Original Article

Different Tea Effects on Periodontium Among Dental Student in Dental College: A Cross Sectional Study

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ABSTRACT

Objectives: This study examined the effects of black tea and green tea on teeth and it's Periodontium among dental students at Liaquat College of Medicine & Dentistry (LCMD) Karachi, Pakistan.

Study Design: Prospective / descriptive / cross-sectional study

Place and Duration of Study: This study was conducted at the Department of Community Dentistry and Periodontology, Liaquat College of Medicine & Dentistry (LCMD) Karachi from November 2016 to January 2017.

Materials and Methods: Total of 240 subjects that were consulted in the survey, 218 (90.5%) fulfilled the inclusion criteria and were included in the study. To access the reason of taking black tea and green tea and their effects on oral health we used the Community Periodontal Index Treatment Need (CPITN) index and Plaque Index to analyze the participants.

Results: Results have shown that most of the female participants drinking green tea as compare to male participants. The most common reason of drinking black tea is Addiction on the other hand health conscious is the key reason of drinking green tea. End of the study we found health gums of those participants who taking green tea ($x2 = 36.57$, $df = 6$, $p<0.001$) while those participants who taking black tea have more plaque accumulation ($x2 = 30.98$, $df = 6$, $p<0.001$).

Conclusion: The study concludes that green tea have some positive effects on Periodontium and helps to prevent plaque deposition.

Key Words: Green Tea, Black Tea, Periodontium, Dental student

INTRODUCTION

Through the centuries, tea has progressed from a common everyday beverage to a medicinal powerhouse that is consumed all around the world. Green tea started appearing in Chinese literature and legend as early as 3000 BCE. According to legend, the discovery of tea as accidental, credit being given either to a man named Shien Non Shei or the Emperor Shen Nung. Both ways, green tea soon became popular trend among wealthy Chinese nobles. No after thousands of years, numerous preparations of this beverage are available commonly worldwide. ,An approximate of 165 million cups of tea are consumed everyday in Great Britain alone. Not only is tea good in taste the high levels of antioxidants in it seem to offer a variety of health benefits.[1,2]

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There are a variety of different types of tea available on the market, like green, black, white, herbal, and oolong. Green tea, extracted from the leaves of the Camellia sinensis plant, is unfermented; the freshly picked up tea-leaf is steam blasted in drums with holes in them or cooked in iron pans, denaturing the oxidizing enzymes present in the leaves. In contrast, black tea is entirely fermented. Other types of tea, like oolong and longing, are fermented partially with varying degrees of processing. White tea is different from green tea with regards to its stage of harvesting, as white tea is picked prior to its leaves being fully opened. Herbal tea is not really tea at all; rather, it consists of an herbal infusion of dried flowers, leaves, seeds, or roots concocted by pouring hot water over the plant ingredients and letting them steep.[3]

Gingivitis and periodontitis, as multifactorial diseases, are mainly caused by an interaction between invasions of virulent bacteria and host immune response of varied degrees. Plaque induced gingivitis being the most common form of gingivitis is induced by microbial plaque accumulation containing more than 300 types of bacterial species.[4,5]

MATERIALS AND METHODS

Free dental checkups ere organized by The Department of Community Dentistry and Periodontology of the

Liaquat College of Medicine & Dentistry in Karachi, Pakistan among dental students at LCMD. The examination was done at the Darul Sehat hospital for the duration of November 2016 to January 2017. The dental students come from all area of Karachi and Pakistan providing opportunity for carrying out this cross-sectional study. The exercise was restricted to intraoral examination including advice to the participants on how to improve and maintain their oral health but did not involve acute consultations of pain or infections.. Participants were also counselled on the presence of plaque and/or need for dental scaling.

Study population

A total of 240 subjects between the ages 19-27 years that came for check-ups were invited to take part in the study. Exclusion criteria included the following: self-reported diabetes, self-reported hypertension, self-reported complains of bleeding gums, subjects that have received radiation therapy, subjects with clinical signs of oral carcinoma, and history of pan and/or betel nut consumption. From the group of selected subjects, 5 presented with diabetes or hypertension, and 14 were excluded due to pan and/or betel nut consumption. A total of 3 individuals were unwilling to participate in the study thus leaving 218 (90.5%) volunteers. The variables investigated included the type of tea taken (black or green tea), the duration of green tea consumption in years (< 5 years, 5 to 9 years, 10 to 14 years and >14 years), and the reason of drinking tea. A subject was labelled a tea drinker if she/he had taken at least one cup every day. No attempts were made to recognize ex-tea drinkers.

Sample Size: The sample size that was estimated for the study (n=218) was originally calculated considering a precision of 5%, a 95% level of the confidence interval, and assuming a 50% prevalence in the underlying referral population.

Ethical Considerations: The study practice was approved by the Department of Research and Ethics of the Liaquat College of Medicine & Dentistry Karachi and a written informed consent was taken by each participant.

Variables: All participants filled a questionnaire that included information on age, gender, smoking status (current smoker/no smoker); the duration of smoking in years (< 5yrs, 5-9 yrs, 10-14 yrs and > 14 yrs); and the type of cigarettes smoked (with or without filter).

Clinical outcome: A trained final year dental student (AA) and a dentist (MN) carried out all the clinical examinations. Information on tea habits was not disclosed to the examiners. Each participant was clinically examined for the presence of plaque on the tooth surface: 1) No plaque on tooth surface; 2) plaque present less than 1/3 surface of tooth; 3) plaque present 1/3 surface of tooth; and 3) plaque present more than 2/3 surface of tooth; and gum status: 1) healthy gums; 2) bleeding gums; 3) calculus present surrounding gums

and 4) periodontal pocketing present. For the sake of our present analysis, the site that was most affected was taken into account at individual level.

Statistical Analysis: χ^2 statistics were used to compare overall differences between groups, the differences between proportions and the equivalent 95% confidence intervals for the differences between groups.**.**

RESULTS

The study group comprised 118 green tea drinker and 58 black tea drinker and 42 are those who don't like to drink tea at all. We examined plaque index and CPITN index of all participants. According to the following study most of the females like to drink green tea (106 out of 174) on the other hand most of the males like to drink black tea (31 out of 44) (figure 1)
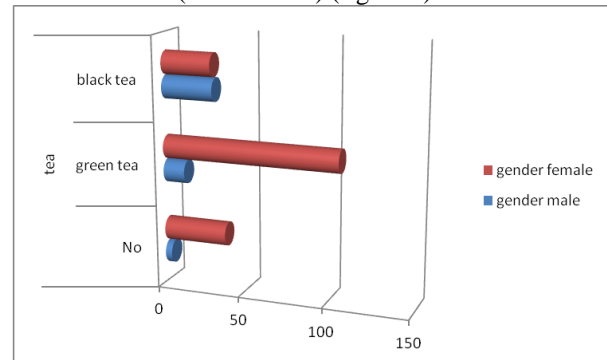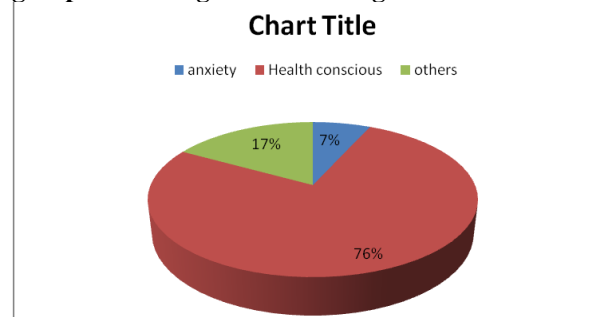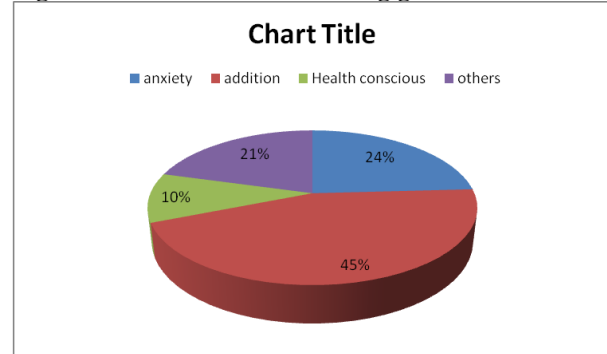

Figure No.1: Distribution of Different Genders groups according to tea drinking habits

(SD= 0.67, SE= 0.06, mean= 3.03, Median= 3.00)

Figure No.2: Reasons of drinking green tea

(SD= 1.056, SE= 0.14, mean= 2., Median= 2.00)

Figure No.3: Reasons of drinking black tea

Table No.1: Periodontal health status according to habit of drinking tea

		CPITN				
		healthy	bleeding	calculus	pocket	Total
tea	No	13	10	13	6	42
	green tea	79	28	7	4	118
	black tea	19	18	14	7	58
Total		111	56	34	17	218

$(x2 = 36.57, df= 6, p<0.001)$

Table No.2: Plaque accumulation on tooth surface according to plaque index:

		Plaqueindex				
		no	1/3	> 1/3	> 2/3	Total
tea	No	14	13	10	5	42
	green tea	76	27	9	6	118
	black tea	15	27	10	6	58
Total		105	67	29	17	218

$(x2 = 30.98, df= 6, p<0.001)$

Table No.3: Periodontal health status according to the duration of green tea habit

		CPITN				
		healthy	bleeding	Calculus	pocket	Total
Duration green	< 5	12	11	6	3	32
	5 - 9	35	10	0	0	45
	10 -14	32	7	1	1	41
Total		79	28	7	4	118

$(x2 = 25.42, df= 6, p<0.001)$

Table No.4: Accumulation of plaque according to the duration of green tea habit

		plaque				
		no	1/3	> 1/3	> 2/3	Total
Duration green	< 5	9	12	7	4	32
	5 - 9	33	9	2	1	45
	10 - 14	34	6	0	1	41
Total		76	27	9	6	118

$(x2 = 25.42, df= 6, p<0.001)$

Periodontal health status according to habit of drinking tea: Among tea drinker, according to CPITN index green tea drinkers have more health gums (66.95%), while black tea drinkers have as compare to green tea

drinker has more bleeding gums (31.03%). $(x2 = 36.57, df= 6, p<0.001)$ (Table 1).

Plaque accumulation on tooth surface according to plaque index: According to plaque index, in green tea drinkers the highest numbers of participants have no plaque (72.38 %) while in black tea drinkers the highest number of participants have plaque present on 1/3 tooth surface (40.30%). The absence of plaque was significantly associated with the drinking habit of green tea $(x2 = 30.98, df= 6, p<0.001)$ (Table 2).

Reason of drinking green tea and black tea: According to my study most of the participants are drinking green tea because they are health conscious (76.30%) on the other hand the mean reason of drinking black tea is addiction (44.80%). (Figure 2 and 3)

Periodontal health status according to duration of drinking green tea: According to CPITN index, the highest number participants who have healthy gum are those who had drink green tea between 10 to 14 years (78.05%). Similarly second highest are those who drink green tea between 5 to 9 years (77.78%). $(x2 = 25.42, df= 6, p<0.001)$ (Table 3).

Plaque accumulation of tooth surfaces according to duration of drinking green tea: According to plaque index, the highest numbers of participants who have no plaque accumulation are those who drink green tea between 10 to 14 years (82.93%). Similarly second highest are between 5 to 9 years (73.33%) $(x2 = 25.42, df= 6, p<0.001)$ (Table 4).

DISCUSSION

Liaquat College of Medicine & Dentistry and Darul Sehat hospital is situated in south Karachi at a central location which covers rural and urban population of gulshan town, the hospital has a well established dental program for more than 10 years with well-resourced dental OPD's.[6] This research was carried out to assess and analyze the role of tea, reason of taking tea and their effects on oral health, we analyzed the Community Periodontal Index Treatment Need (CPITN) index and Plaque Index on participants. Oxidative stress has an important role in the pathogenesis of periodontal disease, as well as in many other disorders.[7]

Tea originated in China probably, as long ago as 2700 BC. Drinking water, boiled for reasons of sanitation, was made more pleasant by the addition of leaves from the tea plant. In present times, tea, in any form, is, with the exception of water, the world's most commonly consumed beverage; more than two billion cups are consumed daily. For thousands of years, tea has anecdotally been considered to have therapeutic properties; this has been sufficiently confirmed in recent years by an accelerating research effort.

The chemical composition of green tea is complex and partly defined. The most abundant components in green tea are polyphenols, in particular flavonoids such as the catechins, catechin gallates and roanthocyanidins. The

fresh leaves contain caffeine (approximately 3.5% of the total dry weight, or about 50 mg/cup when brewed), theobromine (0.15–0.2%), theophylline (0.02–0.04%) and other methylxanthines, lignin (6.5%), organic acids (1.5%), chlorophyll (0.5%) and free amino acids (1–5.5%), including the unique amino acid theanine (4%); numerous 'flavour compounds' are also present but in much lower amounts.[9]

Bacterial biofilm formation in the marginal gingiva and periodontal pockets is important in the pathogenesis of periodontal disease. Previous in vitro studies have shown that green tea catechin inhibits the growth of Porphyromonas gingivalis, Prevotella intermedia, and Prevotella nigrescens and the adherence of P. gingivalis onto human buccal epithelial cells.[10,11,17] In addition, green tea catechins with the steric structures of 3-galloyl radial, EGCg, (-)-epicatechin gallate (ECg), and (-)-gallocatechin gallate, which are the major tea polyphenols, inhibit the production of toxic end products of P. gingivalis.[12-15] These reports of the inhibitory effects of catechin contained in green tea on periodontal pathogens may provide the source for the beneficial effect of the daily consumption of green tea on periodontal health.

Periodontal disease is a contagious disease involving gingival inflammation and the destruction of periodontal tissue. Periodontal pathogens, such as P. gingivalis and Aggregatibacter actinomycetemcomitans (previouslyActinobacillus actinomycetemcomitans), produce matrix metalloproteinases (MMPs) and display collagenase activity.[13-18]

We carried out a inclusive health examination of participants and examined the relationship between the daily intake of green tea / black tea and periodontal disease. The daily intake of green tea was appreciably associated with indices of periodontal disease, including PD, clinical AL, and BOP, such that the more regularly the subjects drank green tea, the more improved was their periodontal condition.

CONCLUSION

Summing up, the present record and study have showed that the health conscious is the main reason of taking green tea in Pakistani population. Green tea takers presented less plaque accumulation as compare to black tea takers and the relationship suggested a dose-response effects.

Author's Contribution:

Concept & Design of Study:	Muhammad Nadeem and Uzma Zareef
Drafting:	Uzma Zareef and Irum Munir Raja
Data Analysis:	Muhammad Nadeem, Uzma Zareef and Irum Munir Raja
Revisiting Critically:	Muhammad Nadeem, Uzma Zareef and Irum Munir Raja
Final Approval of version:	Muhammad Nadeem and Uzma Zareef

Conflict of Interest: The study has no conflict of interest to declare by any author.

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