Altun H, Karacil Ermumcu MS, Seremet Kurklu N. Evaluation of dietary supplement, functional food and herbal medicine use by dietitians during the COVID-19 pandemic. Public Health Nutr. 2021; 24 (5): 861–9.

[11] Dickinson A, Boyon N, Shao A. Physicians and nurses use and recommend dietary supplements: report of a survey. Nutr J. 2009; 8: 29. DOI: 10.1186/1475-2891-8–29. Pristupljeno: 28. 4. 2021.

[12] Dickinson A, Shao A, Boyon N, Franco JC. Use of dietary supplements by cardiologists, dermatologists and orthopedists: report of a survey. Nutr J. 2011; 10:20. DOI: 10.1186/1475-2891-10-20. Pristupljeno: 28. 4. 2021.

[13] Calder PC, Carr AC, Gombart AF, Eggersdorfer M. Optimal nutritional status for a well-functioning immune system is an important factor to protect against viral infections. Nutrients. 2020; 12 (4): 1181. DOI: 10.3390/nu12041181. Pristupljeno: 28. 4. 2021.

[14] Alexander J, Tinkov A, Strand TA, Alehagen U, Skalny A, Aaseth J. Early nutritional interventions with zinc, selenium and vitamin d for raising anti-viral resistance against progressive COVID-19. Nutrients. 2020; 12 (8): 2358. DOI: 10.3390/nu12082358. Pristupljeno: 29. 4. 2021.

[15] Louca P, Murray B, Klaser K, et al. Modest effects of dietary supplements during the COVID-19 pandemic: insights from 445 850 users of the COVID-19 Symptom Study app). BMJ Nutrition, Prevention & Health 2021; 0. DOI.10.1136/BMJ. Pristupljeno: 20. 4. 2021.

[16] Pérez-Rodrigo C, Gianzo Citores M, Hervás Bárbara G, et al. Patterns of Change in Dietary Habits and Physical Activity during Lockdown in Spain Due to the COVID-19 Pandemic. Nutrients. 2021; 21; 13 (2): 300. DOI: 10.3390/nu13020300. Pristupljeno: 29. 4. 2021.

[17] Zhao A, Li A, Ke Y, et al. Dietary diversity among Chinese residents during the COVID-19 outbreak and its associated factors. Nutrients. 2020; 12 (6): 1699. DOI: 10.3390/nu12061699. Pristupljeno: 29. 4. 2021.

[18] Darmon N, Drewnowski A. Contribution of food prices and diet cost to socioeconomic disparities in diet quality and health: A systematic review and analysis. Nutr Rev. 2015; 73, 643–60.

[19] Cano-Ibáñez N, Gea A, Ruiz-Canela M, et al. Diet quality and nutrient density in subjects with metabolic syndrome: Influence of socioeconomic status and lifestyle factors. A cross-sectional assessment in the PREDIMED-Plus study. Clin. Nutr. 2020; 39: 1161–73. doi: 10.1016/j.clnu.2019.04.032. Pristupljeno: 29. 4. 2021.

[20] Jelavić Šako A, Kenđel Jovanović G, Đurica V, Pavičić Žeželj S, Krešić G. Kvaliteta prehrane bolničkih medicinskih sestara. 11. međunarodni znanstveno-stručni skup Hranom do zdravlja/zbornik radova. Jerković, Igor ; Šubarić, Drago ; Jašić, Midhat (ur.). Kemijsko-tehnološki fakultet Sveučilišta u Split, Prehrambeno-biotehnološki fakultet u Osijeku, Tehnološki fakultet Univerziteta u Tuzli. Split, 2018: 14.

[21] Jerković Gavran K, Krijan M, Martić B, Domić, S. (2018). Učestalost konzumacije povrća kod medicinskih sestara/tehničara. Hrana u zdravlju i bolesti. 2018; Specijalno izdanje (10. Štamparovi dani) 11: 7.