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# The Cigarette Smoking, Coffee and Supplements Intake at Students of Sarajevo University

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## ABSTRACT

**Introduction:** The dietary supplements are defined as vitamins and minerals or herbal products and are typically given in the form of a capsule or tablet. The nonsmokers are more attempted to use dietary supplements than individuals who smoke. **Aim:** In our investigation, we examined associations between vitamin B, folic acid, multivitamin or mineral intake among the student population and their correlation with smoking prevalence and drinking coffee. **Materials and methods:** We used a questionnaire to examine the general characteristics of the subjects, age, sex, their lifestyle, cigarette smoking, coffee intake and their use of dietary supplements. Data were collected from participants of the University of Sarajevo and a longitudinal study of 960 men and women aged 18-24 years from 2017 to 2018 was conducted. **Results:** The results showed that 32% of students took vitamin B supplements and 10% folic acid. In opposite, more than half of students took multivitamins (59.5%) and minerals (60.4%) less than one year. About a quarter or less took multivitamins (23.9%) and minerals (24.3%) for years. Less than 20% of students took multivitamins and minerals within a period of one year. In student population smoking prevalence was estimated at 21.2% and coffee intake in 71.2%. The smoking and use of vitamin B supplements were independent of each other,  $p = 0.201$ . The use of folic acid did not depend on smoking  $p = 0.501$ . There were no observed correlations between multivitamin and mineral supplement consumption compared to smoking status or drinking coffee. **Conclusion:** Deficient dietary intake of folic acid and B vitamins from food and supplemental sources appear to be one of the atherosclerosis incidences. Further studies should examine associations between dietary supplements intake and lifestyle of students, as well as smoking status and coffee intake.

**Keywords:** Folic acid, B-vitamins, cigarettes, coffee, and students.

## 1. INTRODUCTION

The dietary supplements are defined as vitamins, minerals or herbal products and are typically given in the form of a capsule or tablet (1). The nonsmokers are more tempted to use dietary supplements than smokers (2, 3). Smoking is associated with decreased circulating folic acid level (5, 6). Daily average intake of folic acid is 400 µg/day, 3.4 mcg of vitamin B12 and about 1.5 mg/day of vitamin B6 in women and 2 mg/day in men (7, 8). The smoke of cigarettes itself is an abundant source of free radicals that promote oxidative stress, by the direct delivery of radicals and their endogenous generation as well as via the activation of inflammatory cells (9). It has been estimated that in one puff of a cigarette, the gas phase of the smoke exposes the smoker to greater production of free radicals (10). This oxidative stress acts as a significant risk factor for chronic disease devel-

opment, such as atherosclerosis and carcinogenesis (11). Serum folic acid concentrations of smokers were lower than those of nonsmokers, but not different with statistical significance. Serum vitamin B12 levels were significantly higher in smokers than the non-smokers (12). Multiple studies demonstrated that low serum folic acid and vitamin B12 concentrations might be the cause of homocysteine (Hcy) elevation, which is proven to cause stroke, vascular dementia and CVD (13-20). However, the available data show that coffee consumption caused no or moderate increase in plasma total Hcy concentrations, insignificant effects—on plasma folic acid, vitamin B6, and cyanocobalamin was found (21-23). Thus, the mechanism behind the total Hcy increase is uncertain, although caffeine, as well as chlorogenic acid, a polyphenol found in large quantities in coffee, was shown to increase to-

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tal Hcy (22, 24). Besides CVD, other conditions causing or accompanying hyperhomocysteinemia include deficiencies associated with poor dietary intake as well as, smoking, alcohol and coffee consumption, advanced age, menopause, renal failure, autoimmune diseases, diabetes mellitus, osteoporosis, neuropsychiatric disorders, cancer, thyroid diseases, birth defects, and various medications (25, 26).

## 2. AIM

The aim of our study was to investigate supplements intake and correlation between supplements and smoking status or coffee intake.

## 3. MATERIALS AND METHODS

In our study, we interviewed students of Faculty of Health Studies, Faculty of Electrical Engineering, School of Economics and Business and Faculty of Educational Sciences at the University of Sarajevo aged 19-22 years in period from 2017 to 2018. The participants were interviewed to collect information regarding age, socio-economic status, cigarette smoking, coffee, and dietary supplements intake. Subjects with currently diagnosed diseases such as diabetes, cancer, cardiovascular disease, and kidney disease, subjects taking medications affecting folic acid metabolism, and subjects that did not finish their survey were excluded; therefore, final number of subjects was 960 students.

In our questionnaire, we examined general characteristics of the subjects, their lifestyle, cigarette smoking habits, coffee intake and use of dietary supplements. Among the questionnaire, we got information about age, sex and parents influence on school achievements of our subjects. In the questionnaire, we asked questions like: "Do you take supplements of vitamin B or folic acid?", "Do you use multivitamin supplements and how long (more than one year; one year or less than one year)?" "Do you use mineral supplements and how long (more than one year; one year or less than one year)?"

### Statistical analysis

In our investigation, after completing the survey, we entered the data in to statistical package for social sciences software, version 13.0 (SPSS Inc, Chicago USA sciences). Descriptive statistics were used to represent data in absolute numbers (N) and relative frequencies (%). The frequency of each variable relative to the sex, faculty attendance, year of study, the status of studies, cigarette smoking, coffee, and dietary supplements intake, was observed. For comparing differences between study groups we used the Pearson  $\chi^2$  test and Spearman's coefficient of correlation. The p value,  $\alpha < 0.05$ , was seen as significant. The comparison between characteristics was presented in tables as absolute and relative numbers with the p-value of the statistical test.

## 4. RESULTS

This study included 960 students from the University of Sarajevo with an average age of  $20.4 \pm 2.1$  years. Majority of the study participants were female accounting 656 (68.3%) while 304 (31.7%) were male. Participants

undergoing the study were students attending Faculty of Health Studies (38.1%), Faculty of Electrical Engineering (24.7%), School of Economics and Business (30.4%) and Faculty of Educational Sciences (6.8%). Majority of the students were at their first year of studies, 593 of them (61.8%) and at last year of studies 367 of them (38.2%). Smoking prevalence was estimated at 202 (21.2 %) and coffee intake 673 (71.2 %) in the student population. The majority of students do not take vitamin B supplements 642 (68 %) and folic acid 843 (90 %). In opposite, more than half of students take multivitamins 462 (59.5 %) and minerals 458 (60.4 %) in period less than one year. About a quarter or less took multivitamins (23.9%) and minerals (24.3%) for years. Less than 20 % of students take multivitamins 129 (16.6 %) and minerals 116 (15.3 %) for one year (Table 1).

Our study included 202 smokers and 751 non-smokers. The chi square test of independence showed that smok-

Question	Answer	N	%
Do you take a vitamin B supplements?	Yes	302	32.0
	No	642	68.0
Do you take a folic acid supplements?	Yes	94	10.0
	No	843	90.0
You use a multivitamin	More than one year	186	23.9
	One year	129	16.6
	Less than one year	462	59.5
You use a minerals	More than one year	184	24.3
	One year	116	15.3
	Less than one year	458	60.4

Table 1. Frequency of consuming supplements of vitamins and minerals in nutrition

ing and use of vitamin B supplements are independent of each other  $p = 0.201$ . Approximately two-thirds of the students that do not take supplements were smokers ( $n = 202$ ) and non-smokers ( $n = 751$ ). In the smokers group, there was 64.5% students taking supplements, and in the non-smoker group 69.2. The presented difference in the percentage share is of no statistical significance. The use of folic acid did not depend on smoking  $p = 0.501$ ; in both groups of participants about nine out of 10 do not use these supplements. The duration of multivitamins intake did not depend on smoking status  $p = 0.556$ , as well as the duration of mineral intake  $p = 0.104$  (Table 2.).

The drinking coffee in the student population was at 71.2% or 673 students. The coffee and folic acid consumption were mutually dependent  $p = 0.042$  (Table 3.). The students who drank coffee ( $n = 673$ ), 58 (8.8%) of them, had lower folic acid intake than the students who did not drink coffee ( $n = 272$ ). Only 35 of them (13.3%) take this supplement. Furthermore, B vitamins intake also does not depend on drinking coffee,  $p = 0.356$ ; in both groups of participants, approximately one-third of students take this vitamin. Duration of multivitamins or minerals intake did not depend on coffee intake  $p > 0.05$ , in both cases, about 60% of subjects, whether they drank coffee, or not, took these supplements for less than a year.

		Smoking		test $\chi^2$
		Yes	No	p
Taking vitamin B supplements	Yes	N 71 % 35.5%	227 30.8%	0.201
	No	N 129 % 64.5%	511 69.2%	
Taking folic acid supplements	Yes	N 17 % 8.6%	75 10.2%	0.511
	No	N 180 % 91.4%	660 89.8%	
Taking multi-tamin	More than one year	N 45 % 26.9%	139 22.9%	0.556
	One year	N 26 % 15.6%	102 16.8%	
	Less than one year	N 96 % 57.5%	365 60.2%	
Taking minerals	More than one year	N 47 % 28.7%	134 22.8%	0.104
	One year	N 18 % 11.0%	98 16.6%	
	Less than one year	N 99 % 60.4%	357 60.6%	

Table 2. The relationship between smoking habit (yes/ no) and consumption of supplements in nutrition of students.

		coffee		test $\chi^2$
		Yes	No	p
Taking vitamin B supplements	Yes	N 204 % 30.7%	90 33.8%	0.356
	No	N 460 % 69.3%	176 66.2%	
Taking folic acid supplements	Yes	N 58 % 8.8%	35 13.3%	0.042
	No	N 601 % 91.2%	229 86.7%	
Taking multi-tamin	More than one year	N 126 % 23.1%	56 25.2%	0.723
	One year	N 94 % 17.2%	34 15.3%	
	Less than one year	N 325 % 59.6%	132 59.5%	
Taking minerals	More than one year	N 128 % 24.2%	52 23.9%	0.310
	One year	N 74 % 14.0%	40 18.3%	
	Less than one year	N 327 % 61.8%	126 57.8%	

Table 3. The relationship between coffee intake (yes/no) and consumption of supplements in nutrition of students.

### 5. DISCUSSION

The results of our study showed that 68.3% of partici-

pants were female and 31.7% male. Smoking frequencies were at 22.2% and coffee consumption at 71.2 % in the student population. The students did not take adequate vitamin B supplements 642 (68 %) and folic acid 843 (90 %). In opposite, more than half of students took multi-vitamins 462 (59.5 %) and minerals 458 (60.4 %) for less than one year. About a quarter or less took multivitamins 186 (23.9 %) and minerals 174 (24.3 %) for many years. Less than 20 % of students took multivitamins 129 (16.6 %) and minerals 116 (15.3 %) for one year, the results shown in Table 1. Dietary supplement users are more likely to be those who are more health conscious and therefore adopt healthy behaviors, such as not smoking and consuming less alcohol, which may motivate them to take dietary supplements. In an investigation of Rock CL, no differences between smokers and non-smokers were found, regarding folic acid and vitamin A, B2, B6 and B12 intake (27). Furthermore elevated B12 levels among smokers might be attributed to higher meat consumption, (since smokers are more likely to choose meat instead of fruit and vegetables) (27, 28). In student population 202 were smokers and 751 non-smokers. The chi square test of independence showed that smoking and use of vitamin B supplements are independent of each other  $p = 0.201$  (Table 2). In the Polish study population, a high proportion of subjects did not take B6 and B12 according to recommendations (29).

In our study use of folic acid did not depend on smoking  $p = 0.501$ ; in both groups of participants about nine out of 10 did not use these supplements of folic acid; results shown in Table 2. The similar results was obtained by one Polish study where insufficient folic acid intake was common (deficiency was noted in nearly 80-90% of the population) (29) in contrast to USA study based on folic acid where intake from food alone or dietary supplement folic acid intake was 30-66% depending on age group (30). A biological plausibility for a selective deficit of folic acid exists among smokers because cigarette smoking increases folic acid requirements by interfering with folic acid utilization and/or metabolism, also leading to a lower circulating folic acid concentration in smokers (31, 32). Therefore, within a constant amount of folic acid intake, the prevalence of biological folic acid deficiency will be higher for smokers (32). Smoking is associated with decreased circulating folic acid levels (33, 34) and an antagonist of folic acid by constituents of cigarette smoke has been hypothesized (32, 35).

In our study the period of multivitamins intake did not depend on smoking status  $p = 0.556$ , as well as the period of mineral intake  $p = 0.104$  (Table 2). In our questionnaire, more than half of the students were consuming coffee. The coffee intake and the use of folic acid supplements are mutually dependent  $p = 0.042$  (Table 3). The students who drank coffee ( $n = 673$ ), 58 of them (8.8%) had lower folic acid intake than the students who did not drink coffee ( $n = 272$ ), of which only 35 (13.3%) took this supplement (Table 3). In several studies, coffee consumption was associated with low nutrient vitamins intake (36-38) and effect profiles of coffee on vitamins, could be explained through renal mechanisms, where coffee con-

sumption increases vitamin excretion. In recent studies increased excretion and lower blood concentrations of micronutrients (including folic acid, PLP, and riboflavin) and higher total homocysteine in patients that were given diuretics (39-42) support this hypothesis.

In our study the B vitamins intake did not depend on drinking coffee, with  $p = 0.356$ ; in both groups of participants, approximately one-third of students took this vitamin (Table 3). In other studies, low serum vitamin B12 was significantly associated with female sex, high coffee intake, low folic acid, and the TT genotype of the MTHFR-C677T polymorphism (43). Participating students, whether they drank coffee or not, took these supplements for less than a year (Table 3). The low folic acid, vitamin B12, and multivitamins intake were less common and only found to be associated with few of the lifestyle factors (43).

## 6. CONCLUSION

Our study participants did not take folic acid and vitamin B in regards to the daily recommendation. In contrast, more than half of students took multivitamins and minerals for less than one year. In both groups, smokers and not smokers, nine out of ten students did not take folic acid. The folic acid, multivitamins or mineral intake did not depend on smoking status. Drinking coffee and folic acid intake are mutually dependent, but B vitamins intake did not depend on drinking coffee. Future research should focus on understanding supplements intake, including long term intake, ensuring that there is an appropriate use of supplements among the student population.

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- **Conflict of Interest:** There are no conflict of interest.

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