

# NUTRITIONAL HABITS AMONG DENTISTRY STUDENTS AND THEIR IMPACT ON PERIODONTAL HEALTH

## НАВИКИТЕ ВО ИСХРАНАТА КАЈ СТУДЕНТСКАТА ПОПУЛАЦИЈА И НИВНОТО ВЛИЈАНИЕ КАЈ ПАРОДОНТАЛНОТО ЗДРАВЈЕ

Pandilova M.<sup>1</sup>, Ugrinska A.<sup>2</sup>, Petrovic D.<sup>1</sup>, Stojanovski M., Ivanovski K.<sup>1</sup>, Georgieva S.<sup>1</sup>, Pesevska S.<sup>1</sup>, Mindova S.<sup>1</sup>, Dirjanska K.<sup>1</sup>, Stefanovska E.<sup>1</sup>, Mitik K.<sup>1</sup>, Ristoska S.<sup>1</sup>

<sup>1</sup>Department of Oral Pathology and Periodontology, University "Ss. Cyril and Methodius" - Faculty of Dentistry – Skopje, <sup>2</sup>Department of Pathophysiology and Nuclear Medicine, University "Ss. Cyril and Methodius" - Faculty of Medicine – Skopje

### Abstract

The impact of adequate nutrition on teeth development, alveolar bone and periodontal ligament, has been proved more than once, yet it still remains unclear if particular components of nutrition have certain influence on the occurrence or severity of periodontal diseases. Periodontal health relies on a balance between the host, environmental and bacterial factors. Although there is considerable evidence linking diminished antioxidant status to increased oxidative damage and disease severity, there have been, up to now, a few dietary studies. Therefore the **aim** of our study was to analyse dietary habits among student population and their relation to periodontal and gingival index values. In order to gain a homogenous group concerning age, life style, and oral hygiene habits the group consisted of 200 dentistry students in the last two years. For the examination we developed a questionnaire of 24 questions concerning the quality and type of dietary products. At the same time all participants were subjected to periodontal examination where periodontal index values and oral hygiene were noted. The data were statistically evaluated by a correlation test and a student t-test. From the results of our research we can conclude that patients should be advised, along with oral hygiene procedure, to consume vegetables and fruits in order to maintain periodontal health or to reduce disease severity. **Key words:** nutrition, gingival bleeding, periodontal health.

### Апстракт

Влијанието на адекватната исхрана врз развојот на забите, алвеоларната коска и пародонталниот лигамент е докажано многу пати, но сепак останува нејасно дали одредени компоненти од исхраната имаат извесно влијание врз појавата или степенот на развој на пародонталната болест. Пародонталното здравје се базира на рамнотежа помеѓу фактори кои зависат од индивидуата, околината и бактериите. Иако постојат значителни докази кои го поврзуваат намалениот статус на антиоксиданси со зголеменото оксидативно оштетување и сериозноста на болеста, направени се и неколку дополнителни студии. **Целта** на нашето истражување беше да се анализираат навиките во исхраната кај студентската популација и нивната поврзаност со вредностите на пародонталните индекси. Со цел да се добие хомогена група на испитаници, во однос на возраста, начинот на живот и орално-хигиенските навики, групата се состоеше од 200 студенти по стоматологија, од последните две години. За испитувањето подготвивме прашалник од 24 прашања во врска со квалитетот и видот на исхраната. Во исто време сите учесници беа подложени на пародонтолошки преглед, каде што беа забележани вредностите на пародонталниот индекс и квалитетот на одржување на оралната хигиена. Податоците беа статистички евалуирани со корелациона анализа и Студентов t-тест. Од резултатите добиени при истражувањето, можеме да заклучиме дека пациентите треба да се советуваат, заедно со процедурата за орална хигиена, да конзумираат зеленчук и овошје, со цел да се одржи здравјето на пародонтот или да се намали сериозноста на болеста. **Клучни зборови:** исхрана, гингивално крварење, пародонтолошко здравје.

### Introduction

Dietary quality and nutrition are important in the promotion and maintenance of health throughout the entire life span. They occupy a prominent position in disease prevention and health promotion. When combined with other modifiable risk factors, such as tobacco or physi-

cal activity, diet and nutrition may have an additive or multiplier effect on an array of chronic diseases, including cardiovascular disease, diabetes, obesity, cancer, osteoporosis, and dental diseases.

Periodontal disease includes gingival inflammation and further development of loss of soft-tissue attachment to the tooth and resorption of the alveolar bone, ulti-

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mately leading to tooth loss. The disease is found primarily among adults with increased numbers in older age but can also be found in younger individuals<sup>1,2,3</sup>. Although convincing scientific evidence support the fact that the pathogenesis of periodontitis involves anaerobic oral bacteria and that tissue damage occurs as a result of the complex interaction between pathogenic bacteria and the host's response to infection, several local and systemic factors are known to be associated with the risk or the severity of the periodontal disease<sup>4,5,6</sup>.

Nutrition is known to be important for maintaining periodontal health, and different dietary aspects have been put forward as possible aggravating factors. The two potential mechanisms in the relation of diet to gingival and periodontal health are diet in relation to plaque formation and the effect of different nutritional deficiencies on periodontal tissues. Research into the local effect of diet on plaque has focused largely on the effect of an abrasive diet in reducing plaque formation. Although animal studies have shown a relationship between diet and plaque formation<sup>7,8,9,10</sup>, the significance to humans is questionable because of differences in tooth morphology

The impact of adequate nutrition on teeth development, alveolar bone and periodontal ligament, has been proved many times, yet it still remains unclear if particular components of nutrition have certain influence on the occurrence or severity of periodontal disease.

Periodontal health relies on a balance between the host, environmental and bacterial factors.

The primary etiology of periodontal disease is bacterial, but a susceptible host is also necessary for disease initiation.

The effect of nutrition as one of the modifying factors of the host immune response has been unjustly underestimated.

Although there is considerable evidence linking diminished antioxidant status to increased oxidative damage and disease severity, there have been a few dietary studies.

Reactive oxidative species cause tissue damage by variety of different mechanisms which include:

- DNA damage,
- Lipid peroxidation,
- Protein damage including gingival Hyaluronic acid and proteoglycan,
- Oxidation like alfa 1 antitripsine<sup>(11,12)</sup>,
- Stimulation of proinflammatory cytokines release by monocytes by activation of nuclear factor Nf kB<sup>13</sup>.

Since the antioxidant content of fruits and vegetables may be a key factor in their beneficial effects, and lack of wider studies, on the other hand, investigating the

dietary intake of such food and periodontal health, we undertook this examination whose main objective is:

- To explore the possible influence of dietary intake of food rich with vitamins on periodontal health.

## Material and methods

At the Clinic of Oral Pathology and Periodontology we conducted an investigation with 200 participants. In order to gain a homogenous group concerning age, life style, and oral hygiene habits the group consisted of dentistry students in the last two years.

For the examination we developed a questionnaire of 24 questions concerning the quality and type of dietary products. For each question participants were offered three possibilities for the frequency of consuming the food that was pointed out – I rarely eat, I eat two of three times a week and a habit of consuming such food every day. According to the chosen answer participants were divided into three groups.

At the same time all participants were subjected to periodontal examination where periodontal index values and oral hygiene were noted.

Index values were compared between groups.

The data were statistically evaluated by a correlation test and a student t-test.

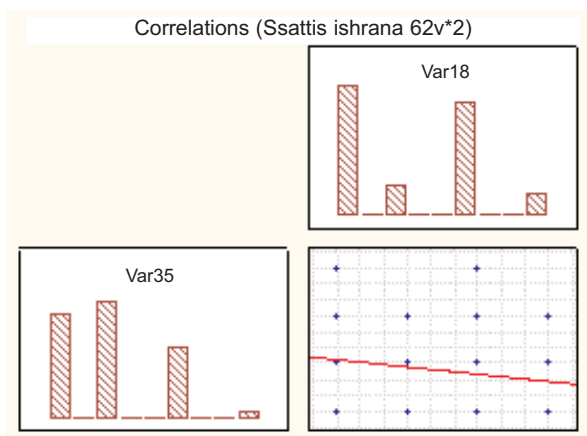
## Results

Participants were divided into three groups according to their answers to the questions.

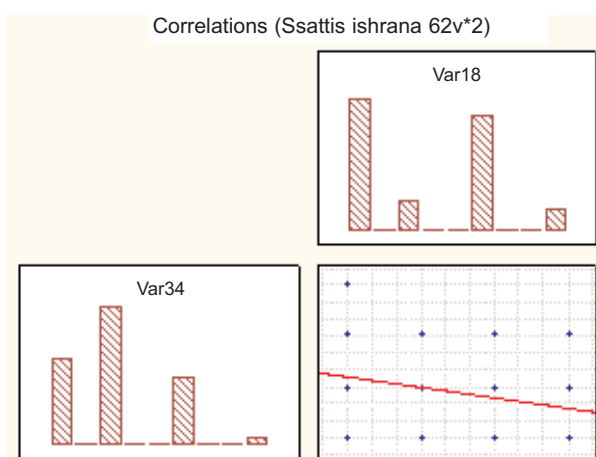
The average score for plaque index values was 0.73 according to criteria proposed by Green-Vermilion.

The highest correlation  $p < 0.0001$  using Spearman was determined between index values of gingival inflammation and gingival bleeding on probing (Sillnes&Loe) and question number 11 (vegetable intake) and question number 18 (citrus fruits intake). Values of the correlation coefficient are presented in Graphs 1, 2 and 3. The intake of vegetables is correlated both to gingival inflammation and gingival bleeding, with correlation coefficients of  $p = -0.27$  and  $p = -0.22$ , accordingly. Consumption of fruits is correlated to gingival inflammation with correlation coefficients of  $p = 0.17$ .

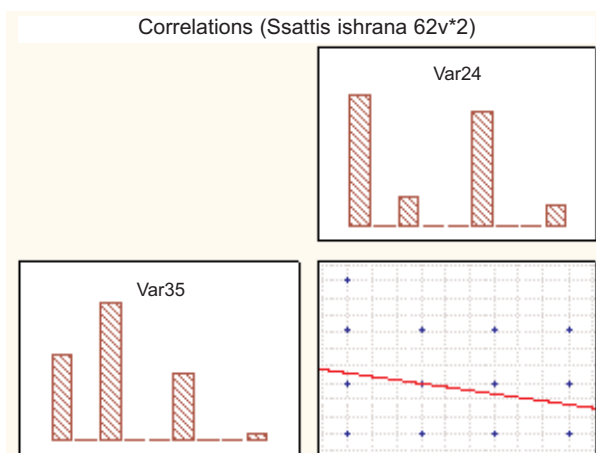
Student t-test was done for the same questions and index values of gingival bleeding and inflammation. Differences between all groups with different vegetable intake regarding gingival inflammation were found, with group A (low consumption of vegetables) differing from group B with a statistical significance of  $p = 0.015$  and from group C with a statistical significance of  $p = 0.023$ .



**Graph 1.** Spearman correlation matrix for Gingival inflammation and vegetable intake.

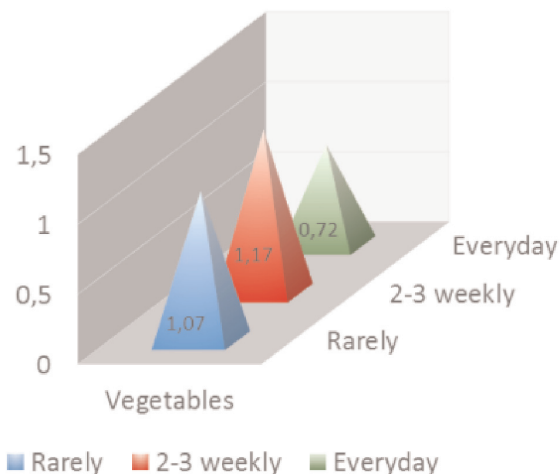


**Graph 2.** Spearman correlation matrix for Gingival bleeding on probing and vegetable intake.

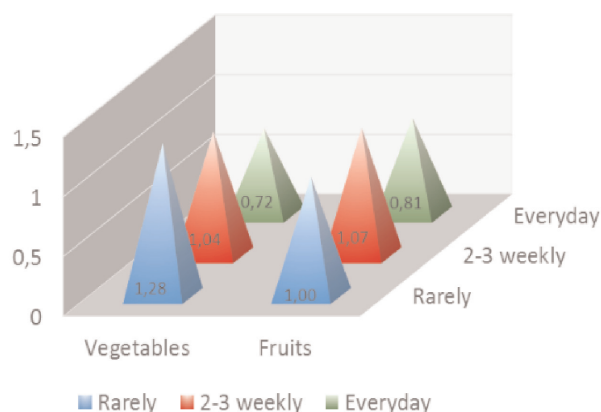


**Graph 3.** Spearman correlation matrix for Gingival inflammation and citrus fruit intake

Regarding gingival bleeding, group A showed lower values than groups C and B, with a statistical significance of  $p=0.001$ . (Graph 4, Graph 5)



**Graph 4.** Gingival bleeding values for the three groups regarding vegetable intake



**Graph 5.** Gingival inflammation values for the three groups regarding vegetable and citrus fruit intake

As expected no significant correlation was found for periodontal destruction and attachment loss for any of the investigated variables.

## Discussion

The soft tissue of the oral cavity is made up of epithelial cells that have rapid rates of replication, metabolism and maturation which require a steady supply of essential nutrients. These cells turn over every

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three to seven days, which makes the tissues of the oral cavity a sensitive indicator of adequate nutrition. Although the role of diet and nutritional factors in maintaining periodontal health is unclear, it is known that the defense mechanism of the gingival tissue and saliva can be affected by nutritional intake and status<sup>1,14,15</sup>.

The influence of dietary intake of antioxidants, mainly vitamins, on reducing the oxidative stress damage in tissues should be considered.

The group of compounds known as antioxidants is the major defense against stress. Primarily, antioxidants which prevent the formation of new radical species include enzymes systems such as peroxide dismutase and glutathione peroxidase.

Secondary, antioxidants trap radical species and prevent chain reaction, include nutrition such as vitamin A, C and carotenoids.

The richest sources of vitamins are vegetables and fruits. Through the digestive tract, they reach all body tissues and cells, where they are essential for various metabolic processes, for example vitamin B for DNA synthesis, vitamin C for collagen synthesis, protection from oxidative damage, vitamin A for DNA replication<sup>16,17</sup>.

The importance of dietary intake food rich with vitamins for the maintenance of periodontal health was confirmed by the results of our study.

The participants who declared daily intake of vegetables and citrus fruits once or more than once a day had significantly lower index values of gingival bleeding and inflammation than those who took these types of food rarely.

Lower index values in the third group, in our opinion, may be due to antioxidant capability of vitamins in these types of food:

- Antioxidant effect: nutrients with antioxidant reaction help maintain cell integrity by reducing the free radical damage to host tissue that is initiated by the host's inflammatory and immune reactions. They also serve to protect the host from bacterial damage;
- Immuno-modulatory effect: nutritional vitamin enhance host immunological response in gingival tissue;
- Both vegetables and fruits are considered to be solid and abrasive food which results in diminished plaque accumulation.

The role of dietary vitamin C as a contributing risk factor for periodontal disease has been investigated using data from the Third National Health and Nutrition Examination Survey (NHANES III), and the results have been compared between smokers and nonsmokers<sup>(18)</sup>. The periodontal health of 12.419 adults aged 20 or older

was compared to their dietary vitamin C intake. The dietary intake of vitamin C showed a statistically significant relationship to periodontal disease in current and former smokers as measured by clinical attachment. It was concluded that those with the lowest intake of vitamin C, and who also smoke, are likely to show the greatest clinical effect on the periodontal tissues. Thus, a weak but significant dose-response increase of risk for periodontal disease in lower vitamin C intake groups was found. The effect of mega-doses of vitamin C on non-deficient individuals has received little attention. A relationship between low levels of vitamin C and impaired wound healing has been demonstrated, and it has been suggested that gingival tissues undergoing healing could benefit from increased levels of vitamin C. In healthy young adult males classified according to periodontal status, one single intravenous dose of 500 mg of ascorbic acid resulted in statistically significant correlations between gingival status and ascorbic acid levels in whole blood and urine<sup>19</sup>. This is in contrast to a more recent study by Woolfe et al.<sup>19</sup>, who evaluated the relationship of vitamin C supplementation to gingival clinical parameters. An intake of 1 g vitamin C per day for 6 wk in normal human subjects did not have an effect on the gingival response to the initial therapy; identical gingival responses to periodontal therapy were found in control and vitamin C-supplemented patients. Final blood vitamin C levels appeared to have increased minimally, suggesting that excesses of the vitamin were excreted in the urine. On the basis of the best available evidence, there are no benefits to the periodontal patient of taking vitamin C supplements and the dietary reference intake may be easily met through consumption of a healthy, balanced diet<sup>20,21,22,23</sup>.

## Conclusion

From the results of our research we can conclude that patients should be advised, along with oral hygiene procedure, to consume vegetables and citrus fruits on daily basis in order to maintain periodontal health or to reduce disease severity.

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