Oral Hygiene Status and Periodontal Status of Older Adults Attending the Cardiology Clinic in a Tertiary Hospital in Nigeria

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ABSTRACT

Background: Older adults may experience reduced manual dexterity, due to age-related physical or neurological conditions, which may affect their ability to practice optimal oral hygiene. Hence, they may present with poor oral hygiene status, which has been associated with adverse systemic health outcome. Therefore, this study aims to assess the oral hygiene status and periodontal health status of older adults attending the Cardiology clinic, University of Port Harcourt Teaching Hospital (UPTH).

Materials and methods: This was a cross-sectional study conducted among older adults at the Cardiology clinic, UPTH. Data was collected using interviewer questionnaire. Simplified Oral Hygiene Index was used to assess oral hygiene status, while Community Periodontal Index (CPI) modified, was used to assess periodontal health status. Collected data was analysed using the Statistical Product and Service Solution SPSS version 25.0. P values < 0.05 were considered statistically significant.

Results: One hundred and six participants; 50.9% (54/106) females, and 49.1% (52/106) males were present. The mean simplified Oral hygiene index (OHI-S) score of the participants was 2.32±1.02. Females had mean OHI-S of 2.09 ± 0.93, with more females 13 (72.2%) presenting with OHIS score of 1.3 - 3.0. Males had mean OHI-S score of 2.55 ±1.07, with more males, 16 (72.7%) having OHIS score of 3.0 - 6.0; this finding was statistically significant (p = 0.016). Most of the participants, 66 (62.3%), had mean OHI-S score of 2.19 ± 0.49. Most of the participants, [76 (71.7%)] had CPI 2. Majority 85 (80.2%), had gingivitis, while 21 (19.8%) had periodontitis.

Conclusion: Most participants had fair oral hygiene status. More Females presented with good oral hygiene status, while most males presented with poor oral hygiene status. Most participants had CPI 2.

Keywords: Oral hygiene, Older adults, Periodontal status, Tertiary Hospital.

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INTRODUCTION

Ageing, an imminent process, is measured by chronological age, which results as an effect of the build-up of diverse cell damage over time, resulting in a slow and progressive decline in physical and mental function, increased disease progression and finally death. [1] The older adults are adults ≥ 60 years old; it was projected, according to WHO, that the world's population above 60 years will increase from 12% to 22%, between 2015 and 2050, with the most being in the developing countries. [1] The older adults are susceptible to various medical conditions, as well as oral diseases, which can affect their health, [2] and their quality of life. [3] The oral health of the older adults is affected by their chewing ability, which can be caused by dental caries, missing teeth, denture wearing and periodontal disease. [4,5] The chewing ability is also affected by low-pay and absence of dental insurance for older patients. [6]

The increased periodontal disease in the older adults may result from cells in the ageing periodontium exhibiting a greater number of inflammatory mediators, which may influence the disease severity.[7] A national survey conducted in 2024 among adult and elderly Nigerians reported a 97.6% prevalence of periodontal disease among elderly Nigerians.[8] Periodontal disease is a common risk factor which links poor oral health to poor systemic health, as poor periodontal health is linked with some systemic conditions such as diabetes mellitus, [9] cardiovascular disease, [10] pregnancy outcome [11] and pulmonary disease. [12]

It has been reported that periodontal therapy improves outcomes in systemic conditions, [13] hence it is expedient to maintain a healthy oral condition. However, maintenance of good dental hygiene among the older adults in Nigeria is quite challenging, as there is an inadequate speciality among the dental professionals trained to care for the older adult's oral health,[14] also, most the older patients have to make out-of-pocket payments for their oral treatment.[15]

Previous studies on older adults were conducted in communities,[16, 17] There is a dearth of studies in the literature on the oral hygiene and periodontal status of older patients attending a tertiary hospital, especially in the South-South region of the country. Hence, this study aims to assess the oral hygiene status and periodontal health status of older patients attending the Cardiology clinic of the University of Port Harcourt Teaching Hospital.

METHODOLOGY

This was a cross-sectional study conducted among older adults with cardiovascular diseases who attended the Cardiology clinic at the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Rivers State, between June and November 2022. A convenient, non-probability sampling technique was used to recruit subjects that gave consent. Ethical Approval for the study was obtained from the Health Research and Ethics Committee of the University of Port Harcourt Teaching Hospital (UPTH/ ADM /90/S.II /VOL.XI/1219). An interviewer questionnaire re was used to collect information from the participants. The questionnaire had three sections. Section A had questions about socio-demographic (age, gender, marital status, ethnicity, occupation), section B had questions on participants' oral health practices, while section C included intraoral examination to determine the simplified oral hygiene status (OHIS) and community periodontal index (CPI). Inclusion criteria for the study were older patients with cardiovascular diseases from sixty years and above, who gave consent.

Greene and Vermillion Oral Hygiene Index was assessed using the simplified oral hygiene index (OHI-S),[18] while the Community Periodontal Index (CPI) modified was used to assess periodontal health status. [19] The examination of signs of periodontal disease was performed with the aid of standardized CPITN-C probe and mouth mirror. The CPITN-C probe has a ball tip of 0.5 mm diameter, and black band markers between 3.5 mm to 5.5 mm from the tip and at 8.5 mm and 11.5 mm from the tip.

CPI Pocket scores

0= Healthy

1= Bleeding on probing

2= Presence of supragingival and subgingival calculus

3= Pocket depth 4-5mm

4= Pocket depth ≥6mm

Measurement of the Community periodontal index was carried out by dividing the mouth in six sextants: 18-14, 13-23, 24- 28, 34-38, 33-43 and 43-48. It was recorded only for index teeth. The indexed teeth in each sextant were examined by running the CPI probe around the whole circumference of the tooth, and pocket depths were measured at six sites per tooth (mesio-buccal, mid-buccal, disto-buccal, mesio-, mid-, and distolingual/palatal). Using CPI code, Code 0 (Healthy) were categorized as healthy periodontium, code 1 (Bleeding on probing) and

code 2 (Calculus detected during probing) were categorized into gingivitis, while code 3 (pocket depth of 4-5mm depth) and code 4 (pocket depth of 6mm or more) into periodontitis. Cohen's kappa coefficient for inter-examiner variation was 0.84.

Statistical Analysis:

Statistical analysis was done using the Statistical Product and Service Solution (SPSS) version 25.0 (IBM SPSS Inc., Chicago, Illinois). Continuous variables were expressed as means and standard deviations. Categorical variables were presented as frequencies and percentages. Differences between groups were compared using the chi-square test for categorical variables and the independent t-test for continuous variables. P values < 0.05 were considered statistically significant.

RESULTS

Sociodemographic characteristics of participants

The study comprises 106 participants: 50.9% (54/106) were females, while 49.1% (52/106) were males, with an M: F ratio of 1:1.04. The mean age was 67.75 ± 8.37 years, with an age range of 60 - 91 years. Forty-five (42.5%) participants had tertiary education; 84 (79.2%) participants were married. (Table 1)

Table 1: **Sociodemographic characteristics of participants**

Variables		Frequency	Percentage
Age group	60-69	75	70.8
	70-79	19	17.9
	80-89	10	9.4
	90-99	2	1.9
Gender	Male	52	49.1
	Female	54	50.9
Highest education	Primary	11	10.4
	Secondary	44	41.5
	Tertiary	45	42.5
	Postgraduate	6	5.7
Marital status	Married	84	79.2
	Widow(er)/Divorced	22	20.8
Ethnicity	Hausa	3	2.8
	Igbo	42	39.6
	Yoruba	8	7.5
	Others (e.g Ikwerre, Ndoni, etc)	53	50.0
Smoking habits	Smokers	4	3.8
	Non-smokers	102	96.2
	TOTAL	106	100.0

Oral hygiene Practices of participants

Table 2 shows that the majority of the participants, 86 (81.1%) used toothbrush and fluoride toothpaste as cleaning aid, 3 (2.8%) each used chewing stick and toothbrush with fluoride and chewing stick and toothbrush without fluoride, while only 2 (1.9%) of the participants used chewing sticks alone. Most of the participants, 90 (84.9%) brushed once daily, and 97 (91.5%) brushed only in the morning.

Among those who used toothbrush as a cleaning aid, 52(50.0%) used medium-textured toothbrush, 27 (26.0%) used a soft-textured toothbrush, while 2 (1.9%) did not know the type of toothbrush they used. The majority of the participants, 87 (83.7%), brushed using the horizontal/scrub method, 16 (15.4%) used the vertical method, and only one participant used the modified bass method. Concerning when the participant changed their toothbrush, 57 (54.8%) changed their toothbrush within 1- 3 months, while 47 (45.2%) changed theirs 4 months and beyond. Regarding the reason for the change of toothbrush, 56 (53.8%) changed their toothbrush because it was frayed, 32 (30.8%) changed theirs because they just felt like changing it, while 16 (15.4%) claimed they changed their toothbrush because it was not brushing their teeth properly.

Regarding the use of interdental cleaning aid, 84 (79.2%) used interdental cleaning aid, while 22 (20.8%) did not use interdental cleaning aid, among those who used interdental cleaning aid; 35 (41.7%) used it every day, 37 (44.0%) used it occasionally, while 1 (1.2%) used it rarely. The majority 71 (84.5%) used toothpick, 9 (10.7%) used dental floss, and 2 (2.4%) used broomsticks as interdental cleaning aids.

Table 2: Oral hygiene practices of participants

Variables		Frequency	Percentage
Cleaning aid used	Toothbrush with fluoride toothpaste	86	81.1
	Toothbrush without fluoride toothpaste	12	11.3
	Chewing stick alone	2	1.9
	Chewing stick and toothbrush with fluoride toothpaste	3	2.8
	Chewing stick and toothbrush without fluoride toothpaste	3	2.8
How often do you clean your teeth	Once	90	84.9
	Twice	16	15.1
What time of the day do you clean your teeth	Morning before breakfast	97	91.5
	Morning after breakfast	4	3.8
	Night before bedtime	1	0.9
	Morning before breakfast and night	4	3.8
Type of toothbrush used	Soft	27	26.0
	Medium	52	50.0
	Hard	23	22.1
	Don't know	2	1.9
Brushing method used	Horizontal scrub	87	83.7
	Modified bass	1	1.0
	Vertical	16	15.4
How often do you change your toothbrush	1-3 months	57	54.8
	≥ 4 months	47	45.2
Why do you change your toothbrush	It is frayed	56	53.8
	Just felt like changing it	32	30.8
	Not cleansing my teeth properly	16	15.4
Do you use interdental cleaning aid	Yes	84	79.2
	No	22	20.8
How often do you use interdental cleaning aids	Everyday	35	41.7
	3-4 times per week	11	13.1
	Occasionally	37	44.0
	Rarely	1	1.2
Interdental cleaning aid used	Toothpick	71	84.5
	Dental floss	9	10.7
	Interdental brush	1	1.2
	Broom stick	2	2.4
	Finger nails	1	1.2

Distribution of OHI-S, CPI and periodontal health of participants

Table 3 shows that the mean OHI-S score of the participants was 2.32 ± 1.02. Most of the participants, 66 (62.3%) had mean OHIS score of 2.19 ± 0.49, 22 (20.8%) had mean OHIS score of 3.86 ± 0.41, while 18 (17.0%) had mean OHIS score of 0.89 ± 0.20. Majority, 76 (71.7%) had CPI 2.9 (8.5%) had CPI 1. Concerning periodontal health status, the majority of the participants, 85 (80.2%), had bleeding on probing and calculus (gingivitis), while 21(19.8%) had periodontal pocket depth ≥ 4mm, periodontitis; none of the participants had a healthy periodontium

Table 3: Distribution of OHIS, CPI and periodontal health of participants

Variables	Oral Hygiene Index	Mean OHI-S score	Frequency (%)`
Simplified Oral Hygiene Index (OHI-S)	0.0 -1.2	0.89 ± 0.20	18 (17.0)
	1.3 - 3.0	2.19 ± 0.49	66 (62.3)
	3.1 - 6.0	3.86 ± 0.41	22 (20.8)
	Mean Simplified Oral Hygiene Index = 2.32 ± 1.02		
Community Periodontal Index (CPI)	CPI 1	Bleeding on probing	9 (8.5)
	CPI 2	Calculus	76 (71.7)
	CPI 3	Pathologic pocket 4-5mm	20 (18.9)
	CPI 4	Pathologic pocket ≥6mm	1 (0.94)
Periodontal Health Status	Health	Healthy	0 (0.0)
	Bleeding on probing and calculus	Gingivitis	85 (80.2)
	Periodontal pocket depth ≥ 4mm	Periodontitis	21 (19.8)

Distribution of OHIS, CPI and Periodontal health status based on gender

Table 4 shows that more females, 13 (72.2%) compared to 5 (27.8%) males presented with OHIS score of 0.0 - 1.2, while more males, 16 (72.7%), had OHIS score of 3.1 – 6.0. This finding is statistically significant (p = 0.016). Females had mean OHI-S score of 2.09 ± 0.93, while males had mean OHI-S score of 2.55 ± 1.07

Concerning CPI, more females, 6 (66.7%) had CPI 1, half of both males, 10 (50.0%) and females, 10 (50.0%) had CPI 3, while only one female, 1 (100.0%), had CPI 4. This finding was not statistically significant. (p = 0.652).

Regarding periodontal health status, the males, 42 (49.4%) and females, 43 (50.6%) presented with bleeding on probing and calculus (gingivitis), while 10 (47.6%) males and 11 (52.4%) females had periodontal pocket depth ≥ 4mm. This finding was not statistically significant (p = 0.883)

Table 4: Distribution of OHIS, CPI and Periodontal status based on Gender

Variables		Gender		P-value
		Male	Female	
simplified oral hygiene index (OHI-S)	0.0 -1.2	5 (27.8)	13 (72.2)	0.016
	1.3 - 3.0	31 (47.0)	35 (53.0)	
	3.1 - 6.0	16 (72.7)	6 (27.3)	
	Mean OHI-S	2.55 ± 1.07	2.09 ± 0.93	
Community Periodontal Index (CPI)	1	3 (33.3)	6 (66.7)	0.652
	2	39 (51.3)	37 (48.7)	
	3	10 (50.0)	10 (50.0)	
	4	0 (0.0)	1 (100.0)	
Periodontal Health Status	Gingivitis	42 (49.4)	43 (50.6)	0.883
	Periodontitis	10 (47.6)	11 (52.4)	

Distribution of OHIS, CPI and periodontal health status based on age group

Table 5 shows that 13 (72.2%) of the participants in the 60 - 69-year age group, 3 (16.7%) in the 70 - 79-year age group and 2 (11.1%) in the 80-89-year age group presented with an OHIS score of 0.0 - 1.2.

Forty-nine (74.2%), 11 (16.7%) and 1 (1.5%) in 60 - 69-year, 70 - 79-year and 90 - 99-year age groups respectively, presented with OHIS score of 1.3 - 3.0, while 13 (59.1%) in 60 - 69-year age group and 1 (4.5%) in the 90 - 99-year age group presented with OHIS score of 3.1 - 6.0. This finding was not statistically significant (p = 0.878). The participants in 60 - 69-year had mean OHI-S of 2.23 ± 0.95, while those in 90 - 99-year had mean OHI-S of 3.40 ± 0.99.

Regarding CPI, 6 (66.7%) in 60 - 69-year age group and 2 (22.2%) in 80 - 89-year age group presented with CPI 1. For CPI 2, 60 (78.9%) were in 60-69-year age group, 4 (5.3%) were in the 80 - 89-year age group, 8 (40.0%) of participants in 60 - 69-year age group and 7 (35.0%) in 70 - 77-year age group presented with CPI 3, only 1 (100.0%) participant in 60-69-year age group presented with CPI 4. This finding was not statistically significant (p = 0.119)

Regarding periodontal health status, 66 (77.6%), 12 (14.1%), 6 (7.1%) and 1 (1.2%) in 60 - 69-year, 70 - 79-year, 80 - 89-year and 90 - 99-year age groups respectively, had bleeding on probing and calculus (gingivitis). Nine (42.9%), 7 (33.3%), 4 (19.0%), 1 (4.8%) in 60 - 69-year, 70 - 79-year, 80 - 89-year, 90 - 99-year age groups, respectively, presented with periodontal pocket depth of ≥ 4mm (periodontitis). This finding was statistically significant (p = 0.023).

Table 5: Distribution of OHIS, CPI and periodontal health status based on age group

Variables		Age group (years)				P value
		60-69	70-79	80-89	90-99	
Simplified Oral Hygiene Index (OHIS)	0.0 -1.2	13 (72.2)	3 (16.7)	2 (11.1)	0 (0.0)	0.878
	1.3 -3.0	49 (74.2)	11 (16.7)	5 (7.6)	1 (1.5)	
	3.1 – 6.0	13 (59.1)	5 (22.7)	3 (13.6)	1 (4.5)	
	Mean OHI-S	2.23±0.95	2.37±1,13	2.64±1.26	3.40±0.99	
Community Periodontal Index (CPI)	1	6 (66.7)	1 (11.1)	2 (22.2)	0 (0.0)	0.119
	2	60 (78.9)	11 (14.5)	4 (5.3)	1 (1.3)	
	3	8 (40.0)	7 (35.0)	4 (20.0)	1 (5.0)	
	4	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Periodontal Health Status	Gingivitis	66 (77.6)	12 (14.1)	6 (7.1)	1 (1.2)	**0.023***#
	Periodontitis	9 (42.9)	7 (33.3)	4 (19.0)	1 (4.8)	

*Statistically significant # Fisher's exact

DISCUSSION

This study assessed the oral hygiene status and periodontal status of older adults with cardiovascular diseases, the mean age of the participants was 67.75 ± 8.37years, and most of the participants were in the 60 - 69-year age group, this finding is comparable to a previous study conducted among older patients who attended a General Hospital in Lagos, with mean age of 68.65 ± 6.58 years and majority below 70 years.[20] There was almost equal distribution of gender in this study, while there were more females than males in previous study,[20] and more males than females in the study conducted among the older persons in Port Harcourt. [17]

It was reported by the American Dental Association that to achieve a remarkable reduction in the amount of plaque accumulation and enhanced oral hygiene, toothbrushing using a fluoride toothpaste should be practised twice daily for about two minutes.[21] In the same vein, the Nigerian Dental Association underscores brushing twice daily, using a fluoride toothpaste, to enhance fresh breath and prevent dental diseases. [22] Most of the participants in this study brushed their teeth with toothbrush and fluoride toothpaste, however, majority clean their teeth once daily. This finding is in tandem with previous studies, where the participants cleaned their teeth once daily. [17, 20] These results showed that the older population in the hospital environment and the communities are not knowledgeable about the recommended oral hygiene practices and its importance. This brings to limelight that the older persons need to be educated about the significance of plaque and calculus, as oral hygiene relates to systemic health [23] and older adults usually have one underlying medical condition or the other. [24] Most of the participants used horizontal scrub technique, this should be discouraged, as wrong brushing technique, especially horizontal technique and the use of hard textured tooth brush have been linked to increased risk of gingival recession.[25] Just a little above half of the participants replace their toothbrushes within 1 - 3 months, which agrees with the recommendation

by the American Dental Association that toothbrushes should be changed every 3 - 4 month or sooner if the bristles become frayed.[26]Toothbrushes alone cannot eliminate plaque from the adjacent surfaces of teeth and interdental/interproximal spaces; hence, interdental cleaning aids are required.[27] A systematic review reported that the effectiveness of plaque removal following a brushing exercise averaged around 42%.[28] It is believed that brushing produces optimal results on the facial surfaces of teeth compared to interproximal surfaces.[29] This is imperative because interdental sites accumulate the highest amount of plaque deposits, whether anteriorly or posteriorly in the mouth.[30] It has been reported in clinical studies that the use of interdental cleaning aids besides toothbrushing improves oral hygiene and decreases the prevalence of periodontal disease and dental caries. [31,32] Majority of the participants claimed they used interdental cleaning aids, this finding is at variance with a previous study, where only a few participants used interdental cleaning aids.[33] However, among those that use interdental cleaning aids, majority use toothpick as interdental cleaning aids, while only few participants use dental floss. This may be because the older adults are more conversant with toothpicks and may be more readily available.

More participants had OHIS score of 1.3 – 3.0 (fair oral hygiene status), while a previous study conducted among the elderly attending the dental out-patients clinic in Dahka reported that more than half of the participants had poor oral hygiene status,[33] while the study conducted among older population in Port Harcourt, Rivers state,[34] reported that most of the participants had both poor and fair oral hygiene. The disparity between this study and that conducted in Dahka,[33] could be because of the differences in the participants' knowledge about oral hygiene, while the study conducted in Port Harcourt[34] was conducted among elderly in the community, where the participants might not be aware of oral hygiene practices, while this study was a clinic-based study.

Comparing oral hygiene of the participants based on gender, most females presented with good oral hygiene, while most males presented with poor oral hygiene, this finding is in tandem with previous study.[34] Males have been reported to present with poor oral hygiene, when compared with females. This may be because men tend to ignore their oral health and have poorer oral hygiene habits.[35] The American Dental Association reported that about 8% more women brush their teeth twice daily compared to men. [36] Also a study conducted in 2018 reported that women were 26% more likely than men to floss daily.[37] Regarding oral hygiene among age groups, more participants in 60-69-year presented with OHIS scores of 0.0 - 1.2 and 1.3 – 3.0, which represent good and fair oral hygiene status respectively. This finding is consistent with the findings from previous study.[34] The mean OHI-S of the participants increased with age, this may be because age increases the occurrence of plaque, calculus, and food impaction intra-orally. Also, there is reduced metabolic capacity and immune capacity among the older adults, thus increasing periodontitis.[38]

Most of the participants in this study, presented with supragingival and subgingival calculus, this finding is in tandem with previous study, [16] but in contrast to a study conducted among older persons in India,[39] where majority of the participants had periodontal pocket depth of ≥ 6mm. This shows that majority of the participants had suboptimal oral hygiene and need to be educated about the impact of oral hygiene on both oral and systemic health of individuals. Twenty participants (18.9%) had pocket depth of 4-5mm, which represent mild periodontitis and 0.94% of the participants had pocket ≥ 6mm, which represent advanced periodontitis. This finding in this study differs from a previous study conducted in India,[33] where the majority of the participants (71.1%) had pocket depth of 6mm or more, and 2.40% had a pocket depth of 4-5mm. The difference could be that the previous study was conducted in an old-age home.

Comparing community periodontal index of participants based on gender, more females presented with CPI 1 (which represents bleeding on probing) than males, while there was no difference between the genders for presence of supragingival and subgingival calculus though this was more in the males. Only one female presented with periodontal pocket depth greater than or equals to 6mm. This finding is in contrast to the finding from a study, [39] conducted among geriatric population in old-age homes in Delhi, India, where more males had periodontal pocket depth ≥ 6mm compared to the females.

Concerning periodontal health, majority of the participants had bleeding on probing and calculus, which follows the trend from a national cross-sectional survey study conducted among adult and older Nigerians.[8] This finding is not surprising as most of the participants had calculus, which is the main retentive factor for plaque; the main

aetiological factor for periodontal diseases.[40] The females had more bleeding on probing and calculus than males. Also, the females had periodontal pocket depth ≥ 4mm than males. This finding is in contrast to another study conducted among the older person in Port Harcourt, where more males had bleeding on probing and calculus, also periodontal pocket depth ≥ 4mm than females.[41] Age was recognized as an independent risk factor for periodontitis. [42] Majority of the participants in the 60 - 69 year presented more with bleeding on probing and calculus (gingivitis) and periodontal pocket depth ≥ 4mm (periodontitis), this finding is consistent with the report that periodontal diseases peak around the age group 60 - 64 years.[43] This finding however contradicts the finding from previous study [39] where periodontal disease increased with increasing age. The prevalence of periodontal disease in this study was 100%, with gingivitis and periodontitis accounting for 80.2% and 19.8% respectively, which is higher than the prevalence reported among older adults in a previous study, [41] where the prevalence of periodontal disease was reported to be 95.2%, with gingivitis being 60.2% and periodontitis 35%. This shows that the oral hygiene and periodontal health of the older participants are poor, hence, it is recommended that oral education be encouraged among the older adults, as oral health is linked to systemic health.

CONCLUSION

Most participants had fair oral hygiene status. More Females presented with good and fair oral hygiene status, while more males presented with poor oral hygiene status. Most participants within 60 - 69 years had good and fair oral hygiene status. Gingivitis and periodontitis were commoner in females.

LIMITATION

The duration of brushing and the loss of attachment (LOA) of the participants, which are essential in determination of an individual's oral hygiene and periodontal status respectively, were not investigated.

Source of support

Nil

Conflict of interest

None declared

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