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Knowledge on gingivitis and oral hygiene practices among secondary school adolescents in rural and urban Morogoro, Tanzania*

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Abstract: *Objectives:* To assess and compare knowledge on gingivitis and oral hygiene practices among rural and urban secondary school students. *Design:* A cross-section descriptive study involving secondary school students aged between 13 and 17 years in Morogoro rural and urban districts. *Methods:* Questionnaire was used to collect information about knowledge on causes, signs, symptoms, complications, treatment modalities and prevention of gingivitis, as well as on oral hygiene practices. *Results:* A total of 196 students participated in this study, of which 58.7% were females, and 52% were from urban schools. The responses were graded into three criteria namely 'lack of knowledge', 'partial knowledge' and 'total or full knowledge'. There was a partial knowledge about gingivitis and full knowledge of the basic oral hygiene measures among secondary school teenagers. The difference between rural and urban residence on the level of understanding was statistically significant in relation to tooth brushing practices ($P = 0.0088$), necessity of using toothpaste ($P = 0.0204$), reasons for using toothpaste ($P = 0.0057$), signs and symptoms of gingivitis ($P = 0.0261$) and treatment of gingivitis ($P = 0.0106$). However, there were no statistically significant differences in distribution of study participants, understanding of tooth brushing practices, reasons for tooth brushing, causes, prevention and complications of gingivitis. *Conclusion:* Secondary school teenagers have partial knowledge about gingivitis and a good knowledge of the basic oral hygiene measures necessary to maintain proper oral health. A small difference on knowledge in

specific areas was noted among rural and urban respondents.

Key words: knowledge assessment; gingivitis; oral hygiene practices; urban; rural; students; Tanzania

Introduction

A major goal of modern dentistry is to maintain the health of oral soft and hard tissues for a lifetime (1). In Tanzania, common problems in oral health have been identified as periodontal diseases followed by dental caries, oral lesions and fluorosis (2). Such a situation appears to be a problem also in other parts of the developing world with minor differences (3–5). The insidious nature of periodontal disease, make its recognition difficult, as a result undiagnosed periodontal diseases continue to be a problem to the profession and the society (1).

Many studies have indicated that, awareness of individuals regarding their periodontal health status when accompanied with knowledge about periodontal disease process, how to manage and control it, can help to improve self oral health care and hence prevention of periodontal diseases (6–10). It is also advised that, the first step towards good health education is to know the reality of the problem (10).

Dental plaque that is a bacterial aggregation on teeth and oral hard structures is the most important aetiological factor in the development of periodontal disease (11). Interaction of plaque bacteria with the periodontal tissues produce an inflammatory response whereby bacteria produce toxins which cause a breakdown of periodontal tissues. The method for prevention of periodontal diseases that has been recommended for decades, is a regular consistent and thorough removal of dental plaque from the margins of gums (12). Lack of this knowledge in the society, reduces or even abolishes the good possibilities dental home care is known to offer for the prevention of periodontal diseases (7).

This study was performed to assess knowledge of the gum diseases particularly signs and symptoms of gingivitis, causes, complications, treatment modalities and ways of prevention among secondary school teenagers in Morogoro rural and urban districts. We also assessed knowledge on basic oral hygiene practices necessary for prevention of gingivitis. The study was performed in rural and urban districts so that results obtained can be compared between the two groups. Results of this study are expected to help estimating the need for oral health education and instructions in secondary schools.

The study population was selected based on the fact that teenagers are said to be engaged in a series of health damaging behaviours, which can be a result of, among other factors, lack of awareness and lack of knowledge about specific consequences of their behaviours (13), a good example being ignorance of oral hygiene activities. It is also advocated that, in order to nurture the dental health of a rising generation, child population should be given a priority in dental services and efforts made to reduce their disease level through population-based preventive measures (14).

Study participants and methods

The study was conducted in Morogoro region. Morogoro rural and urban districts were chosen based on resources constraints and researchers' convenience. These two districts are among the six in Morogoro region namely Morogoro Urban, Morogoro Rural, Kilosa, Kilombero, Mvomero and Mahenge. The target group in this study was secondary school students in the age group of 13–17 years.

The total number of study participants was obtained from the following statistical formulae, $n = z^2pq/d^2$, where: n is the total number of study population, z is the confidence level 5% (1.96), p is the proportion of the population to be studied (which in this case was 0.5), and $q = 1 - p$ (0.5) and d the standard error = 0.05. Therefore, 196 students participated in this study.

This was a cross-sectional comparative study aimed at assessing oral hygiene practices, and comparing the knowledge about plaque-associated gingivitis among secondary school teenagers in Morogoro rural and urban districts. Information was collected by means of self-performing questionnaires originally prepared in English and translated into Swahili, the national language.

A permission to carry out this study was obtained from the Muhimbili University College of Health Sciences (MUCHS) of the University of Dar Es Salaam, through the head of Preventive and Community Dentistry Department, after ethical clearance. A preparatory visit was made, first to the Morogoro Regional Education officer who accepted introductory letter. Here, a list of 17 secondary schools both in Morogoro rural and

Table 1. **Distribution of age, sex and place of residence**

	Rural school						Urban school					
	Boys		Girls		Total		Boys		Girls		Total	
Age group	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
13–15	16	36	28	63.6	44	100	18	36.4	32	64	50	100
16–17	23	46.2	27	54	50	100	24	46	28	53.8	52	100
Total	39	41.5	55	58.5	94	100	42	41.2	60	58.8	102	100

urban districts was obtained and two schools, one of nine schools from rural district and one of eight schools from urban district were selected randomly using 'lottery' system. The names of these two schools were then presented to the Assistant Regional Education officer who authorized visits to the heads of selected schools. Another two preparatory visits were made to the selected schools, Morogoro secondary school (urban) and Askofu Adrian Mkoba secondary school (rural) to set appointments for data collection.

Teachers on duty prepared sampling frames from the school's student register. These sampling frames were stratified into males, females, age group 13–15 years and 16–17 years, respectively. On the day of data collection, systematic sampling following a fixed interval of two subjects at rural school and three subjects at urban school was performed. A total of 94-study subjects from rural and 102 from urban was obtained (Table 1). In case a selected subject was absent at school premises, an immediate next person was included in the sample.

An informed consent was asked from the study participants before distributing the questionnaire. All study participants were seated in a classroom and thereafter questionnaires distributed, and responses were recorded systematically, i.e. a researcher would read the option and the students were left to write down their response on the spaces provided on the questionnaire. The students were asked if they have ever heard about gingivitis, what do they think causes gingivitis and how would they know that the gums were affected by the disease or not. They were also asked how gum disease could be treated and prevented.

In addition, the students were asked what they thought would happen if gum disease was not treated, if it was necessary for people to brush their teeth everyday, and if they thought that it was necessary for people to brush their teeth more than once daily. Furthermore, they were asked if people were to brush once per day, what time did they think was proper for maintaining good oral health. Lastly, the students were asked if they thought people must use toothpaste whenever brushing their teeth, and give reasons for their answers.

Any option responded with only correct responses (one or more) was scored as 'correct', where as any response with one or two correct responses together with one or two wrong responses was scored as 'mixed', and any option responded with both wrong responses was scored as 'incorrect'. The data was entered into a computer and analysed using Epi-Info (Epi6) program (15). Frequency tables were generated and chi-squared test was used to test the differences between groups among the rural and urban residence of the study participants.

Results

The overall participation in the study population included 102 (52%) students from urban and 94 (48%) from rural. Of the 196 study participants, 41.3% were boys and 58.7% were girls, whereby 48% were aged 13–15 years and the rest (52%) were 16–17 years of age. The distribution of study participants by age, sex and residence (Table 1), and the differences between these categories were not statistically significant. Majority of the study participants (69.4%) reported to have heard about gingivitis of which 56.6% were from urban setting, and the difference approached a statistically significant level ($P = 0.0533$).

A bigger proportion of study population gave mixed responses with regards to the causes, signs and symptoms, treatment, prevention and complications of gingivitis (Fig. 1). Only a few participants knew the correct causes, complications, treatment and prevention of gingivitis. The difference in knowledge level between rural and urban respondents in relation to signs and symptoms as well as treatment of gingivitis were statistically significant ($P = 0.0261$ and $P = 0.0106$, respectively).

Regarding the basic oral hygiene practices, 98.9% of study participants from rural and 99% from urban, thought it necessary for people to brush their teeth everyday, and a higher percentage (55.4% in rural and 63% in urban) gave correct reasons for tooth brushing everyday. Majority of the study participants thought people should brush their teeth more than once per day, that is 76.3% of respondents from rural and 80.4% from urban. In relation to time of brushing when you have to brush once per day, most respondents (55%) opted to brush in the morning and 32.5% in the evening (Table 2). More respondents (61%) who opted brushing in the morning were from urban and more respondents (64.5%) who had mixed feelings were from rural. This difference was statistically significant ($P = 0.0088$).

With the use of toothpaste, there were more respondents from urban (97%) than the rural (87%) who thought it was necessary for people to use toothpaste whenever brushing their teeth and the difference was statistically significant ($P = 0.0204$). Most of the rural respondents (50.5%) gave

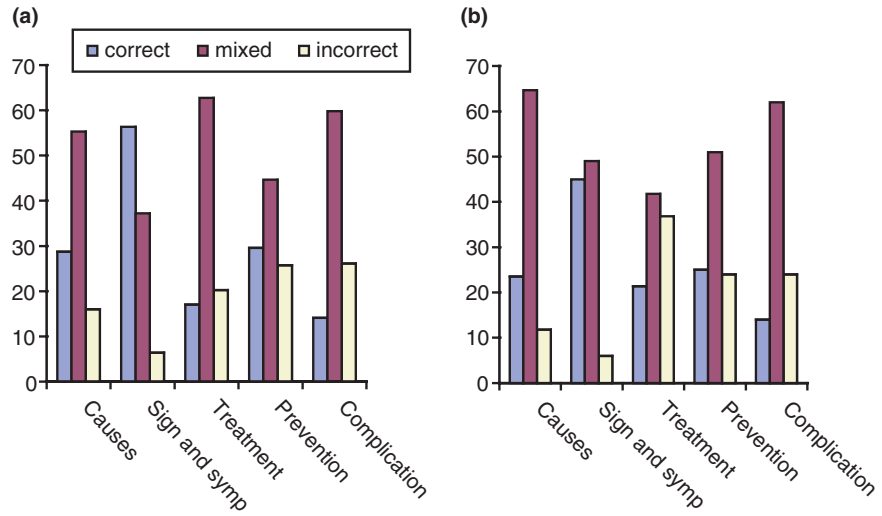

Fig 1. Knowledge about gingivitis from (a) rural and (b) urban respondents.

Table 2. **Opinion on proper time if people are to brush once daily**

	Proper time if people are to brush once daily							
	Morning		After-noon		Evening		Mixed	
Place of school	*n*	%	*n*	%	*n*	%	*n*	%
Rural	41	39.0	–	–	13	56.5	40	64.5
Urban	64	61.0	1	100.0	10	43.5	22	35.5
Total	105	100.0	1	100.0	23	100.0	62	100.0

Table 3. **Knowledge on the use of toothpaste**

	Reasons for using tooth paste					
	Correct		Mixed		Incorrect	
Place of school	*n*	%	*n*	%	*n*	%
Rural	47	50.5	18	19.4	28	30.1
Urban	28	28.3	24	24.2	47	47.5
Total	75	39.1	42	21.8	75	39.1

correct reasons as to why toothpaste should be used whenever brushing; where as most of the urban respondents (47.5%) gave incorrect reasons ($P = 0.0057$); Table 3.

Discussion

This study was conducted in Morogoro region where secondary school students aged between 13 and 17 years from rural and urban schools were recruited. This region, has for many years been a teaching area for University of Dar Es Salaam (DSM) dental students practices of Preventive and Community Dentistry, where various primary schools in Morogoro urban district, are visited and provided with oral health education, as well as simple preventive and restorative dental treatments to students of about 8–12 years of age. Most of the students in secondary schools (aged 13–17 years) were assumed to have come from the catchment area primary schools that were covered by the University of DSM teaching programme in preventive and community dentistry.

Results of this study have shown a partial knowledge of the gum disease among this group, particularly gingivitis associated with dental plaque (16), with little difference between the rural and urban settings. Majority of the study population have heard about gingivitis, of which 56.6% were from urban setting. The possible explanation for this finding may be due to the fact that urban population are more exposed to various sources of information than the rural, in the country. Another possible explanation may be attributed to the effect of community dentistry activities to primary school children in the district that are delivered by dental students during their training in the University of Dar Es salaam. However, although majority of the study participants have heard about gingivitis, only a small proportion knew the correct cause of the disease. This discrepancy might have been attributed to the inadequacy of information.

Several behavioural studies have shown a direct correlation between awareness and practices (13). Awareness of individuals regarding their periodontal health status when accompanied with knowledge about the periodontal disease process, can help to improve self-oral health care and hence prevention of periodontal diseases (6–10). Lack of knowledge on the causes of gingivitis in this study, may shed light on the possible explanation for what has been found in several other studies

on child population in Tanzania and elsewhere such as Saudi Arabia and India, where gingivitis was a common finding (17–21).

Earlier reports had indicated that, population living in rural areas, the poor, uneducated with lower social economic status, have severe periodontal diseases because of poor oral hygiene than those in urban areas, with high social economic status (22). In this study, majority of the respondents from rural setting gave the correct responses with regards to the signs and symptoms of gingivitis (56.4%), when compared with 45% of respondents from urban, and the difference was statistically significant. The reason for this finding is not known, but leads to speculation that the rural population can be more observant when it comes to disease condition than the urban population. In a typical Tanzanian set up, people in rural areas share most life experiences than in the urban where people lead much more independent lives from other community members.

In this study population, we found a partial knowledge on treatment, prevention and complications of gingivitis. This finding possibly underscores the need for having adequate coverage and reliable source of information. It appears that, the lack of adequate information regarding the disease process, might have led to the mixed responses about treatment, complications and prevention of gingivitis seen in this study population. This situation could be detrimental to the society as Brady (1) documented that, lack of knowledge among public, regarding the criteria of periodontal health, reduces, or even abolishes the good possibilities dental home care is known to offer for the prevention of periodontal diseases. These findings also, indicate the need for instituting a planned oral health awareness activities to this age group, and possibly other children in schools.

The study participants knew the basic oral hygiene measures necessary to maintain good oral health. Almost all study participants thought that daily brushing was necessary, and gave correct reasons for such practice. If this kind of understanding could be coupled with the correct measures to educate the community how to practice oral hygiene measures effectively (as dental hygienists and specialists advices), would help to reduce the higher plaque scores reported from various studies in this region and other parts of Tanzania (17, 23–25). The benefits of educational programmes into improving oral health of the individuals have been reported in many studies worldwide (26, 27).

Concerning the frequency of tooth brushing, most of the study participants thought it was better to brush more than once daily, and in that case, opinion from the majority of the respondents showed preference for morning brushing. However, from literature the recommended frequency of tooth brushing is twice daily, and the advocated time being after breakfast and before going to bed (11). In addition to some good opinions given by the study participants on the importance of good oral health practices, training is of paramount importance. van Palenstein *et al.* (28) showed that training of Tanzanian schoolchildren on systematic tooth brushing resulted in improved oral hygiene regardless of whether the children were habitual chewing stick or industrial toothbrush users. Also, Biesbrock *et al.* (26) reported a significant reduction in Gingival Index and Plaque Scores among 5–15 year-old students in America, following a 4-week oral health educational programme that taught among other things, basics of oral biology and proper oral hygiene practices.

In relation to the use of toothpaste, majority of the study participants thought it necessary to use toothpaste whenever brushing teeth. Many participants from rural when compared with urban, knew the correct reasons as to why people should use toothpaste. This has relevancy in the prevention of plaque-associated gingivitis. Toothpastes aids plaque removal because of the presence of abrasive particles of different sizes and hardness (29). Oral cleanliness, as has been known for ages, is undoubtfully the single most important factor related to periodontal disease (30). Understanding of this concept in the community is mandatory in the prevention and controlling the occurrence of periodontal diseases. Mixed ideas or partial knowledge as have been observed in this study, may hinder health promoting oral hygiene habits simply because people are not sure of the benefits good oral hygiene practices may bring or the consequences and complications of ignoring oral hygiene practices.

The limitation of this study is that Morogoro region was sampled for convenience and therefore the findings cannot be generalized for all teenagers in secondary schools in Tanzanian. Also the findings do not address anything for the teenagers who are not in schools in or outside Morogoro region.

From this study, we conclude: (i) There is partial knowledge regarding the periodontal diseases particularly plaque associated gingivitis with respect to its causes, signs and symptoms, treatment, prevention and complications among secondary school students. (ii) Knowledge about basic oral hygiene measures is total and therefore sufficient to effect prevention of gingivitis if correct measures are implemented, such as instructions on proper and systematic tooth brushing techniques. (iii) Comparison of knowledge among students in rural and urban secondary schools, showed little difference with respect to the level of knowledge about gingivitis and oral hygiene practices. (iv) There is a need for oral health

education and oral hygiene instructions to this age group in secondary schools, in Morogoro, Tanzania.

Based on the results obtained in this study the following recommendations are put forward that there is a need to: (i) Provide oral hygiene instructions to child population of teen age (i.e. secondary school children) and explain its desired effect on oral health. (ii) To effect planning and implementation of preventive oral health activities based on the existing knowledge of students oral health habits. (iii) Activate more oral health research and dental public health activities so as to increase the level of awareness and knowledge on the matter. (iv) Encourage visits to oral health care facilities once they see or suspect to have any signs or symptoms of the gum disease.

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References

1 Brady WF. Periodontal disease awareness. *J Am Dent Assoc*, 1984; **109 (5):** 706–10.
2 Muya RJ, Rambush E, Ferjerskov O, Hobdell MH, Normark S. *Changing and Developing Dental Health Services in Tanzania (1980–2000)*. Ministry of Health/DANIDA: Dar es Salaam, Tanzania, 1984; 34–9, 106–32.
3 Baelum V, Fejerskov O, Manji F. Periodontal diseases in adult Kenyans. *J Clin Periodontol* 1988; **15 (7):** 445–52.
4 Kaimenyi JT, Gururaja Rao TR. A comparative study on the periodontal health status of adult populations of Kenya and India. *Indian J Dent Res* 1991; **2 (3–4):** 29–34.
5 Wandera M, Twa-Twa J. Baseline survey of oral health of primary and secondary school pupils in Uganda. *Afr Health Sci* 2003; **3 (1):** 19–22.
6 Croxson LJ. Practical periodontics. Awareness of periodontal disease – the patient. *Int Dent J* 1998; **48 (3 Suppl. 1):** 256–60.
7 Ainamo J. Awareness of the presence of dental caries and gingival inflammation in young adult males. *Acta Odontol Scand* 1972; **30:** 615–9.
8 Vignarajah S. Oral health knowledge and behaviours and barriers to dental attendance of school children and adolescents in caribbean Island of Antigua. *Int Dent J* 1997; **47 (3):** 167–72.
9 Peng B, Petersen PE, Tai BJ, Yuan BY, Fan MW. Changes in oral health knowledge and behaviour 1987 – 95 among inhabitants of Wuhan City, PR China. *Int Dent J* 1997; **47 (3):** 142–7.
10 Gonzalez de Dios J, Monerris Garcia E, Ortega Pastor E, Quesada de la Gala C, Gomez Gomez R, Calpena Vera MT, Ruiz Amoros E, Moya Benavent M. Orodental hygiene habits in preadolescents and adolescents from 2 urban and 2 rural secondary schools. *An Esp Pediatr* 1996; **45 (1):** 14–20.
11 Socransky SS, Haffajee AD. Microbiology of periodontal disease. In: Lindhe J, Karring T, Lang NP, ed. *Clinical Periodontology and Implant Dentistry*. Copenhagen: Munksgaard, 1997: pp. 138–88.
12 Nyandindi U. Oral health habits in the district of Ilala, Tanzania. A dissertation submitted in partial fulfillment for the degree of Master of dentistry of the University of Dar es Salaam. University of Dar es Salaam: Dar es Salaam, Tanzania, 1989.
13 Irwin CE, Millstein SG. Biopsychosocial correlates of risk-taking behaviours during adolescence. Can the physician intervene? *J Adolesc Health Care* 1986; **7 (6 Suppl.):** 82S–96S.
14 Downer MC. The 1993 national survey of the children's dental health. *Br Dent J* 1995; **178 (11):** 407–12.
15 WHO. *Epi-Info Programme Version 6.04d- Word Processing, Database and Statistics Programme for Public Health*. World Health Organization (WHO): Geneva, Switzerland, Centre for Disease Control (CDC): Atlanta, GA, 2001.
16 Armitage GC. Development of a classification system for periodontal diseases and conditions. *Ann Periodontol* 1999; **4 (1):** 1–6.
17 Mosha HJ, Langeback J. Dental caries, oral hygiene, periodontal disease and dental fluorosis among school children in northern Tanzania, oral health surveys. *Trop Dent J* 1983; **6:** 149–56.
18 Mosha HJ. Dental caries, gingivitis, and oral hygiene among school children in Dar es Salaam, Tanzania. Report on oral surveys 1976 and 1983. *Trop Dent J* 1986; **9:** 43–6.
19 Kerosuo E, Kerosuo H, Kallio P, Nyandini U. Oral health status among teenage school children in Dar es Salaam, Tanzania. *Community Dent Oral Epidemiol* 1986; **14:** 338–40.
20 Almas K, Maroof F, McAllister C, Freeman R. Smoking behaviour and knowledge in high school students in Riyadh and Belfast. *Odontostomatol Trop* 2002; **25 (98):** 40–4.
21 Jose A, Joseph MR. Prevalence of dental health problems among school going children in rural Kerala. *J Indian Soc Pedod Prev Dent* 2003; **21 (4):** 147–51.
22 Hobdell MH, Sheiham A. Barries to the promotion of dental health in developing countries. *Social Science Med J* 1981; **15A:** 817–23.
23 Frencken JEFM, Truin GJ, König KG, Ruiken RMHM, Elvers HJM. Prevalence of caries, plaque and gingivitis in an urban and rural Tanzania child population. *Community Dent Oral Epidemiol* 1986; **14:** 161–4.
24 Lembariti BS, Frenken JE, Pilot T. Prevalency and severity of periodontal condition among adults in urban and rural Morogoro, Tanzania. *Community Dent Oral Epidemiol* 1988; **16:** 240–3.
25 Mumghamba EGS. Periodontal Conditions and Treatment Needs in Ilala District, Tanzania. A dissertation submitted in partial

fulfillment for the degree of Master of dentistry of the University of Dar es Salaam. University of Dar es Salaam: Dar es Salaam, Tanzania, 1990.

26 Biesbrock AR, Walters PA, Bartizek RD. Initial impact of a national dental education program on the oral health and dental knowledge of children. *J Contemp Dent Pract* 2003; **4 (2):** 1–10.

27 Redmond CA, Blinkhorn FA, Kay EJ, Davies RM, Worthington HV, Blinkhorn AS. A cluster randomized controlled trial testing the effectiveness of a school-based dental health education program for adolescents. *J Public Health Dent* 1999; **59 (1):** 12–7.

28 van Palenstein Helderman WH, Munck L, Mushendwa S, Mrema FG. Cleaning effectiveness of chewing sticks among Tanzanian schoolchildren. *J Clin Periodontol* 1992; **19 (7):** 460–3

29 Rylander H, Lindhe J. Cause-related periodontal therapy. In: Lindhe J, Karring T, Lang NP, ed. *Clinical Periodontology and Implant Dentistry*. Copenhagen: Munksgaard, 1997: pp. 438–60.

30 WHO. Epidemiology, etiology and prevention of periodontal diseases. Report of WHO Scientific Groups Technical Report Series 621. WHO: Geneva, Switzerland, 1978.