Oral health status and oral impact on daily performance in an adult population with leprosy living in rural Tanzania

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Abstract

Aim: To assess levels of oral health and their impact on daily performance (OIDP) in an adult population with leprosy, living in a rural village in Tanzania.

Objectives: The objectives were threefold: to carry out an oral examination; to undertake a questionnaire survey; to make recommendations for provision of oral health care services.

Design: The study was an opportunistic population survey: carried out over four days. Adults with leprosy living at Bukumbi Care Centre (BCC) were recruited. An oral examination and an OIDP questionnaire were carried out for each subject after obtaining consent.

Results: Thirty three people were recruited, 15 men and 18 women, with an age range of 27-88 years (mean = 60 years). The mean DMFT was 10.48 (D=3.45, M=7.03, F=0.0) and 18 subjects (54.5%) presented with tooth mobility. Twenty people (60.6%) required treatment, but access to care was reported to be limited. The prevalence of oral impacts was 75.7%. The most common activities affected were eating, sleeping and cleaning teeth, with toothache being the main reason for reported problems.

Conclusion: The impact of dental disease on this population is significant and access to dental care is very limited. It is recommended that local government and the charity Bridge2Aid, work together to improve access to oral health education and emergency dental care for the residents of Bukumbi Care Centre.

Key words: Rural Tanzania, leprosy, oral health, impact of oral disease

Introduction

It is globally recognised that people with a disability living in developing countries are among the poorest and most vulnerable. It is estimated that 10% of the world’s population, approximately 650 million people, have a disability and that 80% of the population with a disability live in developing countries (United Nations, 2008). Chronic diseases, including dental caries and other oral conditions, are overtaking communicable diseases as major health problems in many developing countries. This change in disease pattern relates closely to changing lifestyles, which include diets rich in sugar and an increased use of tobacco and alcohol. In developing countries oral disease affects mainly the disadvantaged and those marginalised by society and can have a significant impact on general health status and quality of life (Petersen, 2004).
In many African countries, access to oral health care is limited and teeth are often left untreated or extracted to relieve pain (Petersen, 2004). This is particularly true in the more rural areas of many countries. Tanzania is one of the poorest countries in Africa and obtaining dental care is a problem for many people both in urban and rural areas.

Mwanza is a large town located on the southern shore of Lake Victoria in northwest Tanzania. (Figure 1). Thirty years ago the streets of Mwanza were ‘cleansed’ and those with leprosy or other disabilities who were seen as unsightly, living on the streets (‘The Maskini’), were moved to a rural centre called Bukumbi Care Centre (BCC). These people are very dependent and rely on others to provide for them. Bridge2Aid, a charitable organisation providing dental and community support, is working with the people of Bukumbi to enable them to be independent and to care and provide for themselves, no matter what their appearance or disability (Bridge2Aid).

Leprosy is a chronic infectious disease, which mainly affects the skin, peripheral nerves, upper respiratory tract and the eyes. The disease is associated with an image of disfigurement, disability and exclusion from society. The World Health Organisation (WHO) estimates that there are between one and two million people visibly and irreversibly disabled due to leprosy (World Health Organisation, 2008). Disability resulting from leprosy is a broad term encompassing any impairment, activity limitation or participation restriction affecting a person. Such physical disabilities significantly affect a person’s ability to carry out day to day activities resulting in health, emotional and social problems.

Good oral health is integral to general health and essential for the well-being of the individual. At present, the people of Bukumbi Care Centre suffering from leprosy do not have access to dental care and are limited in their ability to carry out effective oral hygiene. The resulting oral health problems they experience may adversely affect their daily lives and well-being.

Clinical data are widely used to assess oral health status and can provide a basis for planning and developing services. However, such data provide limited information regarding functional and psychosocial parameters. Oral health-related quality of life measures have been developed to address this issue (Slade et al., 1998). One such scale is the Oral Impacts on Daily Performance (OIDP) scale. This scale was developed to assess oral impacts that have a serious affect on an individual’s daily life (Adulyanon et al., 1996; Adulyanon et al., 1997) and is based on the framework of the WHO International Classification of Impairments, Disabilities and Handicaps (ICIDH) (Badley, 1987; Locker, 1988). The OIDP questionnaire is scored to reflect the frequency as well as the severity of the impacts and provides an indication of the importance of the specific impact in the daily life of the person.

Bridge2Aid are keen to provide regular oral care services to the residents with leprosy at Bukumbi Care Centre and a study was therefore proposed with the aim of assessing the oral health status and needs of the population and to determine the impact of their oral health on daily living practices.

Figure 1
Mwanza, located on the southern shore of Lake Victoria

Method

The study was designed as a population survey to consider oral health status, treatment need and the impact of oral health on daily practice. There was a limited time in which the study data could be collected, four days, and as such this was a convenience sample. The work was carried out at Bukumbi Care Centre, near the town of Mwanza in North West Tanzania. Permission to carry out the work was sought from the local Regional Dental Officer.

There are approximately 87 adults with leprosy (16 years and over) living at Bukumbi Care Centre and all were included. The project was explained, in Kiswahili, to those who showed an interest in the study and if they agreed verbally to take part they were included. Those approached were informed that they would be offered basic dental care if this was deemed necessary.

The principle investigator was a dentist from the UK with experience in the fields of research and clinical practice, based at the School of Dental Sciences, Newcastle upon Tyne. A fourth year dental student from the same school, assisted with the study. Support was provided by a local team of Tanzanian staff, including a dental nurse, a driver and interpreter and an administration support officer.

To assess the Oral Impact on Daily Performance (OIDP) a modified form of the OIDP Inventory translated into Kiswahili was used (Adulyanon et al., 1997). This is an eight item index referring to the ability to carry out eight daily life activities including eating, talking, cleaning teeth, sleeping, smiling, emotional
state, working, socialising. For each activity, there is a score for Frequency (Table 1) and Severity (Table 2). The OIDP score calculation is based on the calculation of Performance scores for each of the performances included in the index (eating, speaking, sleeping, etc). The Performance score is equal to the frequency score multiplied by the severity score. The frequency score is expressed on a scale of 0-5 and the severity score on a scale of 0-3, therefore each performance score ranges from 0-15. The overall ODIP score for each person is calculated as the sum of the performance score divided by the maximum total score multiplied by 100. The higher the score the greater the impact. The questionnaire interview was carried out by both the dental nurse and interpreter, prior to the oral examination.

The oral examination was carried out by the dentist and dental student. Duplicate clinical examinations were carried out on a randomly selected sub-sample, considered to be representative of the study subjects, in order to assess reliability.

Caries experience was assessed in accordance with the criteria described by the WHO and recorded as DMFT. (World Health Organisation, 1997) Tooth Mobility was assessed using a modified Miller’s index (Miller, 1950). To generate the index, the ends of two instruments are placed on either sides of the tooth and force applied in a bucco-lingual/palatal direction. Mobility is scored as present or absent. The mobility score is noted as: (1) 2 or more mobile teeth and (0) less than 2 mobile teeth.

The World Health Organisation (2008-2009) disability grading for leprosy index was used. The grade is either 0, 1 or 2. Each eye, each hand and each foot is given its own grade, so the person actually has six grades, but the highest grade given is used as the Disability Grade for that patient (Table 3). This was assessed by questioning the subject and by examination. An example of a grade 2 disability is illustrated in Figure 2.

Treatment need was assessed by the dentist and the subjects offered care if required. The treatment was scheduled to be carried out when all the oral assessments and questionnaires were completed. The medical clinic at Bukumbi Care Centre was used for carrying out the oral examination where there was a basic chair for the subject and light was provided by a torch. The examination was carried out using two dental mirrors. Accessing the clinic was difficult for many of the people with leprosy and therefore some oral exams were undertaken outwith the clinic, where the people were carrying out their daily tasks and again, a torch was used for lighting. The subjects frequently remained seated on the ground as their disability hindered them from being seated or from standing (Figure 3).

Data were collected on paper forms at the time of the study and later entered into Minitab version 15 for analysis. Basic statistics and frequencies were calculated.

Results

Inter examiner reliability was tested using Kappa, which was found to be 0.83 for tooth mobility and 0.88 for the decay component of DMFT. Both these results indicate excellent inter-examiner reliability for the oral examination. There were no differences recorded for the ‘missing’ and ‘filled’ components of DMFT between the two examiners. Differences were noted for the ‘decayed’ component of DMFT and for tooth mobility. A total of 33 (39% of residents) were examined, with a mean age (range) of 60 years (27-88 years). The gender breakdown was 15 women and 18 men.

The mean DMFT for the total group was 10.5 + 8.04 (D=3.5, M=7.0, F=0) and the number of people presenting with tooth mobility was 18 (54.5%). Treatment need was found in 20 residents (60.6%).

The prevalence of oral impacts (reported OIDP >0%) was recorded as 72.7% of the total population studied. The mean OIDP score for the study group was 19.6%. A breakdown of the scores for each category is shown in Figure 4. It can be seen that the impacts on eating, cleaning teeth and sleeping were the most commonly reported.

For the impacts that were most prevalent, eating, cleaning and sleeping, the highest severity score was reported by 36.3%, 31.8%, 17.6% of the subjects respectively. In all these cases the main reason given for the oral effects was ‘toothache’. For cleaning teeth, the other common problem reported was that of bleeding gums.

All subjects were asked if they brushed their teeth on a daily basis, what they used and if they did not brush, what was the reason. The majority of the respondents used tooth sticks to brush. The main reasons given for not brushing were toothache and no availability of a toothbrush. None of the subjects commented that they were unable to hold a stick or brush in order to carry out oral hygiene practice.
### Table 1

**OIDP Frequency scoring system**

How often have problems with your mouth and teeth caused you any difficulty in the following activities?

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>FREQUENCY (Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never (0)</td>
</tr>
<tr>
<td>Eating</td>
<td></td>
</tr>
<tr>
<td>Speaking</td>
<td></td>
</tr>
<tr>
<td>Cleaning teeth</td>
<td></td>
</tr>
<tr>
<td>Sleeping</td>
<td></td>
</tr>
<tr>
<td>Smiling</td>
<td></td>
</tr>
<tr>
<td>Emotional state</td>
<td></td>
</tr>
<tr>
<td>Carrying out work</td>
<td></td>
</tr>
<tr>
<td>Socialising</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2

**Classification of the severity of oral impacts on a performance**

How severe is the problem to you?

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>SEVERITY OF IMPACT (Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never (0)</td>
</tr>
<tr>
<td>Eating</td>
<td></td>
</tr>
<tr>
<td>Speaking</td>
<td></td>
</tr>
<tr>
<td>Cleaning teeth</td>
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<td>Sleeping</td>
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<tr>
<td>Carrying out work</td>
<td></td>
</tr>
<tr>
<td>Socialising</td>
<td></td>
</tr>
</tbody>
</table>
### Table 3
Disability Grading for Leprosy

<table>
<thead>
<tr>
<th>GRADE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No disability found</td>
</tr>
<tr>
<td>1</td>
<td>Loss of sensation has been noted in the hand or foot (the eyes are not given a grade of 1). Loss of sensation in the hand or foot means that one of the main peripheral nerve trunks has been damaged by leprosy and this is more common later in the disease than at diagnosis. It should not be confused with the loss of sensation in a skin patch, which is caused by local damage to the small nerves in the skin, and not to the main peripheral nerve trunks.</td>
</tr>
<tr>
<td>2</td>
<td>Visible damage or disability is noted.</td>
</tr>
</tbody>
</table>

- For the eyes, this includes the inability to close the eye fully or obvious redness of the eye; visual impairment or blindness also gives a disability grade of 2.
- For the hands and feet, visible damage includes wounds and ulcers, as well as deformity due to muscle weakness, such as a foot drop, or a claw hand. Loss of tissue, such as the loss or partial re-absorption of fingers or toes is a late sign in leprosy, but it also gives a disability grade of 2 for that hand or foot.

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**Figure 3**
Subjects frequently remained seated on the ground

**Figure 4**
OIDP Scores for each category

**Figure 5**
Grip accommodation using muscles and tendons in the palm of the hand
Discussion

The World Health Organisation (WHO) Policy Basis on Oral Health places great emphasis on the interaction between oral health and quality of life (World Health Organisation, 2008b). This association is true for all individuals, but becomes even more evident for those with disabilities, who may already be at a disadvantage owing to their dependency on others for care and support. For those living in developing countries where access to oral health care is limited this becomes more acute.

At Bukumbi Care Centre there are 87 registered adults suffering from leprosy; 33 took part in the study and all but one scored the greatest level of disability for leprosy. This is a low response rate (37.9%) and therefore the results must be viewed with caution. The reasons for the low uptake included lack of interest or apprehension about what the dental examination would involve. Many of the residents had never visited a dentist and were wary and perhaps suspicious of western medicine. A number of the residents were absent from the village due to being at work or carrying out daily tasks. Because of the limited time available for the study, there was no other time these individuals could be seen.

Some difficulties arose whilst carrying out the study, namely access to the clinic for the oral examination. Several of the villagers, owing to their disability, were unable to walk to the clinic and wheelchair access was not available. These individuals were therefore examined either in their houses where there was limited light or outside, whilst sitting on the ground. Visibility for the examination was therefore compromised and this may have affected the results. These limitations highlight some of the difficulties of carrying out epidemiology and research in developing countries; resources can be restricted, understanding and motivation of potential subjects may be limited and with regard to those with disabilities, there may be a lack of disability aids to help the individuals to actually take part in such research.

There is a paucity of literature dealing with the impact of leprosy on dental health, however, in a paper by (Nunez-Marti et al., 2004), the authors demonstrated that a group of 76 people with leprosy, aged 40-82 years, showed a tendency to poor dental and periodontal health when compared to a matched control group (Nunez-Marti et al., 2004). A similar situation was reported in the current study with a mean DMFT of 10.8 being reported. Although this is lower than that reported by other authors, mean DMFT = 19.1 (Nunez-Marti et al., 2004) mean DMFT = 16.2 (Ceballos et al., 1993) and a mean DMFT = 15.8 (Diallo et al., 1992), there is a similarity in all studies where the majority of the DMF score is attributable to the missing component, 7.0 in the current study and 13.5 reported by (Nunez-Marti et al., 2004). In the current study group, periodontal disease and tooth mobility were the main reasons given for tooth loss. Some people did report walking 40-50km to the dental clinic in Mwanza to have their teeth extracted as a last resort.

One of the reasons for the poor oral health status reported in this study may be considered to be due to poor oral hygiene, as a result of finger mutilation and hence difficulty controlling a toothbrush, altered oral tissue sensitivity and masticatory muscle control. However, as was demonstrated among the residents of BCC, where the hands have been affected by leprosy, many people learned to accommodate by using the muscles and tendons in the palm of the hand to grip (Figure 5). Undoubtedly, the resultant function will be greatly reduced. Within the population studied, there are several issues that together have a major impact on oral health; reduced ability to carry out oral hygiene effectively, limited access to oral health care services and financial restraints.

The prevalence of oral impacts in the study group was high at 72.7%. This equates to that reported by Kida amongst an adult rural population in Tanzania where the prevalence was found to be 62.1% (Kida et al, 2006). However, the figure is far greater that that reported for adults in several European countries including Norway, 11.3% (Astrom et al., 2005), UK 12.3% (Sheiham, 2001) and Greece, 39.1% (Tsakos et al., 2001). This would suggest that those in developing countries who have poorer access to oral care, may suffer more from oral health-related problems than those in more affluent countries.

The most prevalent impact noted was on cleaning teeth, with 66.6% of the study population reporting this as a problem. If an individual has difficulties tooth brushing due to dental pain, then maintaining oral health becomes a significant issue, leading to the development of further disease and related symptoms. Eating was found to be the next most prevalent impact with 63.6% of the study group reporting this factor, a similar outcome to that found in other studies (Masalu, 2003; Astrom, 2006; Kida, 2006). Eating is one of the most basic and essential daily practices, if compromised, this will have an effect on all aspects of daily life and overall general health.

The severity of the oral impacts in the current study were higher than those previously reported by Kida (Kida, 2006). However, Kida’s study did not consider those with leprosy and related disability. This factor may have had a significant influence on how the Bukumbi residents perceived their oral problem, possibly as an added burden on their already challenging situation.

In all cases toothache was the most frequently perceived cause of impairment for almost all the performances, which is consistent with other work carried out in Tanzania and in Thailand (Adulyanon et al., 1996; Adulyanon et al., 1997; Kida, 2006). It was clear that over half the study population (60.0%) required dental care to relieve dental pain and this was most commonly tooth extraction. Those who did require such care were
offered treatment at the centre where only basic facilities were made available as part of the study. Where restorative or more complex surgical treatment was indicated the people would have to attend the main clinic in Mwanza and few had the ability or means to travel there. Such a situation compromises the ability to provide the most appropriate care, highlighting the issues that result from limited access to dental services.

**Conclusion**

The results of the study clearly show a high level of dental disease amongst the residents screened at Bukumbi Care Centre. The most revealing data supporting the need for oral health care services is that obtained from the OIDP questionnaire which illustrates the impact that dental disease is having on the population surveyed. One of WHO’s goals for oral health is to “Reduce the burden of oral disease and disability, especially in poor and marginalised population”. This could not be more relevant for the people of Bukumbi Care Centre, indeed, the WHO global Oral Health Programme states “…In several African developing countries the most important challenge is to offer essential oral health care within the context of primary health care programmes. Such programmes should meet the basic health needs of the population……” (Petersen, 2004).

The oral impacts most commonly reported in this study eating, cleaning teeth, sleeping and work, are all essential daily practices for any individual and the fact that a preventable and / or treatable oral health problem is having such a significant influence must be considered unacceptable in the 21st century.

Bridge2Aid are well placed to address the issue or oral care for those living at the centre and with the support of the local government, have the opportunity to work towards improving access to oral health education and to basic and emergency oral care for the whole population in this area.

**Acknowledgments**

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Bridge2Aid: www.bridge2aid.org accessed April 2009


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