



Exploring The Awareness And Therapeutic Benefits Of Green Tea And Green Coffee By Dietary Intake On Oral Health Among General Population Of Madhya Pradesh: A Questionnaire- Based Study

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ABSTRACT

Introduction – Green tea and green coffee renowned for its anti-oxidant, anti-inflammatory and anti-microbial properties. It has been suggested that green tea and green coffee promote periodontal health by reducing inflammation, preventing bone resorption and limiting growth of certain bacteria associated with periodontal disease.

Aim -To raise awareness of anti-inflammatory, anti-microbial effect of green tea and green coffee on oral health among general population of Madhya Pradesh.

Material and methods -A cross-sectional questionnaire-based survey was conducted. The questionnaire is self-prepared, validated, and made more reliable. Data collection is done by google forms and analyzed using SPSS Version 2.0 Chicago.

Results- Majority of participants belong to 25-34 years of age. 88%of participants stated yes when they were asked if green tea and green coffee can be used as an alternative to chemical oral hygiene product .80.5% of participants stated yes when asked about do they know green tea and green coffee exert anti-inflammatory and anti-microbial action on oral health.

Conclusion – The present study is only focused in raising awareness about the effect of green tea and green coffee on oral health in general population of Madhya Pradesh . It was found that 89% of the population stated that this study is conducted and promoted to raise awareness of green tea and green coffee and their role in oral health.

KEYWORDS – Anti-bacterial activity, green Tea, green Coffee, anti-microbial activity, periodontal disease, oral health.

INTRODUCTION –

Periodontal disease is a common oral disease, affecting approximately 10-15% of adults worldwide. Periodontal disease represents a multifactorial inflammatory disease due to certain pathogenic bacteria, results in periodontal tissue destruction, and the loss of alveolar bone. ^[1] It is well-established fact that *Porphyromonas gingivalis* is the keystone periodontal pathogen. Other microorganisms which have shown to play a role include *Tannerella forsythia*, *Fusobacterium nucleatum*, *Actinobacillus actinomycetemcomitans*. ^[2] When these pathogens inhabit the local periodontal tissues, an immune response is initiated by fibroblasts and macrophages by producing several cytokines (interleukins 1 and 6 and tumor necrosis factor - α), as mediators of the inflammatory response and immune reaction. Routine practice of anti-microbial adjunct to conventional periodontal therapy was well established owing to tissue penetrable nature of pathogenic bacteria.

Hence the development of natural form of therapies for the treatment of periodontal diseases is of great relevance, as the administration of systemic antimicrobials has been reported to cause the development of multi resistant microorganisms, inter bacterial transfer of resistance determinants and various side effects. ^[3]

Commercially consumed natural substances worldwide are green tea and green coffee. These natural products have a lot of health benefits which include antibacterial, antifungal, and antiviral properties. The antifungal activity of green tea is credited to its polyphenol content and catechins. And for green coffee, it is caused by the chemical compounds such as caffeine, phenol, alkanoids, flavonoids, and saponins. ^[2]

Several in vitro studies, have suggested that green tea catechins such as – epigallocatechins gallate (EGCG), inhibit periodontal pathogens and the destruction of periodontal tissue. The antioxidant, anti-microbial, anti-collagenase, antimutagenic and chemo preventive properties of these catechins are proved to be therapeutic and beneficial in the treatment of various chronic diseases. Green tea is usually available in the form of beverage, mouthwash containing extract of green tea and a chewing gum. ^[4]

Chlorogenic acid (CGA) and caffeic acid, which are non-volatile organic acids found in coffee, is a polyphenolic natural compound. Structurally, it is an ester of caffeic acid with the 3-hydroxyl group of a quinic acid. It has been reported to possess many health benefits including antibacterial, antifungal, antioxidant, chemo preventive and other biological activities. ^[3]

Previous in-vitro studies showed that green tea catechin inhibits the growth of *Porphyromonas gingivalis*, *Prevotella Intermedia* and the adherence of *P.gingivalis* on human buccal epithelial cells. Oxidative stress plays an important role in the pathogenesis of periodontal disease and many other disorders. It is believed that it can defend against inflammatory diseases due to its anti-oxidant property. The periodontal pathogens produce matrix metalloproteinases (MMP) and exhibit collagenase activity. The green tea catechins have been shown to inhibit the collagenase activity. ^[5]

Nakumara et al (2009) have demonstrated that green tea catechins had inhibitory effect on osteoclastic bone resorption and osteoclast formation either by suppression of LPS-induced alveolar bone resorption or by blocking interleukin -1 production. ^[6]

Another recent study showed that compared to scaling and root planing alone, the local drug delivery gel containing green tea catechin as an adjuvant was more effective in reducing clinical parameters of periodontitis. ^[7]

Moreover, periodontal disease is one of the risk factors for systemic diseases, including cardiovascular disease, diabetes. ^[8-9] Thus, reducing the incidence and prevalence of periodontal disease may serve to decrease the overall probability of systemic disease. ^[10]

Therefore, the aim of this study was to raise awareness of anti-inflammatory, anti-microbial effect of green tea and green coffee on oral health among general population of Madhya Pradesh.

MATERIALS & METHODS –

Study design:

A cross-sectional questionnaire-based survey was conducted. The questionnaire-based study was carried out online through google forms individually was ensured when the subjects filled up the survey. The questionnaire is self-prepared, validated, and made more reliable. A total of 14 questions were asked to detect if the subjects were aware of the therapeutic benefits of green tea and green coffee among the general population of Madhya Pradesh.

Selection criteria:

The population from various areas of Madhya Pradesh were included in this study, whereas those who were not willing to participate in this study and had incompletely filled forms were excluded.

Ethical Clearance:

Approval from the Institutional Ethical Committee (EC – 244213) was obtained before conducting this study.

Data Collection:

This study consisted of 14 multiple-choice questions regarding the awareness of therapeutic benefits of green tea and green coffee by dietary intake on oral health. The questions with different options were created using Google Forms. Google Forms was shared with the participants, and they were asked to fill out the form. The questions were mainly targeted on the benefits, effects of consuming green tea and green coffee for maintaining oral health.

Statistical analysis:

A total of 200 responses were gathered, and recorded in a Microsoft Excel.

RESULTS –

In light of the reactions and answers from the subjects, the subjects, the factual examination was performed and the outcomes were arranged methodically and analysis was performed and the results were tabulated systematically. In this study 200 subjects answered this questionnaire, the data were collected and systematically analyzed and represented as pie charts and bar diagram.



Figure 1- The above pie-chart shows responses about knowledge of beneficial effect of green tea and green coffee on oral health

Figure 2 – The above pie-chart shows responses of participants if they know any healthy benefits of green tea and green coffee

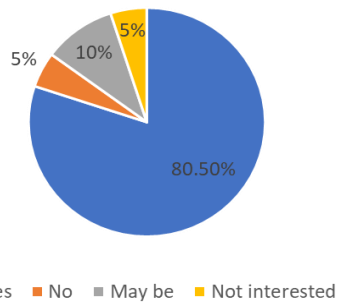


Figure 3- The above pie chart shows responses of Participants if they know green tea and green coffee also exerts its anti-inflammatory, and anti-microbial action on oral health.

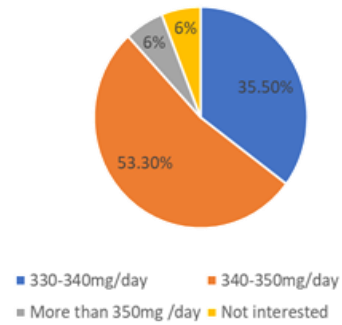


Figure 4 – The above pie-chart shows the responses of participants about safest amount of consuming green tea and green coffee

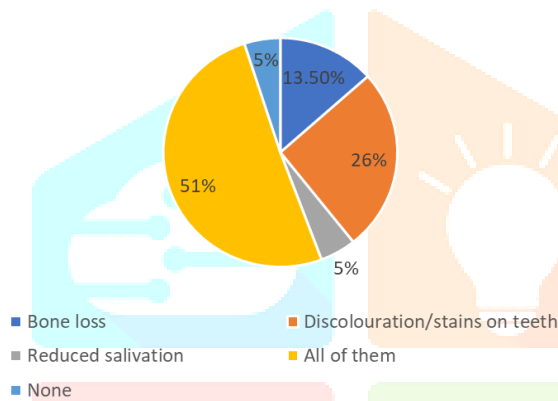


Figure 5 – The above pie chart shows responses of participants, if they know any side effects of green tea and green coffee

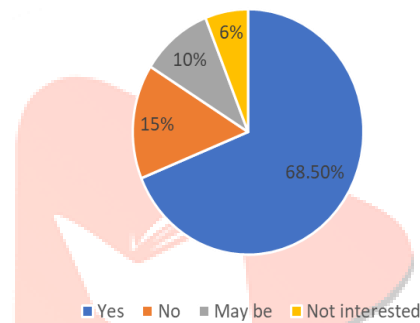


Figure 6 – The above pie chart shows the responses of the participants about patient who are on warfarin medication should not drink green tea and green coffee

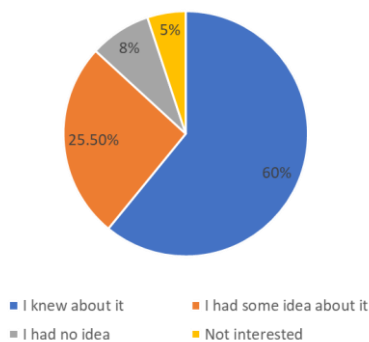


Figure 7 – The above pie-chart shows responses of participants, how much they were aware after taking this survey is for

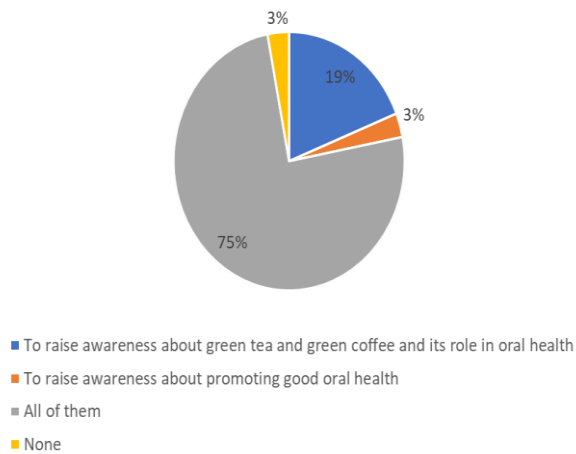


Figure 8 – The above pie-chart shows responses of participants about what they think this study is for

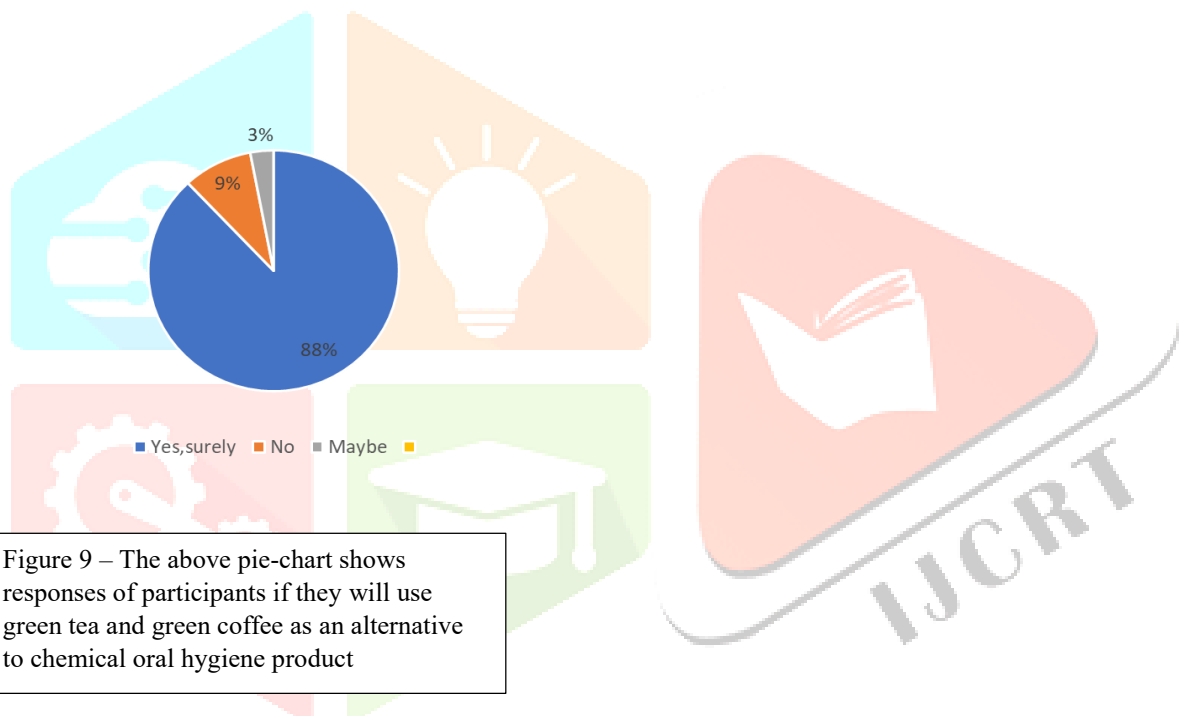


Figure 9 – The above pie-chart shows responses of participants if they will use green tea and green coffee as an alternative to chemical oral hygiene product

Table 1: Responses of study participants

Questions	Responses	Percentage	Total
Age	Under 18	8.5%	200
	18-24	14.5%	
	25-34	56%	
	35-44	12.5%	
	45-54	5%	
	55 and above	4%	
Do you know that there are various chemical free greener products in dentistry?	Yes	78%	200
	No	7%	
	Maybe	10.5%	
	Not interested	5%	
	Clove oil	20%	

Do you know any kind of following daily used herbal products that promote good oral health other than toothpaste and mouthwash?	Green tea & green coffee	60%	200
	Turmeric	6%	
	All of them	9.5%	
	None	5%	
Do you know any healthy benefits of green tea and green coffee?	Helps in weight loss	16%	200
	Promote good oral health	23.5%	
	Decrease blood pressure		
	All of them	52%	
	None	5.5 %	
Do you have any idea that green tea and green coffee had beneficial effect on oral health?	Yes	75%	200
	No	8%	
	Maybe	12%	
	Not interested	5%	
Do you know green tea and green coffee also exerts its anti-inflammatory and anti-microbial properties on oral health?	Yes	80.5%	200
	No	5%	
	Maybe	10%	
	Not interested	5%	
Do you know any beneficial effect of green tea and green coffee that consider it to be a natural curative agent of oral cavity?	Reduce plaque build-up	16.5%	200
	Prevent bleeding gums	9%	
	Helps in bad breath	16 %	
	All of them	58.5%	
Do you know why green tea and green coffee has received greater attention in recent times for oral health?	Potent anti-oxidant	62%	200
	Natural product and eco-friendly	25%	
	Cost- effective	10%	
	No side effects	2%	
	None	1%	
What is the safest amount of consuming green tea and green coffee	330-340mg/day	35.5%	200
	340-350mg/day	53.3%	
	More than 350mg/day	6%	
	None	6%	

according to you?			
Do you know any side effects of excessive consumption of green tea and green coffee on oral health?	Bone loss	13.5%	200
	Discoloration/stains on teeth	26%	
	Reduced salivation	5%	
	All of them	51%	
	None	5%	
Do you know patient who are taking warfarin and heparin should not drink green tea and green coffee?	Yes	15%	200
	No	75%	
	Maybe	8%	
	Not interested	2%	
After taking this survey, how much do you think you are aware about green tea and green coffee for oral health?	I knew about it	60%	200
	I had some idea about it	25.5%	
	I had no idea	8%	
	Not interested	5%	
What do you think this study is for?	To raise awareness about green tea and green coffee and its role in oral health	19%	200
	To raise awareness about promoting good oral health	3%	
	All of them	75%	
	None	3%	
After this survey, will you use green tea and green coffee as an alternative to chemical oral hygiene product?	Yes	88%	200
	No	9%	
	Maybe	3%	

In figure 1, the results showed that about 75% of participants has knowledge about beneficial effect of green tea and green coffee on oral health, where 7% has no idea about beneficial effect of green tea and green coffee on oral health. In figure 2, about 52% of participants revealed that they know the healthy benefits of green tea and green coffee that is green tea and green coffee helps in weight loss, promote good oral health, decrease blood pressure, where 5% of participants do not know about any healthy benefits of green tea and green coffee on oral health. In figure 3, showed majority of participants nearly 80.5% had an idea about anti-inflammatory, anti-microbial properties of green tea and green coffee on oral health. In figure 4 showed majority of participants nearly 53% reported that the safest amount of consuming green tea and green coffee is 340-350 mg/day, where 35.5% of participants stated 330-340 mg/day is the safest dose of green tea and green coffee consumption. In figure 5, 51% of participants reported that green tea and green coffee can cause bone loss, discoloration of teeth, reduced salivation if taken at excessive amount. Figure 6 showed that, 68.5% of participants are aware about patient who are on warfarin medication should not

consume green tea and green coffee, where 15% of participants are not aware, 10% had some idea about not consuming green tea and green coffee if they are on warfarin medication. In figure 7, the result shows that, 60% of participants were aware about the benefits of green tea and green coffee after taking this questionnaire-based survey, 25.5% of participants reported that they had some idea about the benefits of green tea and green coffee before this survey. Figure 8 showed that, 75% of participants reported that this questionnaire-based study is to raise awareness about green tea and green coffee and their role in oral health, as well as to raise awareness about promoting good oral health, where 2% of participants had no idea about the aim of this study. Figure 9 showed that, 88% of participants will use green tea and green coffee as an alternative to chemical oral hygiene product, where 1% of participant are not agreed for using green tea and green coffee as an alternative to chemical oral hygiene product.

DISCUSSION –

The daily intake of green tea is significantly associated with indices of periodontal disease, including pocket depth (PD), clinical attachment loss (CAL), bleeding on probing (BOP), such that the more frequently the subjects drank green tea, the better was their periodontal condition. Previous in vitro studies showed that green tea catechin inhibits the growth of *Porphyromonas gingivalis*, *Prevotella intermedia*, and *Prevotella nigrescens* ^[11,12] and adherence of *P. gingivalis* onto human buccal epithelial cells. ^[12] Pruthviraj et al, demonstrated that the caffeine extracted from the leaves and leaf buds of *Camellia sinensis* (green tea), and the beans of *Coffea arabica* (coffee) inhibits the growth of gram- negative bacteria like *E. coli*, *Proteus mirabilis*, *Klebsiella pneumonia*, *P. aeruginosa*. ^[13] Green coffee and green tea being natural agents with anti-microbial, anti-oxidant, anti-fungal, anti-inflammatory and anti-cancer potential can definitely prove to be a viable option to general population. ^[14]

Hirasawa et al also demonstrated bactericidal activity of green tea catechins against *Prevotella* and *P. gingivalis* at a concentration of 1mg/ml. They found a significant reduction in markers of gingivitis after the use of slow- release buccal delivery system over a period of 8 weeks. More recent studies have shown that some virulence factors (toxic metabolites, protein tyrosine phosphatase, and gingipains) and etiological agents of periodontal disease are neutralized by EGCG (epigallocatechin gallate). ^[11]

Recent studies have emphasized that in addition to the microbial activity, the host immune-inflammatory reactions destroy the oral tissues to greater extent. ^[15] In such cases, green tea is considered to be a natural preventive and curative agent. ^[16] Numerous studies have shown the beneficial effects on the regular intake of green tea in maintaining oral health. ^[11]

Barouti et al found that a four-week regimen of mouth washing with a dilute catechin solution reduced the mouth malodor (halitosis) associated with periodontal disease. ^[17]

Shereen et al concluded that, daily intake of green tea has a beneficial effect in prevention and treatment of periodontitis ^[18], as well as Nagraj et al (2015) concluded that, the lowest concentration of pure green coffee bean extract was proven to be effective on four periodontogenic bacteria *Porphyromonas gingivalis*, *Prevotella intermedia*, *Fusobacterium nucleatum*, and *Aggregatibacter actinomycetemcomitans*. ^[19]

In the light of results of this survey, it was evident that the majority of the participants were aware of therapeutic benefits of green tea and green coffee on oral health.

CONCLUSION –

Based on this survey, following conclusions can be drawn, the majority of participants have adequate knowledge and awareness about the therapeutic benefits of green tea and green coffee on oral health. Overconsumption of green tea may cause sleep disturbances at night and decrease bioavailability of iron from the diet. Patients on warfarin therapy should not take green tea, as it can increase risk of bleeding. Pregnant and lactating women should limit the consumption to 1-2 cups/day as it can increase the heart rate. ^[20] Caffeine of green coffee is known to be able to inhibit the osteoblast like cells proliferation and increase the expression of the receptor activator of NF- κ B ligand (RANKL), that initiate bone loss in oral cavity. ^[21]

LIMITATION -

The survey tool in this study was made by modifying several questionnaires used in previous studies, therefore direct validity verification was overlooked. However these findings can be used for further research, the studies with clinical interventions will provide more awareness on the effects of green tea and coffee on oral health. More continuing education and awareness programs can be initiated to enhance more improved understanding of the healthy benefits of green tea and coffee.

CONSENT –

As per international standard or university standard, participant's written consent has been collected and preserved by the author.

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