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Analysing the effect of green tea and lycopene on salivary uric acid levels in gingivitis patients

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Abstract

The purpose of this study was to evaluate the contribution of green tea and lycopene on the estimation of salivary uric acid levels in gingivitis patients. Sixty healthy participants were used in this investigation, and were divided into two groups of thirty each. Participants in Group A received green tea and cap. Lykolike-G-12 (DM Pharma). Group B was control group. At baseline and 40 days following the procedure, clinical variables such as the modified sulcular bleeding index [SBI] and Quigley-Hein PI were measured. The ELISA kit was used to quantify uric acid (UA). While salivary UA was greater in group A than group B, there was a substantial reduction in both gingival bleeding index and plaque in the test group when compared to the control group. We discovered that oral lycopene supplements and green tea extract are useful in treating gingivitis in patients. Salivary UA levels are positively correlated with antioxidants.

Keywords: Chronic gingivitis, green tea, lycopene, plaque, sulcular bleeding

Full-length article **Corresponding Author*, e-mail:drmunazperio@gmail.com

1. Introduction

Periodontal disease is defined as an inflammatory event leading to an advanced worsening of the periodontal attachment state, which is a major cause of early tooth loss. Common periodontal illnesses include gingivitis and periodontitis. Gingival irritation is known as gingivitis. Periodontal disease has a complex aetiology [1]. Patients with chronic periodontitis have significantly higher levels of oxidative damage to proteins, lipids, and DNA as well as lower levels of antioxidant enzymes in their bodies. This led to the hypothesis that chronic periodontitis could have oxidative stress as one of its etiological causes [2]. It is clear that during the inflammatory response that results in oxidative stress, reactive oxygen species (ROS) overwhelm the body's natural antioxidant defence mechanism. Antioxidants can boost the body's defence system by considerably reducing the inflammatory process [3]. Among the several carotenoids, lycopene is one of the most powerful antioxidants. It has the ability to scavenge free oxygen radicals and is not Provitamin A [4]. It is thought to be 125 times more efficient than glutathione, 10 times more efficient than α-tocopherol, and 100 times more efficient than vitamin E. Green tea's scavenging qualities provide it additional antioxidant effect. Additionally, it indirectly upregulates phase II antioxidant enzymes [5].

Green tea's main ingredient, catechin, inhibits the growth of *Porphyromonas gingivalis, Prevotella intermedia, and Prevotellanigrescens* [6]. Saliva contains uric acid, a strong antioxidant with antioxidant qualities. Its level is related to periodontal health and may serve as a gauge of bodily fluids' capacity for antioxidants [7]. Therefore, the goal of the current study was to measure the amount of salivary uric acid and assess the effects of lycopene combined with green tea in gingivitis patients.

2. Materials and Methods

The Periodontology department conducted this research after taking inclusion and exclusion criteria into account. The institutional ethics committee provided ethical clearance prior to the study's commencement. After being informed, each patient gave their written consent. The study was carried out between February and November of 2018. Sixty healthy participants with generalized gingivitis, ranging in age from 20 to 55, were involved in this prospective study. In this randomized controlled study, all participants were randomly assigned to two groups, each consisting of 30 samples, using a lottery approach. Lykolike-G-12 (DM Pharma), a caplet containing 300 mg of green tea extract and 16 mg of lycopene, was administered to individuals in Group A once daily for 40 days.

Group B was control group. Before the trial began, all subjects underwent full mouth scaling and root planning (SRP). After an hour of SRP, a single examiner used the UNC periodontal probe (Hu-Friedy, Chicago, IL, USA) at six sites per tooth to determine clinical factors, such as the modified Quigley-Hein PI and the sulcular bleeding index (SBI), at baseline. At baseline and 40 days later, 5 millilitres of unstimulated saliva were collected, and all test materials were kept in an airtight box between 2 and 8 degrees Celsius. Using an ELISA kit from RayBiotech, uric acid (UA) was measured, and an ELISA reader was used to record the results.The t-test was used in SPSS software (Windows version 23.0) to perform a statistical analysis of the collected data. The paired and unpaired t-tests identified differences within and between groups, respectively. The significance level was set at less than 0.05.

3. Results

A significantly significant reduction in PI from baseline to the 40th day was found in the intra-group comparison (Table 1) (P<0.00). Table 2 (P<0.00) shows a significantly significant reduction in SBI from baseline to the 40th day based on an intra-group comparison. After the 40th day, an extremely substantial decrease in UA was found through intra-group comparison (Table 3) (P<0.00). The total antioxidant profile (TAC) increased as a result of antioxidants. Table 4 shows that group A's average score on the modified Quigley-Hein PI and SBI differed significantly from group B's. While salivary UA was greater in group A than group B, there was a substantial reduction in both gingival bleeding index and plaque in the test group when compared to the control group.

4. Discussion

Plaque biofilm causes periodontitis, an inflammatory process that ends in the loss of periodontal attachment and tooth loss [8]. Oxygen free radicals and other nonradical oxygen derivatives involved in the formation of oxygen radicals are both found in reactive oxygen species [9].The most frequent free radicals that cause periodontal damage are hydroxyl, superoxide, nitric oxide, and singlet oxygen. Low quantities of antioxidants prevent the substrate from oxidising [10]. Lycopene, a strong antioxidant, is present in human plasma. The purposes of current study was to measure salivary uric acid levels and evaluate the effects of lycopene and green tea on gingivitis patients.

In their in vitro investigation, Gadagi et al. discovered that patients who had green tea extract had much lower clinical attachment levels and pocket probing depths than those in the control group [11]. According to Tagashira et al.'s findings, green tea polyphenols prevent *P. gingivalis* from growing and bacteria from adhering to the buccal mucous membrane [12].When Behfarnia et al. evaluated how effective green tea chewing gum was at reducing gingival inflammation, they saw improvements in the SBI and approximate PI as well as a reduction in the amount of interleukin-1β [13].The reduced sample size in this study is one of its limitations. To validate the findings, more study with a bigger sample size is required.

Table 1: Assessment of modified plaque index

Variables	Mean	SD	Mean reduction	*t*	*P* value
Group AI					
Baseline	2.08	0.62	1.3±0.18	13.21	0.00
40th day	0.78	0.41			
Group B					
Baseline	2.24	0.52	0.67±0.07	10.49	0.00
40th day	1.53	0.59			

Table 2: Assessment of sulcular bleeding index (SBI)

Variables	Mean	SD	Mean reduction	*t*	*P* value
Group A					
Baseline	2.28	0.58	1.48±0.15	16.76	0.00
40th day	0.76	0.44			
Group B					
Baseline	2.47	0.61	1.01±0.05	10.57	0.00
40th day	1.49	0.56			

Table 3: Assessment of uric acid level

Variables	Mean	SD	Mean reduction	*t*	*P* value
Group A					
Baseline	2.92	1.33	5.17±3.35	4.47	0.001
40th day	8.12	4.78			
Group B					
Baseline	4.09	4.12	0.62±0.38	1.87	0.03
40th day	4.72	4.67			

Table 4: Intergroup comparison of mean changes in all parameters

Parameters	Group A	Group B	t	P
Plaque index	1.28	0.68	6.68	0.00
SBI	1.48	1.01	5.71	0.00
UA	5.16	0.62	3.62	0.02

Unpaired t -test.

5. Conclusions

The scientists discovered that supplementing with green tea extract and oral lycopene is beneficial for treating gingivitis in patients. Salivary UA levels are positively correlated with antioxidants.

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