Periodontal Status of Filipino Older Adults in the Focused Interventions for FRAIL Older Adults Research and Development Program (FITforFRAIL): A Cross-sectional Study

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ABSTRACT

Introduction and Objective. Periodontitis is highly prevalent worldwide, and previous investigations have reported increased prevalence and severity among elderly. Regular monitoring of dental health, which includes periodontal conditions, has been recommended by the Philippine Department of Health, as basis for the development and updating of policies and laws that will address the public health problem of periodontal disease among the ageing Filipino population. Therefore, this present study aimed to determine the prevalence and severity of periodontal disease among Filipino older adults who participated in the Focused Interventions for Frail Older Adults Research and Development Program (FITforFRAIL) study.

Methods. This study on the periodontal status of Filipino older adults is a cross-sectional substudy of the FITforFRAIL research of the Institute on Aging, National Institutes of Health, University of the Philippines Manila. Participants aged ≥60 years were from four identified geographical regions in the Philippines. Three hundred sixteen completed oral health assessment, which included full mouth periodontal recording, and 183 participants were eligible for inclusion in the periodontal component. Periodontal diagnoses were determined using the Centers for Disease Control-American Academy of Periodontology (CDC-AAP) case definitions for surveillance of periodontitis and the 2018 European Federation of Periodontology (EFP)/AAP classification. Descriptive statistics (frequency, percentage, and mean) were used to report the sociodemographic characteristics and periodontal diagnoses of the participants. The clinical periodontal measures used to indicate the extent and severity of periodontitis were presented as mean [standard error (SE)] or percentage (SE).

Results. Using the CDC/AAP case definitions, majority (97.3%) were diagnosed with periodontitis, with 33.3% having severe periodontal destruction. On the other hand, based on the 2018 EFP/AAP classification, all participants had periodontitis and most (94.5%) presented with severe disease. Moreover, using the latter classification system, the percentage of severe periodontitis was observed to increase with age. Among the young-old, 93.1% had severe disease, while 94.1% of the middle-old and 100% of the oldest-old were found to have severe destruction.

Conclusions. Based on the results of the study, the prevalence of total and severe periodontitis is high

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among this sample of Filipino older adults. Future studies for regular monitoring of the oral health of Filipino older adults are recommended.

INTRODUCTION

Periodontal diseases are chronic inflammatory conditions that affect the tooth-supporting structures and are induced by the accumulation of a dental biofilm on the teeth. The bacteria in the dental biofilm initially induce gingivitis, wherein inflammation is confined to the gingivae. In susceptible individuals, continued microbial accumulation due to suboptimal oral hygiene and lack of professional dental treatment may lead to periodontitis, which is the more severe form of periodontal disease.[1] If left untreated, periodontitis may result in tooth loss, potentially lowering the quality of life.[2] Moreover, research over the past two decades supports the association of periodontitis with various systemic conditions, including diabetes mellitus, cardiovascular disease, and rheumatoid arthritis.[3-5]

Periodontitis is highly prevalent, with reports of 50% prevalence among adults globally and with 60% of those aged over 65 having the disease. Severe periodontitis has been noted in 10-15% of populations.[6] Moreover, based on analysis of the Global Burden of Disease study 2019, the prevalence of periodontitis worldwide increased by 99% from 1990 to 2019.[7]

The epidemiological reporting of periodontal disease prevalence requires the categorization of periodontal conditions based on case definitions for health and disease. To date, there is no consensus as to a single classification system that should be used to categorize periodontitis in periodontal status surveys. However, in 2015, the Joint European Union/United States of America (USA) Periodontal Epidemiology Working Group proposed the use of the Centers for Disease Control-American Academy of Periodontology (CDC-AAP) case definitions, in order to standardize the reporting of population-based surveillance of periodontitis.[8] The CDC-AAP classification distinguishes absence of periodontitis from mild, moderate, and severe periodontitis. Periodontal destruction as manifested by ≥3 mm of clinical attachment loss (CAL) is required for diagnosis of periodontitis.[9] More recently, the 2018 European Federation of Periodontology/American Academy of Periodontology (EFP/AAP) classification was developed to update the definitions of periodontal health, gingivitis, and periodontitis. In contrast to the CDC-AAP case definitions, this newer classification diagnoses periodontitis when CAL is at least 1 mm. Decreasing the CAL threshold to ≥1 mm in the 2018 classification was proposed to increase sensitivity and prevent missing out on the detection of early stages of periodontitis.[10]

Previous investigations have established an increase in the prevalence and severity of periodontitis with increasing age.[11] An analysis among different age groups in the 2017 Global Burden of Disease study revealed that severe periodontitis exhibited an increasing trend until age 60-64 years. Moreover, tooth loss, which is a sequela of untreated periodontitis, peaked in the 85-89 age group.[12]

The world's population is ageing. In 2019, the number of persons aged ≥65 reached 703 million and this number has been estimated to double by 2050. In the Philippines, 5.7 million were aged 65 and over, with a projected increase to 9.4 million in 2030.[13] Therefore, with the expected uptrend in the number and percentage of older adults, along with epidemiological evidence of increased prevalence of periodontitis as age increases, periodontitis will likely remain a public health concern globally.

In the Philippines, 49.9% of assessed participants were diagnosed with some form of periodontal disease using the modified Community Periodontal Index, as part of the 2018 National Survey on Oral Health (NSOH). Among older adults aged 65 to 74, 83.58% were determined to have some form of periodontal disease. Analysis of periodontal data also revealed age to be associated with periodontal disease, with 45.21 odds of having periodontal disease among those aged 65 to 74 years.[14] Moreover, in a retrospective case-control study that reviewed the periodontal statuses of Filipino patients who sought periodontal consult at a university dental clinic from 2016-2018, 87.5% of those aged over 60 years were found to have periodontitis based on the 2018 EFP/AAP classification of periodontal diseases and conditions.[15]

Focused Interventions for FRAIL Older Adults Research and Development Program (FITforFRAIL) is a mixed methods study that used quantitative and qualitative techniques. It aimed to describe the health status of older adults in four geographical regions in the Philippines, with primary focus on the determination of the medical status and prevalence of frailty among the selected older adults. FITforFRAIL included substudies to determine the following: nutritional status, cognitive condition, self-reported quality of life, and dental health status, which included an evaluation of the participants' periodontal conditions. Regular monitoring, reporting, and publication of dental health data has been recommended by the Philippine Department of Health (DOH) based on its 2018 oral health survey.[14] Routine monitoring of the periodontal health status of Filipino older adults could provide the necessary data to develop and/or update policies and laws that will address the public health problem of periodontal disease among the ageing Filipino population. Therefore, this present study aimed to determine the prevalence and severity of periodontitis among Filipino older adults who participated in the Focused Interventions for Frail Older Adults Research and Development Program, using the CDC-AAP and 2018 EFP/AAP periodontal disease classification systems.

MATERIALS AND METHODS

Study Design and Participant Selection

This study on the periodontal status of Filipino older adults is a descriptive cross-sectional substudy of the Focused Interventions for Frail Older Adults Research and Development Program of the Institute on Aging, National Institutes of Health, University of the Philippines Manila.

FITforFRAIL utilized a mixed-methods approach, with quantitative and qualitative techniques. In summary, participants should have initially met the following inclusion criteria: (1) aged ≥60 years, (2) living in one of the four identified geographical regions in the Philippines, and (3) able to communicate, respond to questions, and consent to the study. The four regions, namely National Capital Region, Regions IV-A, VII, and XI, were selected based on the (1) number of older adults recorded in the 2015 Philippine population census, (2) number of geriatric specialists in the region, (3) accessibility to researchers in terms of transportation, information, and communication, (4) support from Department of Health regional office and local government units, and (5) safety of the research team.

Sample size calculation was performed based on the 7,548,769 population of older persons aged 60 and over in the 2015 census by the Philippine Statistics Authority.[16] Assuming prevalence of 50% and 95% confidence level, the computed minimum sample size was 385. The final sample size was 424, adjusting for 10% refusal. Proportionate allocation was done, based on the number of older persons in the four identified regions, and further stratified according to the percentage of males and females in each region. Participants were randomly selected from a list of older persons obtained from the Office of Senior Citizens Association (OSCA) of the study sites.

From a total of 990 randomly selected older persons, 504 gave their consent to participate in a sequential assessment, which included a Comprehensive Geriatric Assessment interview,[17] Montreal Cognitive Assessment, Mini Nutritional Assessment, World Health Organization Quality of Life: Brief Version (WHOQoL-BREF), medical examination, oral health assessment, and laboratory testing.

Only 316 participants underwent oral health assessment because of dropouts at different stages of the study. Reasons for dropping out included the following: no response after follow-up/rescheduling, no longer interested, not allowed by relatives, too busy, sick, out of town, deceased, and no reason provided. Inclusion criterion for the periodontal component of FITforFRAIL was the presence of ≥2 teeth, based on periodontal classification systems requiring a minimum of two teeth to be able to diagnose a patient with periodontitis.[9,18] Among the 316 participants who underwent the oral health assessment, 133 were excluded from the periodontal component of FITforFRAIL. Eighty-one were completely edentulous, while 52 dentate participants were excluded due the following reasons: only one tooth remained (9 participants), remaining teeth were mostly root fragments
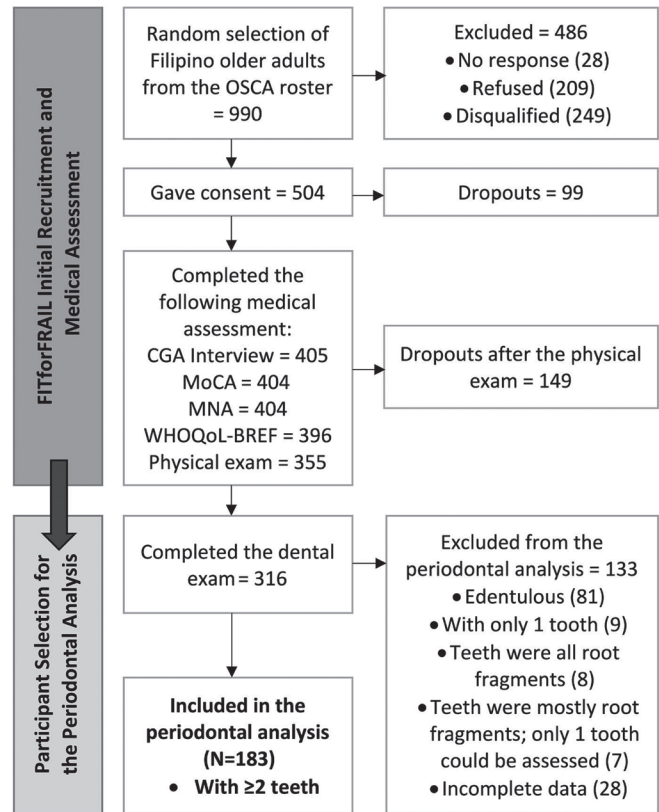
Figure 1. Flow diagram of participant screening for inclusion in the periodontal analysis of FITforFRAIL.

OSCA – Office of Senior Citizens Affairs; CGA – Comprehensive Geriatric Assessment; MoCA – Montreal Cognitive Assessment; MNA – Mini Nutritional Assessment; WHOQoL-BREF – World Health Organization Quality of Life: Brief Version

and only one tooth could be assessed for its periodontal condition (seven participants), remaining teeth are all root fragments (eight participants), or incomplete data/unfinished assessment arising from limitations of not being able to record probing depths and/ or clinical attachment levels due to patient discomfort, calcular deposits, and tooth mobility (28 participants). This left a total of 183 participants who were included in this substudy on the periodontal conditions of FITforFRAIL participants. Figure 1 shows the flow diagram starting from initial recruitment of FITforFRAIL participants to the determination of the participants to be included in the periodontal analysis.

Periodontal Assessment and Disease Classification

Periodontal assessment was conducted following the data collection protocol of the United States National Health and Nutrition Examination Survey (NHANES) 2009-2012.[19] Prior to the examination of the participants, three dentists underwent a training and calibration session conducted by a Philippine Board of Periodontology certified periodontist. All four dentists then performed full mouth periodontal evaluation using a UNC-15 probe (Hu-Friedy™). For each

tooth, the probing pocket depth (PPD) and gingival recession (GR) were recorded at six sites (distobuccal, mid-buccal, mesiobuccal, mesiolingual, mid-lingual, and distolingual). Clinical attachment loss (CAL) was computed as the sum of PPD and GR.

Periodontal analysis was conducted for the eligible 183 participants who had at least two remaining teeth. Periodontal diagnoses were assigned based on two classification systems: the CDC-AAP case definitions for surveillance of periodontitis[9] and the 2018 EFP/AAP classification.[18,20,21]

The CDC-AAP classification distinguishes periodontal conditions as follows: (1) no periodontitis are cases that do not exhibit any of the features indicated for mild, moderate or severe periodontitis, (2) mild periodontitis is characterized by ≥2 interdental sites with CAL ≥3 mm, and PPD ≥4 mm on at least two interdental sites that are not on the same tooth or one site with PPD ≥5 mm, (3) moderate periodontitis is defined by the presence of CAL ≥4 mm on ≥2 interdental sites that are not on the same tooth, or the presence of PPD ≥5 mm on ≥2 interdental sites that are not on the same tooth, and (4) severe periodontitis, wherein cases present with CAL ≥6 mm on ≥2 interdental sites that are not on the same tooth and at least one interdental site with PPD ≥5 mm.[9]

On the other hand, when categorizing based on the 2018 EFP/AAP classification of periodontal diseases and conditions, periodontitis cases may fall under the following disease severity: (1) stage I, which is initial/mild periodontitis characterized by a maximum interdental CAL of 1-2 mm, (2) stage II, which is moderate periodontitis with a maximum interdental CAL of 3-4 mm, (3) stage III, which is severe periodontitis characterized by a maximum interdental CAL ≥5 mm, with potential for additional tooth loss, and (4) stage IV, also with greatest interdental CAL ≥5 mm, which is severe periodontitis with extensive tooth loss and potential for loss of the dentition.[10,18] In this study, participants whose conditions were classified as stages III and IV were collectively grouped as severe periodontitis.

Clinical periodontal measures were evaluated following the Joint European Union/USA Periodontal Epidemiology Working Group's standards for reporting the prevalence and severity of periodontitis in epidemiologic studies.[8] Mean PPD and CAL of all assessed periodontal sites were calculated. Moreover, the prevalence of at least one affected site, and the proportion of sites and teeth per mouth with PPD of ≥4 and ≥6 mm and CAL of ≥3 and ≥5 mm were determined.

Data Analysis

Descriptive statistics [frequency, percentage, and mean ± standard deviation (SD)] were used to report sociodemographic variables and the periodontal diagnoses of the participants. The clinical periodontal measures used to indicate the extent and severity of periodontitis (PPD and CAL) were presented as mean [standard error (SE)] or percentage (SE). Statistical computations were performed using IBM SPSS Statistics at a 0.05 significance level.

Ethics Approval

This study received technical and ethical approval from the University of the Philippines Manila Research Ethics Board (UPMREB 2017-422-01).

Table 1. Sociodemographic Characteristics of the Study Participants

Sociodemographic Characteristic	Total (n=183)	Age Group		
		60-69 years old (n=116)	70-79 years old (n=51)	≥80 years old (n=16)
		Frequency (%) / Mean ± SD		
Age, years	68.4 ± 6.7	64 ± 2.6	74.1 ± 2.8	82.4 ± 1.9
Sex				
Male	73 (39.9)	48 (41.4)	18 (35.3)	7 (43.8)
Female	110 (60.1)	68 (58.6)	33 (64.7)	9 (56.3)
Highest educational attainment				
No formal education	0 (0)	0 (0)	0 (0)	0 (0)
Elementary	60 (33)	33 (28.5)	18 (36)	9 (56.3)
High school	47 (25.8)	33 (28.5)	13 (26)	1 (6.3)
Vocational	8 (4.4)	7 (6)	0 (0)	1 (6.3)
College	48 (26.4)	34 (29.3)	10 (20)	4 (25)
Post-graduate	19 (10.4)	9 (7.8)	9 (18)	1 (6.3)
Smoking status				
Current smoker	24 (13.1)	20 (17.2)	4 (7.8)	0 (0)
Former smoker	59 (32.2)	34 (29.3)	17 (33.3)	8 (50)
Non-smoker	100 (54.6)	62 (53.5)	30 (58.8)	8 (50)
Diabetes mellitus	32 (17.5)	23 (19.8)	7 (13.7)	2 (12.5)
Tooth Count				
With <20 teeth	129 (70.5)	78 (67.2)	39 (76.5)	12 (75)
With ≥20 teeth	54 (29.5)	38 (32.8)	12 (23.5)	4 (25)
Mean number of teeth	14.5 ± 8.0	15.3 ± 8.3	13.1 ± 7.1	13.25 ± 8.2

RESULTS

Sociodemographic Characteristics

The sociodemographic characteristics of the 183 participants are shown in Table 1. The mean age of the participants was 68.4 (SD= ± 6.7). Majority were young old, aged 60-69 (mean age ± SD= 64 ± 2.6), followed by the middle old who were aged 70-79 (mean age ± SD= 74.1 ± 2.8). Only 8.7% of the participants belonged to the old-old age group of ≥80 years (mean age ± SD= 82.4 ± 1.9). There were more females for all age groups, and among all participants, the greatest percentage was recorded for those whose highest educational attainment was elementary. Majority were non-smokers, with only 13.1% claiming to be current smokers. The overall prevalence of diabetes was 17.5%. Most of the participants had <20 remaining teeth, with a mean number of 14.5 teeth per participant.

Prevalence and Severity of Periodontitis

A high prevalence of periodontitis was recorded among the participants, using both periodontal classification systems. Based on the CDC/AAP case definitions, a total of 178 (97.3%) were diagnosed with periodontitis. The classification of periodontitis severity, stratified by age group, can be seen in Figure 2.

When the periodontal conditions of the participants were diagnosed using the 2018 EFP/AAP classification, a 100% prevalence of periodontitis was observed. None of the participants were diagnosed with gingivitis or initial/mild periodontitis. Moreover, an upward trend in the percentage of severe periodontitis (Stages III and IV) can be seen with increasing age, as shown in Figure 3.

Prevalence, Extent, and Mean Values of Clinical Periodontal Measures

The extent and severity of periodontitis based on threshold values of PPD (≥4 mm and ≥6 mm) and CAL (≥3 mm and ≥5 mm), stratified by age group, are reported in Table 2.

The mean probing pocket depth was 2 mm. Majority of the older adults (64.5%) had at least one site with PPD ≥4 mm and approximately a quarter (24.6%) had one or more sites with PPD ≥6 mm. On average, 8.5% of all periodontal sites of each participant exhibited PPD of ≥4 mm, while only 1.2% of participants' total sites had PPD ≥6 mm. Moreover, more than one in five (22.5%) teeth per participant were found to have PPD ≥4 mm, with about 4.7% of the teeth affected by PPD of ≥6 mm.

On the other hand, the mean clinical attachment loss was 4.2 mm. All of the participants presented with at least one site with ≥3 mm clinical attachment loss, while almost all (94.5%) had one or more sites with CAL ≥5 mm. On average, each participant was found to have CAL ≥3 mm in 81.5% of examined sites, with slightly more than one-third (34.5%) of sites having CAL ≥5 mm. Almost all teeth per participant (92.4%) manifested CAL ≥3 mm and more than half of each participant's teeth (55.5%) had CAL ≥5 mm.

DISCUSSION

This substudy of FITforFRAIL examined the periodontal status of a representative sample of Filipino older adults. None of the participants were diagnosed with a healthy periodontium. All presented with some form of periodontal disease, with a high prevalence of periodontitis
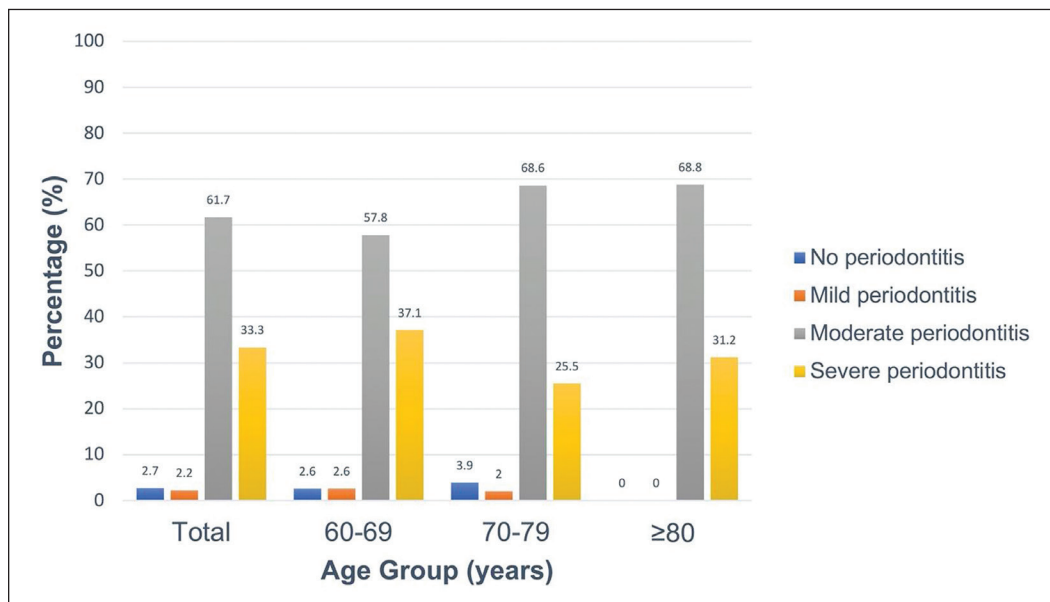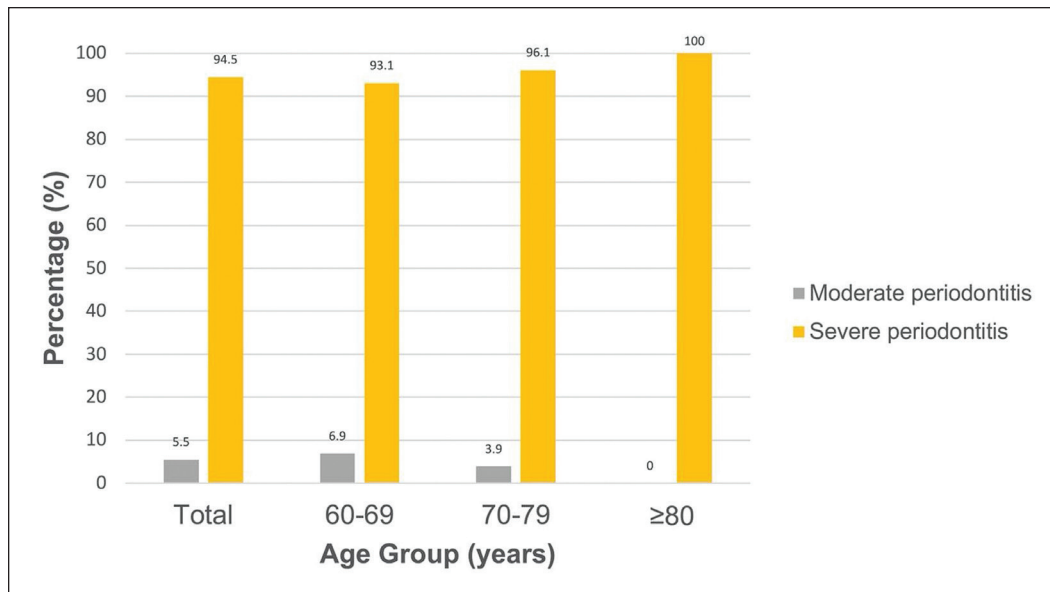

Figure 2. Percentage distribution of participants according to the Centers for Disease Control-American Academy of Periodontology case definitions[9] in total and according to age.

Table 2. Mean Probing Pocket Depth (PPD) and Clinical Attachment Loss (CAL), Prevalence of at least One Affected Site per Mouth, and the Proportion of Sites and Teeth per Mouth with PPD of ≥4 and ≥6 mm and CAL of ≥3 and ≥5 mm, in Total and Stratified by Age Group

Clinical Periodontal Measure	Total (n=183)	Age Group		
		60-69 years old (n=116)	70-79 years old (n=51)	≥80 years old (n=16)
		Percentage (SE); Mean (SE)		
Probing pocket depth				
Mean PPD (mm)	2 (0.1)	2 (0.1)	2 (0.1)	1.8 (0.2)
Prevalence of PPD ≥4 mm	64.5 (3.5)	67.2 (4.4)	64.7 (6.7)	43.8 (12.4)
Prevalence of PPD ≥6 mm	24.6 (3.2)	25 (4)	23.5 (5.9)	25 (10.8)
Proportion of sites/mouth with PPD ≥4 mm (%)	8.5 (1)	8.2 (1.1)	9.7 (2.3)	7.5 (3.5)
Proportion of sites/mouth with PPD ≥6 mm (%)	1.2 (0.3)	1.1 (0.4)	1.4 (0.5)	1.7 (1)
Proportion of teeth/mouth with PPD ≥4 mm (%)	22.5 (2)	22.4 (2.4)	24.2 (4.1)	17.5 (7.1)
Proportion of teeth/mouth with PPD ≥6 mm (%)	4.7 (1)	4.1 (1)	5.8 (2.4)	6 (3.1)
Clinical attachment loss				
Mean CAL (mm)	4.2 (0.1)	4.1 (0.1)	4.2 (0.2)	4.4 (0.4)
Prevalence of CAL ≥3 mm	100 (0)	100 (0)	100 (0)	100 (0)
Prevalence of CAL ≥5 mm	94.5 (1.7)	93.1 (2.4)	96.1 (2.7)	100 (0)
Proportion of sites/mouth with CAL ≥3 mm (%)	81.5 (1.2)	81.2 (1.6)	82.5 (2)	80.8 (5.2)
Proportion of sites/mouth with CAL ≥5 mm (%)	34.5 (2)	32.8 (2.4)	36.9 (4)	38.6 (6.7)
Proportion of teeth/mouth with CAL ≥3 mm (%)	92.4 (1)	91.4 (1.3)	95.5 (1.2)	89.6 (4)
Proportion of teeth/mouth with CAL ≥5 mm (%)	55.5 (2.4)	53.7 (3.1)	59.1 (4.4)	57.2 (8)

Figure 3. Distribution of participants according to the 2018 European Federation of Periodontology/American Academy of Periodontology[18] classification in total and according to age.

observed using both the CDC/AAP case definitions (97.3%) and 2018 EFP/AAP classification (100%). This contrasts with the 2018 National Survey on Oral Health in the Philippines, wherein 16.42% of older adults aged 65-74 were found to have a healthy periodontal status, with the remaining 83.58% observed to have periodontal disease.[14] In the 2011 National Monitoring and Evaluation Dental Survey (NMEDS), the reported percentage with healthy periodontium (54.9%) among those in the 65-74 age group was even higher and only 45.1% had some form of periodontal disease.[22] However,

methodological differences preclude a direct comparison of the present study with both the 2018 NSOH, which used a modified Community Periodontal Index[23] and the 2011 NMEDS that employed the Community Periodontal Index of Treatment Needs.[22] The two earlier oral health surveys did not distinguish gingivitis from periodontitis cases and reported the two types of periodontal conditions collectively. In addition, the present study employed a full-mouth recording protocol, while both the 2018 NSOH and 2011 NMEDS used partial recording, wherein the mouth was

divided into sextants, and only one index tooth per sextant was examined. Assessment of all six sites on all teeth remains the gold standard for determination of periodontal disease,[24] since partial assessment and recording protocols may result in underestimation of periodontal disease prevalence.[25,26]

On the other hand, similar to the present study, previous research in other countries have also observed a high prevalence of periodontitis using the CDC/AAP case definitions, albeit with relatively lower percentages compared to the present study. In an investigation by Eke et al. on older adults aged ≥65 years in the USA, 68% were diagnosed with periodontitis,[27] while other studies on ≥65-year-old community-dwelling older adults in Northern Manhattan (USA) and Takahagi (Japan) reported prevalence of 80.3% and 84.2%, respectively.[28,29] Moreover, severe periodontitis was more prevalent (33%) in this present study compared to the 11.0% and 23% prevalence of severe disease that was noted in the two studies that examined older adults in the USA. However, a higher percentage (49.8%) of older adults in the Japanese study were discovered to have severe periodontitis.

One possible explanation for the generally higher prevalence of both overall and severe periodontitis among the study participants while using the CDC-AAP classification could be the higher percentage of smokers in this current study compared to those in the two studies that assessed American populations.[27,28] Epidemiological studies have established the role of smoking as a risk factor for periodontitis. Moreover, clinical investigations in different populations confirm more severe attachment and bone loss, as well as an increased likelihood of disease progression in smokers as compared with nonsmokers.[30] In addition, the higher prevalence of diabetes mellitus among the Filipino participants in comparison to that of the Japanese elderly, could also account for the higher prevalence of periodontitis in the current study. As with cigarette smoking, diabetes is also an established risk factor that increases susceptibility to the onset of periodontitis. Patients with chronic hyperglycemia exhibit greater periodontal destruction and poorer treatment outcomes.[6,31,32] On the other hand, the higher severity of severe periodontitis among the Japanese older adults may be due to their greater mean number of teeth in the oral cavity (23.1 ± 5.3), compared to the average tooth count among the Filipino older adults in this current study (14.5 ± 8.0). It has been proposed that patients with greater numbers of retained teeth would have higher levels of oral disease, given that more teeth may potentially be affected. In a study by Joshi et al., the extent of clinical attachment loss increased as the number of retained teeth increased.[33] However, the higher attachment loss in retained teeth may be associated with greater risk of tooth mortality.[34]

This present study also classified the periodontal conditions of the participants based on the 2018 EFP/AAP classification.[18,20,21] In 2015, the Joint EU/USA Periodontal Epidemiology Working Group had proposed that the case definitions developed by the Centers for Disease Control and the American Academy of Periodontology in 2012 be employed in population-based periodontal epidemiological investigations that would standardize reporting of periodontal conditions and enable comparison of data from different populations.[8,9] However, during the 2017 World Workshop on the Classification of Periodontal Diseases and Conditions, the group of periodontal experts who convened and approved the 2018 EFP/AAP classification, set the threshold for CAL at ≥1 mm to diagnose a patient with periodontitis.[18] This contrasts with the CDC/AAP classification, wherein CAL should be ≥3 mm for a case to be designated as periodontitis.[9] Decreasing the CAL threshold to ≥1 mm in the 2018 classification was proposed to increase sensitivity and prevent missing out on the detection of early stages of periodontitis.[10] Recent epidemiological studies that compared the prevalence of periodontitis using 2018 EFP/AAP classification and the CDC/AAP case definitions have reported higher prevalence when classifying based on the newer system.[35,36]

Using the 2018 EFP/AAP classification, a higher prevalence of both overall (100%) and severe periodontitis (94.5%) was detected in the present study's participants, in comparison to that obtained with the CDC/AAP case definitions. Similarly, high percentages of periodontitis were observed in previous studies that employed the 2018 disease classification system. In a study by Ju et al. in 2022, the researchers also reported a 100% prevalence of periodontitis among Australian older adults aged ≥60 years based on dental records obtained from 2013 to 2014.[37] Moreover, in another study that examined the periodontal status of a Norwegian population, 96.6% of the participants aged 60 years and older were found to have periodontitis.[38] However, the prevalence of severe periodontitis (Stages III and IV) was relatively higher in the present study, which may possibly be attributed to the higher percentage of smokers among the Filipino participants in comparison to the Australian and Norwegian older adults in the two other studies. As mentioned earlier in the discussion, greater periodontal destruction as seen in attachment levels and bone loss have been observed in smokers because of the impairment of the host response.[30]

The extent and severity of periodontitis based on threshold values of PPD (≥4 mm and ≥6 mm) and CAL (≥3 mm and ≥5 mm) were also determined in this study. In general, all PPD and CAL measures were higher in comparison with those observed in American, Australian, Japanese, and Norwegian populations.[27-29,37,38] Aside from the higher prevalence of smokers and diabetics among the Filipino older adult participants, a possible contributory factor could be the limited procedure coverage of the Philippine Department of Health's Oral Health Program. Under this program, services of the DOH and local government units that can be availed by older adults aged 60 years and above include only the following: (1) dental examination, (2) patient education on proper oral hygiene, diet, and the adverse effects of smoking, alcohol, and sugar-containing

food and beverages, and (3) oral urgent treatment, including pain management and extraction of unsavable teeth.[39] The Philippine Universal Health Care Act stipulates that all Filipino citizens are entitled to dental benefits, as implemented by the Philippine Health Insurance Corporation (PhilHealth).[40] However, the dental services covered by PhilHealth do not include preventive or therapeutic periodontal procedures such as scaling and root planing, and are limited to treatment of sequelae of dental caries.[41]

To the researchers' knowledge, this is the first study that has reported the periodontal conditions of Filipino older adults based on full mouth assessment of six sites on all teeth. Previous national oral health surveys used a partial recording protocol in determining periodontal disease prevalence.[14,22] However, certain limitations should be considered in interpreting the results of this study. The small sample size may not permit generalization to the entire population of Filipino older adults. Due to multiple dropouts at various stages of medical assessment of the participants, only 316 of the original 504 who gave consent underwent oral health assessment, with further reduction in those qualified to be included in the periodontal analysis. Second, the exclusion of older adults who did not complete periodontal assessment because of discomfort may have resulted in selection bias. Lastly, the inherent limitation that comes with self-reported smoking habits applies to this present study. Underreporting and recall bias may affect the validity of indicated smoking statuses.

CONCLUSIONS

Based on the results of the study, the prevalence of total and severe periodontitis is high among Filipino older adults, using both the CDC/AAP case definitions and the 2018 EFP/AAP classification of periodontal diseases and conditions. Future studies for regular monitoring of the oral health of Filipino older adults are recommended on a higher number of participants.

Implications for Policy and Recommendations

The high prevalence of periodontitis among the ageing Filipino population is a public health problem that needs to be addressed. Aside from the present study's results, the 2018 NSOH reported 45.21 odds of having periodontal disease among Filipinos aged 65 to 74 years.[14] Treatment of periodontal diseases is straightforward and geared towards resolving inflammation, maintaining teeth, and preventing further tooth loss. Tooth loss may lead to chewing impairment, which in turn could affect nutritional intake and increase the risk for frailty. Complete edentulism and having less than 20 teeth may have a negative impact on the daily living of the elderly. In addition, functional as well as esthetic impairment from tooth loss may negatively impact the oral health-related quality of life.[42] Therefore, the authors recommend the following:

1. Expansion of oral health benefits through PhilHealth, the DOH, and local government units, to include treatment of gingivitis (scaling) and periodontitis (scaling and root planing)
2. Implementation of policies that would increase the current availability of the DOH's mobile dental care, with home visits for simple procedures such as oral hygiene instruction, scaling, and tooth extraction for frail elderly
3. Strengthening of periodontal health programs for all age groups, since timely preventive treatment of younger age groups would reduce the prevalence of periodontitis and tooth loss of older adults in the future
4. A surveillance system through the DOH, Philippine Dental Association, and educational/research institutions to regularly monitor the oral health conditions of the elderly, and provide updated data/evidence for future policy recommendations
5. Employment of the 2018 EFP/AAP classification system in future oral health surveys since the system has increased sensitivity and prevents missing out on the detection of early periodontitis

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

The authors declared that they have no conflicts of interest concerning this study.

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