Physiotherapy students’ oral health-related knowledge, attitudes and practices at an identified institution of higher learning in KwaZulu-Natal, South Africa

ABSTRACT

Background
Oral self-care health is integral to general health. However, limited studies reflect physiotherapy students’ dental practices such as frequency of toothbrushing, toothbrush replacement, use of oral rinses, dental flossing, use of interdental aids or knowledge of dental plaque.

Study objectives
This study assessed knowledge, perceptions and oral self-care practices among physiotherapy students.

Method
This descriptive cross-sectional survey recruited second-, third-, and fourth-year physiotherapy students at an identified training institution in South Africa by means of a self-administered questionnaire.

Results
A total of 137 students participated in the study with a response rate of 83%. Participants indicated that 58% (n=79) had good knowledge and 85% (n=117) reported oral self-care practices. Almost all participants (99%; n=136) used a brush with toothpaste; 76% (n=104) brushed twice daily; 53% (n=72) replaced their toothbrush every 3 months and 48% (n=66) rinsed their mouth after eating. More than two-thirds of the study sample (62%; n= 84) used an interdental aid and (37%; n=50) reported dental visits once a year with (74%; n=100) only when necessary. From these 96% (n=132) experienced barriers such as costs (54%; n=71) and inadequate time (42%; n = 55). The majority of participants (72%; n=98) supported oral self-care be included in the physiotherapy curriculum.

Conclusion
Although there were inconsistencies in physiotherapy students’ reported oral health-related knowledge, perceptions and self-care practices, the majority of participants supported the inclusion of dental health into the undergraduate physiotherapy curriculum. This will enhance interprofessional education and improve oral health outcomes for both students and patients.

Keywords
Health, self-care, dental care, knowledge, interprofessional education

INTRODUCTION

Oral hygiene practices and general health are interrelated.1-4 Oral self-care practices, such as the frequency of toothbrushing and toothbrush replacement, use of oral rinses, dental flossing, use of interdental aids and understanding dental plaque have been proven to be an effective preventative measure at an individual level to maintain good oral health status as part of general health care.1,4 Poor oral health status can lead to oral pain resulting in poor eating ability, and oral diseases which impact negatively on self-esteem, impair social interactions and result in overall poor quality of life for the individual.1 The World Health Organization (WHO) advocates the integration of oral health education and promotion into general health care because health professionals interact daily with patients and this can be an effective strategy to improve oral health outcomes.1,5-6 Likewise, there is a need for extensive educational programmes to encourage and promote good oral health practices.4,7
Based on the dynamic relationship between oral and general health which can be influenced by an individual’s personal attributes, behaviours and perceptions, there is a need to determine whether health professionals have the relevant and necessary knowledge and behaviour to impart positive oral health information to patients. This is supported by international guiding documents such as the Ottawa Charter on Health Promotion (1986) which advocates health professionals to focus on the prevention of diseases and promotion of a healthy lifestyle, as well as the WHO Global Oral Health Programme, which highlights the need to facilitate, improve and promote oral health and integrate these into chronic disease prevention and health promotion. Thus there is a need for all health professionals to ensure that their own knowledge of oral health self-care practices are sound when educating and advocating oral health.

In addition, a study by De Oliveira Diniz et al. identified knowledge gaps in health professionals’ (doctors, nurses, physiotherapists, audiologists, pharmacists, psychologists and others) oral self-care practices such as their consumption of sugary diet, poor brushing techniques and inadequate access to additive fluoride uptake.

Despite the known linkages between oral health status and systemic disorders such as cardiac diseases and diabetes, not much is known on the extent to which such information is covered in health sciences curricula at a higher education level. Additionally, from an undergraduate learning perspective, collaboration and interprofessional partnership between dental and physiotherapy students as well as qualified health professionals (dentists and physiotherapists) are required. The benefit of interprofessional relationships is learning from each other in that way, developing greater respect for each other’s profession. By learning together and about each other they could improve undergraduate as well as postgraduate working relationships and the value of a team approach and the holistic management of patients. Moreover, the experience of learning together can break down professional walls, change attitudes and reduce stereotypes. Interprofessional education can be an effective tool for developing collaboration and improving professional practice among health professionals.

Despite the value of interprofessional education, there is little evidence that physiotherapy training includes elements of oral health care, although PHC principles are included in the physiotherapy curriculum. To our knowledge, this is the first study to examine oral health self-care practices among undergraduate physiotherapy students in South Africa. This study can therefore raise awareness of the need to ensure that the undergraduate physiotherapy curriculum is reviewed and designed in a manner to facilitate a multidisciplinary approach that includes oral health care. To initiate this process, the first step is to determine the relationship between oral hygiene and oral self-care which are influenced by personal attributes, behaviours and perceptions. Therefore, the primary purpose of this study was to determine the knowledge, perceptions and oral health self-care practices of undergraduate physiotherapy students at an identified institution in South Africa. This is a four-year programme offered in the School of Health Sciences and the training focuses primarily on the comprehensive management of health issues to restore the optimal function of individuals and the wider society.

**METHODOLOGY**

**Study design**

This was a descriptive cross-sectional study.

**Study populations (including sample determination if done, sampling etc)**

A whole population approach was used to identify full-time undergraduate physiotherapy students (n=169) at the identified training institution. Four students did not meet the study criteria and were excluded from the study; hence the sample size was 165. The study population was further stratified according to the year of study and students registered in the 2nd (n=60), 3rd (n=61) and 4th levels (n=48) of the physiotherapy programme were included in the study. The inclusion criteria for participation in the study were that students should be engaging and interacting with patients in hospitals, clinics and health centres. The study excluded first-year students because these students do not engage in clinical-based training.

**Data collection (instruments used, validation, reliability)**

A self-administered questionnaire was used to collect data and permission was obtained from Oberoi et al. to adapt and use their questionnaire. The first section of the questionnaire focused on the participant’s sociodemographic information. The second section focused on the student’s oral self-care knowledge, attitudes and practices related to oral health care such as the frequency of toothbrushing and toothbrush replacement, use of oral rinses, dental flossing, use of interdental aids and understanding dental plaque and the relationship between oral and general health. Questions were also designed to elicit information on dental visits, barriers to accessing dental care and perceptions of self-reported dental health status.

The questionnaires were administered in English which is the university’s medium for teaching and learning in health sciences.

**Pilot study**

The questionnaire was validated in a previous study that examined dental students’ attitudes and practices toward oral care and was found to be reliable, having a Chronbach alpha coefficient of 0.73. The questionnaire was also piloted with third and fourth-year Occupational Therapy students to ensure the relevance and coherence of the questions posed. The questionnaire was also reviewed carefully to avoid any ambiguity in participants’ responses to the questions posed and to minimise any potential bias that could occur as a result of misunderstanding in the datasets for analysis. The questionnaire was finalised after reviewing and making the necessary corrections.

**Participant recruitment**

As part of the recruitment process, meetings were set up with relevant classes in the undergraduate physiotherapy programme to inform students of the purpose of the proposed study. Students were informed of the voluntary nature of the study. The researchers ensured that the questionnaires were left with the class captains for distribution and completed questionnaires were collected from these identified students. A follow-up was done after one month and all outstanding completed questionnaires were collected.

**Ethical considerations**

Ethical clearance for the study was obtained from the Human Social Sciences Research Ethics Committee (HSSREC) at...
an institution of higher learning in KwaZulu-Natal (KZN), South Africa (HSS/1539/01) and the necessary gatekeeper permissions from the Registrar at the same institution in KZN and the Academic Leader of Physiotherapy were sought to access the study population. Written consent was obtained from all study participants and participants were informed of their rights to withdraw from the study at any point without any negative consequences. All data was anonymised and reported in an aggregate format to protect the identity of the participants. The institution's name was also anonymised as per the condition stipulated in the gatekeeper’s permission letter. The raw data was stored safely in a locked cupboard and the electronic data was password protected with access being granted only to the research team and the approving research ethics committee.

Data analysis (tests used and software used)

The data was first cleaned for any outliers and missing data was excluded from the analysis – for example, a row with missing values was deleted. The data was then coded and analysed using SPSS version 29.0 (IBM Corp, USA). The study included univariate descriptive statistics such as frequency and mean distribution for the categorical data. The Likert scales were dichotomised into two categories of strongly agree/agree and neutral/disagree/strongly disagree. The Pearson's Chi-squared test was used to assess for a possible relationship between the independent variables (age, gender and year of study) and the dependent variables such as frequency of toothbrushing and use of interdental aids. Ordinal data such as the number of dental visits were compared using the Kruskal-Wallis test. A probability level of p<0.05 was used to indicate significance in the data presented. The open-ended questions were first recorded in a narrative format and were coded. Thereafter, the data was grouped according to the broad themes and then further analysed for emergent themes.

RESULTS

A total of 165 questionnaires were distributed with 137 completed and analysed for data, reflecting an 83% response rate. The responses according to the year of study were: 2nd 48 (35%); 3rd 42 (31%) and 4th 47 (34%) respectively. The participants were predominantly female 104 (76%) with no statistical association found between the level of study and gender.

Knowledge and perceptions of oral health status

Dental plaque as indicated by 117 (80%) of participants was: dirt on teeth, 76 (65%); bacteria on teeth, 33 (28%); other 8 (12%) with 15% (n=20) of participants having no knowledge of dental plaque.

Seventy-nine (58%) participants indicated their oral health status to be good or excellent. However, 75 (55%) indicated their gums bled during flossing with the highest percentage being the 4th year students 33 (70%) compared to 22 (52%) and 20 (42%) of 2nd and 3rd year students respectively (0.01). All respondents agreed that oral hygiene was important for general health (Table 1).

Reported oral health self-care practices

Almost all participants 136 (99%) reported using a toothbrush and toothpaste to clean their teeth with the duration of brushing varying between 1-2 minutes 57 (42%); 3-5 minutes 73 (53%) and more than 5 minutes 7(5%). One hundred and four (76%) participants brushed twice daily and 72 (53%) changed their toothbrush after every 3 months. Sixty-six (48%) participants rinsed their mouth after meals; 53 (39%) rinsed once only in the morning; 70 (51%) used a mouthwash; 124 (91%) brushed their tongue routinely. Eighty-four (62%) participants used an interdental aid; 64 (76%) a toothpick and 39 (46%) dental floss (Table 2).

Access to dental services

There were varying responses with regard to participants accessing facility-based oral health services. This ranged from once a year 50 (37%) to twice a year 20 (15%) with 59 (43%) not having any dental consultations in the past year. More than two-thirds of the study sample 100 (74%) reported seeking dental care only if required. An
overwhelming majority of participants 132 (96%) reported barriers to accessing dental care with the following challenges: high cost 71 (54%); not enough time 55 (42%) and fear of a dental visit 19 (14%).

**DISCUSSION**

This study’s findings indicated that physiotherapy students had varying levels of knowledge related to dental health such as their knowledge of dental plaque (biofilm). Additionally, although students reported having good oral health status almost half of the study sample 75 (55%) reported their gums bled during flossing. This finding is consistent with the findings reported by Singh and Pottapinjara who also noted that although participants in their study reported good oral health status, a third of their participants reported gingival bleeding during dental flossing. 

**Table 2: Oral self-care practices**

<table>
<thead>
<tr>
<th>Year</th>
<th>Second (n=48)</th>
<th>Third (n=42)</th>
<th>Fourth (n=47)</th>
<th>Total (n=137)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td><strong>Device to clean teeth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toothpaste &amp; brush</td>
<td>48</td>
<td>100%</td>
<td>41</td>
<td>98%</td>
<td>47</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>2%</td>
<td>0</td>
</tr>
<tr>
<td><strong>Cleaning time</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>1-2 min</td>
<td>24</td>
<td>50%</td>
<td>15</td>
<td>36%</td>
<td>18</td>
</tr>
<tr>
<td>3-5 min</td>
<td>21</td>
<td>44%</td>
<td>24</td>
<td>57%</td>
<td>28</td>
</tr>
<tr>
<td>&gt; 5 min</td>
<td>3</td>
<td>6%</td>
<td>3</td>
<td>7%</td>
<td>1</td>
</tr>
<tr>
<td><strong>Frequency of cleaning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once a day</td>
<td>11</td>
<td>23%</td>
<td>9</td>
<td>21%</td>
<td>5</td>
</tr>
<tr>
<td>Twice daily</td>
<td>35</td>
<td>73%</td>
<td>31</td>
<td>74%</td>
<td>38</td>
</tr>
<tr>
<td>Three or more times</td>
<td>2</td>
<td>4%</td>
<td>2</td>
<td>5%</td>
<td>4</td>
</tr>
<tr>
<td><strong>Changing toothbrush</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once a month</td>
<td>1</td>
<td>2%</td>
<td>7</td>
<td>17%</td>
<td>6</td>
</tr>
<tr>
<td>Every 3 months</td>
<td>29</td>
<td>60%</td>
<td>22</td>
<td>53%</td>
<td>21</td>
</tr>
<tr>
<td>Every 6 months</td>
<td>13</td>
<td>28%</td>
<td>12</td>
<td>30%</td>
<td>17</td>
</tr>
<tr>
<td>Every year</td>
<td>5</td>
<td>10%</td>
<td>1</td>
<td>2%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Rinsing mouth with water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always after meals</td>
<td>25</td>
<td>52%</td>
<td>21</td>
<td>50%</td>
<td>20</td>
</tr>
<tr>
<td>Once in the morning</td>
<td>16</td>
<td>33%</td>
<td>16</td>
<td>38%</td>
<td>21</td>
</tr>
<tr>
<td>Always before meals</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>1</td>
</tr>
<tr>
<td>Never</td>
<td>7</td>
<td>15%</td>
<td>5</td>
<td>12%</td>
<td>5</td>
</tr>
<tr>
<td><strong>Use of commercial mouthwash</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>21</td>
<td>44%</td>
<td>24</td>
<td>57%</td>
<td>25</td>
</tr>
<tr>
<td>No</td>
<td>27</td>
<td>56%</td>
<td>18</td>
<td>43%</td>
<td>22</td>
</tr>
<tr>
<td><strong>Cleaning tongue</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tooth brush</td>
<td>44</td>
<td>92%</td>
<td>38</td>
<td>90%</td>
<td>42</td>
</tr>
<tr>
<td>Tongue cleaner</td>
<td>3</td>
<td>6%</td>
<td>3</td>
<td>7%</td>
<td>2</td>
</tr>
<tr>
<td>Nothing</td>
<td>1</td>
<td>2%</td>
<td>1</td>
<td>2%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Interdental aid</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toothpick</td>
<td>18</td>
<td>35%</td>
<td>16</td>
<td>38%</td>
<td>11</td>
</tr>
<tr>
<td>Dental floss</td>
<td>9</td>
<td>19%</td>
<td>3</td>
<td>7%</td>
<td>7</td>
</tr>
<tr>
<td>Pick &amp; floss</td>
<td>5</td>
<td>10%</td>
<td>6</td>
<td>14%</td>
<td>6</td>
</tr>
<tr>
<td>Floss &amp; brush</td>
<td>1</td>
<td>2%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Pick &amp; brush</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>2%</td>
<td>0</td>
</tr>
<tr>
<td>All</td>
<td>0</td>
<td>0%</td>
<td>2</td>
<td>5%</td>
<td>0</td>
</tr>
<tr>
<td>Nothing</td>
<td>15</td>
<td>31%</td>
<td>14</td>
<td>33%</td>
<td>23</td>
</tr>
</tbody>
</table>

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Generally bleeding gums is a sign of poor gum health, indicating that our sample did not have good oral self-care. Although knowledge does not automatically lead to better self-care behaviour it is possible that those having the relevant knowledge of oral health may adopt these practices and be able to transfer this knowledge to others – for example, physiotherapy students to their patients. Health professionals are expected to serve as role models to their patients and, accordingly, are expected to follow healthy lifestyles and practices and engage in positive self-care recommendations for their own behaviour. Generally, students in the health professions are expected to have good knowledge and practices related to health and one assumes that a similar understanding of dental care related to their knowledge, oral hygiene and self-care practices be relatively good. This is based on the premise that these are related to and influence health which has a direct bearing on health professionals when engaging and inculcating improvements or lifestyle changes for patients. The challenge arises when there is an expectation that health education will inculcate positive notions of the concept of health but it cannot be assumed that students will readily integrate these concepts into their theoretical and practical knowledge. 16 This finding is further supported by Raval and Sainani who concede the need for educational programmes to encourage good oral health and practices among health professionals.

This study also indicated that participants reported using toothbrushes and toothpaste for cleaning their teeth at least twice daily (104.7%). A similar finding of 121 (70%) was found in a study conducted with nursing students by Kerr and Singh. 18 These findings are much higher than those reported by Onwubu et al., where only 56.2% of their participants brushed their teeth twice daily. 19 Further, only 53% of the participants in this study changed their toothbrushes after 3 months. This finding is supported by Tadin et al., who reported that 59.7% of their study participants reported replacing their toothbrushes after 3 months; however, only 26.7% of their study sample reported the use of dental floss compared to 46% of participants in this study. 20 Likewise, Okoroafor et al. and Kerr and Singh also reported low use of dental floss in their studies. 21 Similarly, participants in this study did not consider the role of diet in oral hygiene self-care practices. The results from this study, however, correlate to the findings by De Oliveira Diniz et al. 12 where although participants had good knowledge and oral self-care practices there were gaps in certain aspects of their oral hygiene knowledge and practices. We support this as the participants in this study indicated gaps in their oral health practices by their responses as the data show they lacked knowledge related to dental plaque, correct use of dental aids and the importance on regular dental consultations. They also lacked knowledge on the use of toothpicks as they did not know that the use of toothpicks was contraindicated in areas with tight interdental contacts and that its use would depend on the interdental spaces, papillae and tooth crowding. Also using toothpicks in areas where the spaces between the teeth are limited was not recommended by dentists or oral hygienists. The reason for this is that there is a risk of toothpicks breaking during usage and that the broken fragments could get lodged between the teeth and damage the gingiva and surrounding tissues leading to pain, inflammation and discomfort. The correct use of interdental aids is not only relevant for health professionals, but physiotherapists and physiotherapy students as well, because they can educate their patients on the correct use of toothpicks such as the triangular low surface ones which will benefit those with tight interdental spaces. 23, 24

This study showed that regular visits by physiotherapy students to a dentist were poor and some would only seek dental services when there was pain or other oral symptoms. These were similar findings in other studies where dental visits were motivated by the need to relieve pain and discomfort. 25, 26 The reported barriers to dental consultations by participants were predominately the cost of dental care and limited time to visit the dental practitioners which concur with the findings as reported by Singh and Pottapinjara as well as Kerr and Singh. 27, 28 Perhaps these findings relate to physiotherapy students having lectures and clinical interactions with patients almost the entire day leading to students indicating that their physiotherapy programme was “loaded” and they had time constraints for dental consultations. The “limited” time factor also related to students being constrained to and not being able to engage in part-time activities to supplement their income so “cost” of or payment for dental visits was also a challenge. Although the students reported good oral self-care the large number reported to having bleeding gums and limited knowledge of dental plaque was a concern. It is generally known that most oral health-related habits are established early in life and are mediated by parental behaviour to encourage oral self-care. 29 Perhaps this aspect is neglected during the formal university programme as students have a “loaded” programme and could lead to students neglecting their oral care and failing to integrate their environmental, social and personal resources and abilities. 30 These may be additional reasons to include dental and oral self-care practices in the physiotherapy curriculum because oral self-care practices established early in life can be reinforced and maintained. Further, the advantage of formally introducing oral hygiene and oral self-care into the physiotherapy curriculum could reinforce pre-existing knowledge and build on promoting healthier lifestyle choices for both students and their patients.

STRENGTHS AND LIMITATIONS OF THE STUDY

Since this was an initial study, the data offers useful insight into physiotherapy students’ knowledge of mouth hygiene and oral self-care practices but the authors concede some limitations with the study. The first is the use of a single site hence the findings are only generalisable to the identified site. A second limitation is that the researchers could not differentiate the possibility of bias as self-reported responses can sometimes reflect what the participants considered to be ideal rather than what they really practiced. Despite these limitations, the study provides valuable baseline data that could inform curriculum review in physiotherapy in the identified institution. At the same time, the study could be replicated in other universities offering physiotherapy
curricula as well as other health science training programmes. More research is recommended to explore health science academics for the inclusion of oral hygiene self-care in undergraduate physiotherapy curricula.

CONCLUSION

The study findings indicate that physiotherapy students had inconsistent reported knowledge, perceptions and oral health-related practices. This further iterates the need to support, through the learning process, oral health self-empowerment, where the individual takes responsibility for his/her own oral health. Such efforts could reap better oral health outcomes for both students as well as the communities they serve.

Acknowledgment

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This study did not receive any funding.

Conflicts of interest

The authors declare no conflict of interest.

REFERENCES

8. World Health Organization (WHO), Ottawa Charter for Health Promotion, 1986