PERIODONTAL STATUS ACCORDING TO COMMUNITY PERIODONTAL INDEX AMONG 40+ YEARS ADULTS IN MTWARA RURAL SETTINGS

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Summary

Objective: To study the periodontal health status of Mtwara adult population aged 40[+] years.
Design: A cross-sectional descriptive study
Settings: Mtwara Rural district
Main outcome measures: Presence of gingival bleeding on gentle probing, dental calculus, probing periodontal pocket depth (PPD): 4-5 mm or 6+ mm, according to Community Periodontal Index (CPI).
Results: A total of 201 adults (males 115 (55.8%) and females 86 (44.2%)), aged 40[+] years were recruited. Based on hierarchical CPI scoring (Score 0-4), no participant had healthy periodontal tissues or gingival bleeding as highest CPI score. The prevalence for calculus was 13.9% and there were more males than females that had calculus (p=0.019). The prevalence of PPD 4-5 mm and 6+ mm were 41.8% and 44.3%, respectively. The mean number of sextants with PPD 4-5 mm was higher in males than in females (p=0.009), but for PPD 6+ mm, there was no difference.
Conclusion: The findings of this study population have shown an extremely high prevalence of gingival bleeding, high prevalence of calculus and periodontal disease but of low severity. The Mtwara Rural adult population aged 40+ years should be considered at increased risk for destructive periodontal disease, and hence need to plan for a preventive intervention.

Key words: Gingival bleeding, Calculus, Periodontal pockets, Community Periodontal Index, Mtwara Rural.

Introduction

Periodontal conditions that affect adult population in Tanzania as reported from basic oral health surveys include among others, dental calculus, gingival bleeding and periodontal diseases.[1-4] Importance of these basic oral health surveys is that they provide a sound basis for estimating oral health status of a population and its future needs for oral health care, and for monitoring changes in the levels and patterns of oral diseases and conditions.[5]

For epidemiological studies on the prevalence of periodontal diseases globally has been using among other indices, the Community Periodontal Index of Treatment Needs (CPI-TN)[6]. The CPI-TN has been used for the assessment of prevalence of periodontal diseases and periodontal treatment needs in different communities worldwide using the community periodontal index (CPI) and treatment needs (TN) components of the CPI-TN index respectively, irrespective of differences in socioeconomic status in the communities studied. At present, as from 1997, the World Health Organization (WHO) recommends the use of CPI alone and excludes the assessment of treatment needs (TN) at a community level and therefore the index CPI-TN has been changed to CPI[5]. However, the scoring criteria for

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periodontal disease assessment at the community level for the key variables (gingival bleeding, calculus, periodontal pockets (3.5-5.5 mm and 6[+] mm) and the periodontal probe used under the CPITN and CPI indices remains exactly the same as before[5, 6].

Outcomes of using CPITN or CPI for the assessment of periodontal disease prevalence utilizing the partial mouth approach (use of index teeth no. 17, 16, 11, 26, 27, 31, 36, 37, 46 and 47) resulted to under-estimation of periodontal diseases.[7] However, whenever necessary the use of full mouth examination but with hierarchical recording in respective sextants (partial recording) has been recommended[8] to address the problem of under-estimation, particularly the one that occurs as a result of site-specificity prevalence of periodontal disease.[9]

Data on periodontal diseases in Africa based on CPI indicates that prevalence of dental calculus was very common and occurrence of shallow pockets (probing periodontal pocket depth (PPD) 4-5 mm were fairly high, whereas deep periodontal pockets (PPD 6+ mm) were infrequent.[10] In Tanzania, it has been reported that the most significant risk factors for periodontal diseases among others were, age 40 years and above, rural residence, and presence of dental calculus.[11, 12] Reports on periodontal status in rural adult population in Tanzania are scarce and these included studies in Morogoro rural in Morogoro region and Ukonga rural in Dar-es-Salaam region.[2, 4] Earlier CPI findings on adult population in Ukonga rural had shown that the prevalence of periodontal conditions (gingival bleeding and dental calculus) was very high ranging from 95 to 98 percent[4]. From the same study, it was reported that prevalence of periodontal pockets of 4-5 mm ranged from 14% to 38% in different age groups (45-88 years), whereas periodontal pockets of 6+ mm ranged from about 2% to 5% among adults aged 55-88 years.[4] Studies on periodontal status conducted on general adult population in Tanzania have shown that gingival bleeding and dental calculus affect almost the entire population, whereas periodontal pockets affected only a small proportion of the population.[3, 4] For example, Mosha and coworkers[13] reported that periodontal pockets were a rare finding among the 35-44 and 55[+] years age groups in two regions (Tanga and Mbeya) that were studied. In Zanzibar and Pemba Islands, among adults aged 30-69 years, it was found that 45-88% and 5-33% had periodontal pockets 4[+] mm and 7[+]mm respectively.[3] The differences in relation to diagnostic criteria, the diversity of the population examined and the variation in the way data are presented render the comparison of findings from different studies difficult.[3] However, use of Community Periodontal Index among other things, has been found as relatively more appropriate where comparison of the findings would be needed for prioritizing and planning of oral health services.[14] From the review of literature on

periodontal conditions in Tanzania, among others, one problem is evident that the periodontal status among adults in remote areas such as Mtwara is not known. Lack of such information usually makes the exercise of proper planning for oral health services specific to those areas difficult.

This study is therefore, aimed at assessing the periodontal health status by scoring gingival bleeding on gentle probing, dental calculus and probing periodontal pocket depths in adult population aged 40^+ years in Mtwara region.

Study participants and methods

Ethical clearance to conduct the study was obtained from the Ethical Committee of the Muhimbili University College of Health Sciences (MUCHS). From the Regional Medical Officer in Mtwara, we obtained permission to carry out the study in region. This study was conducted in adult population in Mtwara Rural, one of the districts in Mtwara region located in Southeast cost zone in Tanzania. Mtwara region was sampled conveniently because there was another study that was going on in this region. The design of the study was a cross-sectional descriptive one. The sampling frame consisted of all the four districts in Mtwara region that are Mtwara urban, Mtwara rural, Tandahimba, Newala and Masasi. A simple random sampling was done whereby five small pieces of paper were printed the name of one district each and folded accordingly and put on the table to pick one paper and therefore one district, Mtwara Rural was sampled. Administratively, the districts are divided into Wards and further subdivided into villages. From the 2002 Tanzania population and housing census regional and district age groups report, the population of Mtwara region and Mtwara Rural district was 1,124,481 and 204,157 inhabitants, respectively, and age 40^+ years were 23% and 23.06%, respectively[15].

A multistage simple random sampling technique was conducted from ward to village levels whereby five villages were selected to form the study sites. The Ward and Village leaders took part in the sampling exercise as when the small pieces of papers were printed the names of the wards and villages and folded, one of the leaders was asked to pick one paper which then formed part of the sampled wards/villages, accordingly. The villages that were studied were Imekuwa and Majengo in Naumbu ward, Chekereni in Kitere ward, Njengwa in Njengwa ward and Namkuku in Nanyamba ward. With the help of Regional Dental Officer in Mtwara Region, the authority in the sampled district, wards and Villages were visited and purpose of the study explained in a simple understandable language. The Village leaders informed their people about our visit and the study and requested them to gather in one place which was selected by the leaders themselves after having explained the minimal requirements in terms of accessibility, shelter, room space and daylight illumination. Again when the villagers were gathered together, adults were informed of the purpose of the study in a comprehensible manner and "an informed consent" was sought from them. Those willing to participate in the study were enrolled accordingly. Age was the only

inclusion/exclusion criteria and all adults aged 40 years and above were included. However, the rest of the population were not included in the study but those in need for oral health service were examined and an emergency service was rendered free as reported in detail elsewhere[16].

A total of 201 participants were successfully recruited; males (115) and females (86) for this study apart from twelve participants who for unknown reasons had absconded (Table 1). Based on self-reported age, the study participants ranged from 40 to 95 years old, with a mean age of 54.98 years. The difference in participation rate among males and females in different age groups was not statistically significant. The study population representative ness to the Mtwara rural district and Mtwara region population was 0.43% and 0.08%, respectively.[15]

Table 1. Distribution of study participants by age groups and gender

Age group (years)	Gender		Total
	Male	**Female**	
	n (%)	**n (%)**	**n (%)**
40 - 44	19 (48.7)	20 (51.3)	39 (19.4)
45 - 54	40 (58.8)	28 (41.2)	68 (33.8)
55 - 64	28 (54.9)	23 (45.2)	51 (25.4)
65 - 74	17 (63.0)	10 (37.0)	27 (13.4)
75^+	11 (68.8)	5 (31.2)	16 (8.0)
All	**115 (55.8)**	**86 (44.2)**	**201 (100.0)**

Clinical examination was done in village public buildings (school buildings, dispensaries and Village government buildings), indoors in rooms that permitted optimal use of daylight. Study participants were seated in normal office or other chairs that had backrest and all the time they faced opened windows that allowed optimal use of natural daylight. Intra-oral examination using the specifically designed Community periodontal index probe (CPI probe)[5,6], included all teeth present plus the third molars (CPI - full mouth examination and partial recording approach) as an alternative to the commonly used CPI index teeth (teeth code. no. 17, 16, 11, 26, 27, 31, 36, 37, 46 and 47) for the purpose of increasing sensitivity in periodontal disease diagnosis as identification of periodontal pockets among other things, varies according to tooth type, tooth site/surface.[9]

The code number system used to indicate each specific tooth in the mouth was in accordance to the International Dental Federation (FDI) coding system.[5] The first digit (1, 2, 3 and 4) specifies the quadrant of the mouth starting with upper right, upper left, lower left and lower right). The second digit in each code number (1-8) specifies the actual tooth, starting with first incisor, second incisor, canine, first premolars, second premolar, first molar, second molar and finally the third molar (wisdom tooth). As recommended by WHO, during intraoral examination and recording, in designating a tooth, the examiner had to call the quadrant number, then the tooth number-for example, the upper right second incisor, 12= "one-two" rather than twelve; the lower left third molar, 38 = "three-eight" rather than "thirty-eight".[5]

The mouth was divided into sextants defined by tooth code numbers: 18-14, 13-23, 24-28, 38-34, 33-43 and 44-48, whereby the highest score in relation to periodontal status was recorded in each sextant in accordance to the Community Periodontal Index.[5] A sextant that had all teeth missing was excluded from the examination. Three indicators used for periodontal status assessment were gingival bleeding on gentle probing, dental calculus, and probing periodontal pocket depth. Scoring criteria was based on the "highest score in the hierarchical CPI scoring system" as follows: Healthy periodontal tissues (CPI = 0), gingival bleeding on gentle probing (CPI = 1), dental calculus (CPI = 2), probing periodontal pocket depth of 4-5 mm (CPI = 3), and probing periodontal pocket depth of 6+ mm (CPI = 4). The periodontal examination instruments used were the mouth mirror and the specially designed lightweight CPI probe with a 0.5 mm ball tip marked with a black band at 3.5-5.5 mm and 8.5-11.5 mm from the ball tip[5]. Three dentists (EGS, MM and PM as examiner 1, 2 and 3 respectively) performed the clinical examination and calibration was done before and during the study. For intra-examiner reproducibility, examiner 1, 2 and 3 examined a total number of 24, 18 and 30 cases in terms of sextants, respectively. Also examination of 30 cases in terms of sextants was conducted for inter-examiner reproducibility. The interval between duplicate measurements were about one hour and two hours for inter-examiner and intra-examiner reproducibility, respectively as the village/rural setting could not allow for a much longer period. The Cohen's Kappa statistics (chance corrected proportional agreement) for each of the six sextants examined ranged from 0.4 to 1.0, which indicated a moderate to perfect agreement[17, 18]

Data analysis

Data were entered into a personal computer and analyzed using Statistical Package for Social Sciences (SPSS) 10.0 for Windows. Frequency tables and cross-tabulations were generated for different age groups by gender, and the "hierarchical CPI score" findings for periodontal diseases and conditions for proper presentation, as recommended by WHO[5]. Further analyses were performed whereby the study participants were grouped into a dichotomized age group, using a cut off point of 55 years (an age that formerly one retires from work in Tanzania), and thus having two groups of study participants, 40-54

years and 55+ years age group. Also, additional analyses were done using cross-tabulation of the CPI findings by singly counted sextants and grouped sextants up to half mouth (1-3 sextants) and more than half mouth (4-6 sextants). Statistical tests applied were Pearson's Chi-square (X^2) test for all categorical data and the Student's t-test to compare the mean number of sextants (± standard deviation) that had "specific CPI score or higher" by age groups and gender. For all analyses, the level of statistical significance was set at p< 0.05. Also the 95% confidence intervals for the inferred general population were computed for the mean number of sextants (± standard deviation) that had "specific CPI score or higher".

Results

The proportion of study participants with specific CPI scores is shown in Table 2. Assessment of periodontal status using the CPI hierarchical scoring system revealed that none of the study participants had healthy periodontal tissues - CPI score "0" as highest" and the same was the case for gingival bleeding - "CPI score "1" as highest" (Table 2). In the age group of 40-54 years and 55+ years, most (94.5%) of the study participants had 4-6 sextants (compared to 1-3 sextants) with gingival bleeding or higher CPI score, and the difference was statistically significant (p=0.000). The proportion of study participants that had dental calculus - "CPI score "2"as highest" was 13.9% (Table 2), and there were more males than females particularly in the age group of 45-54 years (p=0.019). The proportion of study participants that had probing periodontal pocket depth 4-5 mm (CPI score "3") and 6+ mm (CPI score "4") as highest" were 41.8% and 44.3%, respectively (Table 2).

The mean number of sextants with a specified CPI score or higher is shown in Table 3. The mean number of sextants that had healthy periodontal tissues was extremely low, accounting for a fraction of a sextant (0.06 ± sd 0.28) for all study participants, whereas in the in the 40-44 years age group it was 0.51 ± 0.22 sextants; and 0.11 ± 0.42 sextants in the 65-74 years age group. The highest mean number of sextants that had gingival bleeding or higher CPI score was high 5.95 ±0.22 sextants in the 40-44 years age group. The differences in the mean number of sextants with "gingival bleeding or higher CPI scores" in males (5.57 ± 1.09) as compared to females (5.62 ± 0.90) was not statistically significant.

Table 2. Percentage of study participants that had a specified Community Periodontal Index (CPI) score "as highest " by age groups

Age group (years)	*Healthy (CPI=0) n (%)	*Gingival Bleeding (CPI=1) n (%)	Dental Calculus (CPI=2) n (%)	Periodontal Pocket 4-5 mm (CPI=3) n (%)	Periodontal Pocket 6+ mm (CPI=4) n (%)	Total n (%)
				Percentage of study participants who had "as highest CPI score"		
40-54	-	-	17 (15.9)	38 (35.5)	52(48.6)	107 (53.2)
55+	-	-	11 (11.7)	46 (48.9)	37(39.4)	94 (46.8)
All	**-**	**-**	**28 (13.9)**	**84 (41.8)**	**89 (44.3)**	**201 (100.0)**

*No study participant had healthy periodontal tissues (CPI=0) or gingival bleeding (CPI=1) "as the highest score"

However, the mean number of sextants with calculus or higher CPI score was high (4.93 ± 1.62 to 5.95 ± 0.22) in all study participants. Among the participants aged 55+ years, the mean number of sextants that had PPD 4+ mm ranged from 2.75 ± 2.05 to 3.18 ± 1.82. The mean number of sextants that had PPD 6+ mm was relatively highest (1.13 ± 1.73) in the age group 40-44 years and decreased with an increasing age up to (0.63 ± 0.79) in the 65-74 years age group (Table 3). The mean number of sextants with probing periodontal pockets of 4+ was significantly higher in males than in females (p=0.009). However, the study participants that had PPD of 6+ mm did not show any significant difference between males and females.

The mean number of sextants excluded from periodontal examination showed a tendency to increase with age, from 0.02 ± 0.17 to 0.96 ± 1.63 sextants in the 45 to 74 year old participants (Table 3). Most (93.5%) of the excluded sextants were found among study participants in the 55+ years age group. The difference in the proportion of study participants with excluded sextants (either 1-3 or 4-6 sextants) in the age groups 40-54 years and 55+ years was not statistically significant.

The inferred CPI findings for the general adult population aged 40+ years in Mtwara Rural district is shown in Table 4. When the findings from this study population were inferred to the general adult population aged 40+ years in Mtwara Rural district, all people had gingival bleeding. The presence calculus was the most common finding followed by periodontal pockets (Table 4). Periodontal pockets of 6+ mm were found in a maximum of about one sextant only (95% CI, 0.684-1.057).

Table 3. Mean number of sextants with a "specified Community Periodontal Index (CPI) score or higher" by age groups

Age group (years)	No. of study partici-pants (N=201)	Mean number of sextants with specified CPI score or higher					
		Healthy (CPI=0) mean (sd)	Gingival Bleeding or higher score (CPI=1+2+3+4) mean (sd)	Dental Calculus or higher score (CPI=2+3+4) mean (sd)	Periodontal Pocket 4-5 mm or higher score (CPI=3+4) mean (sd)	Periodontal Pocket 6+ mm (CPI=4) mean (sd)	Excluded sextants mean (sd)
40-44	39	0.51 (0.22)	5.95 (0.22)	5.95 (0.22)	3.26 (2.00)	1.13 (1.73)	-
45-54	68	0.10 (0.35)	5.87 (0.38)	5.78 (0.51)	3.09 (1.93)	0.91 (1.22)	0.02 (0.17)
55-64	51	-	5.29 (1.29)	5.27 (1.28)	3.18 (1.82)	0.76 (1.41)	0.71 (1.29)
65-74	27	0.11 (0.42)	4.93 (1.62)	4.93 (1.62)	2.78 (1.80)	0.63 (0.79)	0.96 (1.63)
75+	16	-	5.56 (1.03)	5.31 (1.35)	2.75 (2.05)	0.81 (1.28)	0.44 (1.03)
All	**201**	**0.06 (0.28)**	**5.59 (1.01)**	**5.53 (1.05)**	**3.07 (1.90)**	**0.87 (1.34)**	**0.35 (0.99)**

Table 4. The inferred Community Periodontal Index (CPI) findings for general adult population aged 40 years and above in Mtwara Rural district

Community Periodontal Index (CPI) findings	Mean No. of sextants [*N= 201]	Standard deviation (± sd)	p-value	95% Confidence Interval (95% CI)
Healthy periodontal tissues	0.059	0.276	0.003	(0.021 - 0.098)
Gingival Bleeding+ (CPI score 1 or higher)	5.587	1.012	0.000	(5.446 - 5.728)
Calculus+ (CPI score 2 or higher)	5.532	1.054	0.000	(5.384 - 5.679)
Periodontal pockets 4-5+ mm (CPI score 3 or higher)	3.075	1.900	0.000	(2.811 - 3.339)
Periodontal pockets 6+ mm (CPI score 4)	0.871	1.339	0.000	(0.684 - 1.057)
Excluded sextants	0.353	0.995	0.000	(0.215 - 0.492)

*N = Total number of study participants

Discussion

Of the two hundred and one participants studied, no gender bias was expected in the findings, as the difference in the proportion of male/female participation was not statistically significant. In relation to age among the elderly, in some few instances it was necessary to estimate the age of the participants, as they did not know possibly due to ignorance and lack of retrievable records. Such difficulties that necessitates estimation of age of some of the study participants has previously been reported in other oral health surveys in Tanzania.[3, 11] The age estimation in the few elderly individuals in this study might have introduced some bias and to some extent also it might have affected the validity of the age groups studied.

Despite the limitations pointed out about CPI by Baelum and Papapanou[19], the index was used in this study due to the fact that it is still recommended by the WHO as an appropriate epidemiological tool for assessing periodontal diseases at community level and to a great extent allows comparative analysis of the periodontal disease profile worldwide.[5, 14] Moreover, the CPI is easy to apply using the specifically designed CPI probe.[5] Although the "partial mouth" findings using the CPI index teeth are reasonably representative of the full mouth findings, in the present study it was deliberately decided to use the full mouth approach for the intention to reduce the problem of underestimation of the prevalence of periodontal disease.[20, 21] Baelum and coworkers reported that the proportion of persons with probing periodontal pocket depth of 6+ mm that could be overlooked if only index teeth are examined was 39% and 23% in the 40-44 years and 50-54 years age groups, respectively.[21] Hence, comparison of findings from the present study (which used CPI and a full mouth examination

approach with partial recording) with other CPI studies should be done with caution.

The proportion of participants that had calculus was significantly higher in males than in females, contrary to Ilala findings, where no gender difference was found.[22] Presence of calculus in the majority of the participants is a common finding in other adult populations in Tanzania and other countries in Africa such as Niger.[4, 23]

In the present study, the mean number of sextants with periodontal pockets of 4-5 mm or more was significantly higher in males than in females. Since the proportion of study participants that had calculus was also significantly higher in males than in females, and given the fact that calculus surface is always covered by an un-mineralized layer of viable bacterial plaque, this could among other things explain the observed differences in the prevalence of periodontal pockets between males and females.[24] Taking into account the age group studied and the community periodontal index used, the prevalence of periodontal pockets was higher in Mtwara rural adult population aged 40^+ years than it has previously been reported in Tanzania and other African population in Niger.[4, 23] This could among other things be explained by differences in the occurrence of risk factors in these populations, and the methodology used in respect to full- versus partial-mouth examinations.[5, 10] In relation to age, the study participants in 40-44 years age group had slightly higher mean number of sextants with 4-5 mm periodontal pockets than other age groups. This might be due to the fact that participants in the 40-44 years age group had no excluded/edentulous sextants. A factor among others such as missing teeth in the advanced age groups leading to edentulous and exclusion of sextants from examination and thus leaving fewer sextants that could be examined is thought to have contributed to the lower number of periodontal pockets.

Since this was a rural community-based study, no attempts were made to screen the participants for the presence of medical conditions that are considered to be risk factors for periodontal diseases. Therefore, the contribution of systemic diseases such as diabetes mellitus, HIV/AIDS, in conjunction to earlier identified risk factors (age over 40 years, rural residence and microbial plaque and dental calculus), were not studied in this population.[11,25-27] Mtwara rural population had no access to any form of periodontal therapy and therefore the findings from this study seem to be in accord to what has been described as "natural history of periodontal disease" among Sri Lanka tea laborers.[28]

The mean number of excluded sextants (0.02-0.97) in the present study population was relatively very low, taking into account that the maximum number of sextants one could have as excluded due to missing teeth (edentulousness) is six. With caution in relation to the age group being referred to for comparison, Mtwara rural population (40+ years) had lower mean number of excluded sextants than the (45+ years) in Ukonga rural population (0.97-1.4 sextants)[5], but higher than the one (0.01-0.07 sextants) recorded for the adult population (45+ years) in Ilala district, Dar es Salaam.[22] The possible reason among others is thought to

be inaccessibility to oral health services and therefore retention of teeth and/or root stumps which would have otherwise been extracted.[4, 29, 30]

In the present study in Mtwara rural district, all teeth and surfaces were examined including the third molars (full mouth examination) rather than the ten CPI index teeth (partial mouth examination) and therefore minimizing under-estimation of periodontal conditions accordingly.[21] However, since the CPI hierarchical scoring system was used, the inherent problems of over-estimation of gingival bleeding and dental calculus could be anticipated to some extent because the problem has been reported to be more pronounced in young adults, who were not part of this study population.[19, 21] Furthermore, based on the CPI hierarchical scoring system, calculus score "2", might have resulted into overestimation of gingival bleeding as it has been reported previously that not every tooth surface with calculus did exhibit gingival bleeding.[7, 31] The prevalence and severity of periodontal disease might have also been underestimated due to the fact that only probing periodontal pockets was used without the assessment of "loss of attachment apparatus". Underestimation in this respect arises particularly in populations that exhibit both periodontal pockets and gingival recessions, a situation that has been reported earlier in other study populations in Tanzania and elsewhere.[11, 32, 33] Reproducibility of the diagnostic criteria among the three examiners varies from moderate to very good as assessed using Kappa statistics, and this wide range of agreement might have introduced to some extent some degree of under or over-estimation in the prevalence and severity of periodontal disease diagnosis.[10]

When the findings from this study population are inferred to the general adult population at the age 40^+ years in Mtwara Rural district, it shows that the prevalence of periodontal disease in Mtwara Rural district was high but of low severity.

No attempts have been made to address the periodontal treatment needs in this community as previous experience has shown that the "treatment needs" enormously outweighed the meager resources in developing countries [4,10], and such endeavor is no longer recommended by WHO.[5] It suffices to note that most if not all of the periodontal treatment needs go untreated except for tooth extraction.[16, 30] Similar situation in relation to difficulties in access for periodontal care prevails also in rural area of other developing countries such as India.[34] The best approach to combat periodontal diseases in the rural population with meager resources seems to be primary prevention through oral health promotion programs that focus on behavioral changes right from childhood.[12] Furthermore as found necessary for other study groups in Tanzania, the role of mass media in raising awareness in oral health matters both in rural and urban places need to be emphasized accordingly.[35]

Conclusion

Based on the findings of this study, the Mtwara Rural adult population aged 40+ years has an extremely high prevalence of gingival bleeding, high prevalence of calculus and periodontal disease but of low severity. This population should be considered at high risk for destructive periodontal disease and therefore planning for a preventive intervention program is recommended.

Acknowledgment

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