Community Dental Health (2014) **31,** 158–162
Received 6 November 2013; Accepted 11 February 2014

doi:10.1922/CDH_3329Broder05

Type II diabetes and oral health: perceptions among adults with diabetes and oral/health care providers in Ghana

H.L. Broder[1], D. Tormeti[2], A.L. Kurtz[1], D. Baah-Odoom[3], R.M. Hill[1], S.M. Hirsch[1], S.A. Hewlett[2], J.K. Nimako-Boateng[3], J.Y. Rodriguez[1] and L. Sischo[1]

[1]New York University College of Dentistry, New York, USA; [2]University of Ghana Dental School, Accra, Ghana; [3]University of Ghana School of Public Health, Accra, Ghana

Objective: This study sought to examine oral health beliefs and attitudes, and utilisation of oral health care services among individuals with diabetes and health professionals who serve them in Ghana. ***Basic Research Design:*** A qualitative study using grounded theory was conducted. ***Clinical Setting***: University of Ghana Dental School at Korle Bu, University of Ghana School of Public Health, National Diabetes Research and Management Centre at Korle Bu, and New York University College of Dentistry. ***Participants***: A convenience sample of 59 patients comprised 7 focus groups conducted in either Twi or English. Seven key informant interviews with healthcare professionals and one spiritual leader were completed. ***Results***: Data from the focus groups and interviews reveal: 1, half of the participants with diabetes have oral manifestations (e.g., bleeding gums) and participants are generally unaware of interrelationship between diabetes and oral health; 2, dental treatment utilisation is minimal and associated almost exclusively with reparative and emergency care; and 3, medical health providers do not acknowledge the interrelationship between oral health and diabetes nor do they incorporate oral health issues into diabetes screening/treatment. ***Conclusion***: Oral health knowledge and practices are limited among patients with diabetes in Accra, Ghana. Collaborative efforts for in-service education and training for oral health and medical professionals may be beneficial in serving the oral and general health care needs as well as improving the oral health-related quality of life of Ghanaians with diabetes.

Key words*: diabetes mellitus, qualitative research, periodontitis, quality of life, oral health, health literacy*

Introduction

Diabetes mellitus (diabetes) is a chronic condition affecting 371 million people globally (International Diabetes Federation, 2012) with 1.6 million in Ghana alone (Amoah *et al*., 2002). Although not commonly discussed in the medical literature, diabetes is also associated with oral health. In fact, the dental literature consistently links diabetes and periodontitis, which is an "irreversible loss of the supporting tooth structures" (Lalla and Papapanou, 2011). Patients with diabetes are at an increased risk for developing periodontitis and periodontitis is more prevalent and severe in people with diabetes. Periodontal disease is common if diabetes is not well controlled (Loe, 1993; Mealey and Oates, 2006). Indeed, patients with uncontrolled diabetes can have numerous oral manifestations including increased inflammation, accelerated loss of tissue, increased suppuration, candida infection (Ship, 2003) as well as decreased wound healing. It is well-documented that adherence to care is an ongoing challenge in serving patients with incurable chronic conditions, like diabetes (Dunbar-Jacob and Mortimer-Stephens, 2001).

In Ghana little is known about periodontal disease among people with diabetes. Scant data also exist regarding Ghanaians' attitudes and perceptions of oral health and self-care habits as well as current treatment practices for those with diabetes (Aikins, 2005), which makes qualitative research particularly useful (Charmaz, 2006; Pooler, 2013). Given the high rate of diabetes in Ghana, it is important to understand oral health knowledge, oral health impact and practices among patients with diabetes. The purpose of this study was to assess oral health perceptions and service utilisation among individuals with diabetes and general health providers in Ghana and to provide an intermediate step toward investigating potential future health interventions.

Addressing contextual factors is intrinsic for comprehending people's attitudes, behaviours and values relative to their physical and oral health. Thus, to identify and better understand some contextual factors surrounding diabetes and oral healthcare in Ghana, we formulated the following research questions: 1, What are the oral health perceptions and health knowledge among adults with diabetes seeking treatment at the National Diabetes Research and Management Centre?; 2, What are these patients' current oral health practices and oral health utilisation?; and 3, What are the current oral health promotion/education services at the Centre?

Method

In July 2012, faculty and global health administrators from New York University College of Dentistry (NYUCD) travelled to Accra, Ghana, to develop a collaborative research effort with the University of Ghana Dental School (UG Dental School), the UG School of Public Health, and the

Correspondence to: Dr Hillary L. Broder, New York University College of Dentistry, 380 2nd Avenue, Suite 301, New York, NY 10010. Email: hillary.broder@nyu.edu

Diabetes Centre. Approval was subsequently secured from the UG Ethical and Protocol Review Committee and the NYU Committee on Activities Involving Human Subjects to conduct focus group interviews with patients and individual interviews with key informants.

For one week in January 2013, diabetes patients were recruited daily at the Centre to participate in focus group interviews. Each morning the Centre nurse educator conducts a regularly scheduled 15-minute health education discussion in the waiting area. During the study's recruitment week, the nurse briefly identified the study aims before introducing a Ghanaian periodontist, a member of the research team. This specialist provided a comprehensive explanation of the project's purpose in both English and Twi (the predominant local language in Ghana). Subsequently, a research team member spoke with patients who were interested in the study. Focus groups (conducted in both English and Twi) were held at the Dental School campus.

Based on local advice, the groups were of mixed gender but separated by age. The inclusion criteria were broad: active patients from the Centre who spoke Twi or English and were between 20-45 years old (for the younger focus groups) or over 45 years old (for the older focus groups). Researchers conducted two focus groups for the younger patients and five for the older group, which included most of the Centre's patients. All participants were patients with diabetes seeking treatment at the Centre though no additional exclusion criteria were applied. Written consent was obtained prior to participation in a focus group. Participants received a cash incentive of 20 cedi (approximately 10 US$) and were offered refreshments.

Informants, who included public health, dental, and health professionals and a religious leader, were also interviewed during the recruitment period. These informants represent a balance of perspectives to provide additional insight regarding the topics under investigation. Following written consent, interviews were conducted at locations convenient for the informants. Digital recorders were used to record sessions and interviews; audio files were housed on secure Webspace on the NYU server. Verbatim transcriptions were accomplished by professional transcription services.

This study represents a collaborative effort among the Centre, Dental School, UG School of Public Health and NYUCD. Located on the Korle Bu Teaching Hospital campus, the Centre is a tertiary, out-patient national referral centre serving clients with diabetes and is the national referral centre for patients with diabetes. The Dental School, also on campus, has a five-year program which is part of the College of Health Sciences that awards a Bachelor of Dental Surgery degree. The NYUCD International Initiatives Office provides community outreach and has partnered with the UG and Korle Bu Teaching Hospital to foster health promotion and disease prevention in Ghana through service, education, and research.

Qualitative analyses were informed by grounded theory (Charmaz, 2006; Glaser and Strauss, 1967). Our approach follows Krueger and Casey's (2009) framework and Burawoy's (1998) ‘‘extended case method,'' which takes context as its starting point and seeks to understand wider processes.

To establish inter-rater reliability and ensure the validity of the findings, two of the investigators independently reviewed and coded randomly selected transcripts and then met to discuss codes, achieve consensus, and resolve differences (Patton, 1999). While coding, the investigators wrote theoretical memos, which were used to analyse emerging concepts and themes in ways that move the analysis from individual participants' experiences to a higher analytical understanding of diabetes care, oral health practices and perceptions, and need/receptivity about implementing a possible future oral health promotion study. The qualitative software ATLAS.ti (2012) aided analyses of the data.

Results

Of the 115 patients with diabetes who expressed interest in the study, 59 (51%) of them participated across the seven focus groups. Four focus groups were conducted in Twi and three in English. Each session had a lead moderator and a co-leader and averaged 65 minutes. See Figure 1 for the focus group interview script.

Eight informant interviews, averaging 30 minutes, were also completed by the project's principal investigator. While the interviews were tailored toward the informants' experiences and expertise, common themes regarding oral health utilisation and understanding were covered across the interviews.

Introduction: As you know, you were all recruited from the Diabetes Clinic. Please introduce yourself by your first name and how long you've been going to the Clinic.

1. What was the reason(s) that you went to seek care? (symptoms/when)
2. What do people do to control their diabetes? Is your diabetes now controlled? Why do you think it is controlled; or think that it is not controlled?

Transition: We know that the mouth is connected to the rest of the body AND people can have concerns about their mouths, including their gums and/or teeth.

3. What is meant by oral health—good oral health—poor oral health?
4. Has anyone had oral health concerns since having diabetes? OR noticed a connection between oral health and diabetes? If yes, what? If no one answers—ask about oral manifestations—like fungus—white stuff—bleeding gums, dry mouth, burning feeling in their mouths, lack of taste.
5. What causes these oral health issues?
6. What have you done about it? What works—what does not work?
7. What is the relationship between what you eat and oral health—and diabetes?
8. If you have a dental concern, what do you do? What are things people should do to take care of their mouth/teeth/gums?
9. When was the last time you went, if ever, to a dentist? Ever go to the dental school at Korle Bu?
10. Do you believe that helping your mouth could help your diabetes? If so, why?
11. Do you believe that controlling your diabetes could help your oral health? If so, why?
12. If you thought it would help your diabetes and your mouth, would you go to the dentist? What are the things that would prevent or stop you from going?
13. What things would facilitate you going for care?

Summary: Ask for additional queries or comments from co-leaders/participants/observers.

Figure 1. *Focus group interview script*

Causes of Diabetes

Both informants and focus group participants linked family history and poor diet to diabetes onset. As one focus group participant said, *"at first, our elders used to say that it is transferred through genetics but today, when we go to the clinic the doctors tell us because our food. So if you don't care about what you eat, though it may not be in your family, you can get it."* Other causes of diabetes mentioned by participants included food consumption, use of fertiliser, obesity, and spiritual forces. In relation to the latter, some focus group participants intimated that diabetes may be associated with evil spirits or bad deeds, and so they initially sought help from pastors. However, if their condition worsened, self-reports indicated that these participants usually sought medical care or complied with their current treatment regimen. One informant also noted that while some patients accept the medical causes of diabetes, others have lingering thoughts that spirituality and superstitions may have caused their disease.

Diabetes Care

According to focus group participants, the Centre aims to control diabetes through lifestyle modification and/or medication, with an emphasis on modifying patients' diets. As one focus group participant said: *"The best thing is I watch my body reaction and the food I take. I make sure I don't take the food I'm not supposed to."* Patient participants are also advised to exercise to help control their diabetes. While exercise allows some participants to avoid taking diabetes medication, others combine medication and exercise to control their diabetes.

Despite these reported efforts, about half of the participants believed their diabetes is not "under control." Some participants attributed their inability to control their diabetes to low adherence to their treatment plan and/or resistance to a strict diet. As one woman said, *"I am even fed up with the vegetables and ate whatever I wanted. I even stopped coming here [the Centre] for two years. I only started coming here when I became pregnant."* Other participants revealed an inability to start or continue an exercise regimen. Others stopped taking their medication once their health improved: *"The mistake I made was that I stopped taking the drugs thinking that I am now ok. Unfortunately, the urination started again."* Centre personnel also endorsed the poor adherence among their patients.

Given the importance of spirituality, some participants seek treatment for their diabetes from spiritual/religious leaders. One focus group member, for example, went to a prophet for diabetes treatment. While the prophet "didn't pray" for him, the prophet did "touch him" and the patient's glucose levels reportedly decreased. Other focus group members describe the importance of praying for relief from their diabetes symptoms. The religious leader informant also recited a relationship between spirituality, the power of prayer, and health: *"I know that it's God who has given people the mind to learn about healing sick people through oral medication and also through prayer; so I believe in both."*

While most participants understand that diabetes is controllable but not curable, some want to be cured. This attitude was more prevalent among younger patients. As one young focus group participant said, *"I believe there should be a cure, because every disease has one."* Another participant expressed that God, her "ultimate healer," will cure her diabetes. In fact, two Centre informants reported that younger patients are less compliant with diabetes treatment due to low interest in taking their medication. They often make unhealthy food choices compared to elderly patients who are closely monitored by family members to ensure compliance. Finally, according to a Centre medical professional, those patients who refuse to accept that diabetes is incurable often seek care from herbalists/spiritual leaders who they believe will "cure" their disease.

Diabetes and Oral Health

When queried about their oral health, over half of the focus group participants expressed common oral health concerns, including sore, swollen and bleeding gums, bad breath, sensitive or loose teeth, etc. Despite these problems, several participants revealed never having been to a dentist. A Dental School informant believed that most patients with diabetes and periodontal disease have never been to the dentist, and most of them are unaware of their periodontal condition when they seek dental care.

Most focus group participants do not link oral health problems and diabetes and very few realised the interrelationship between blood sugar levels and oral health. They were often unaware that keeping their blood sugar under control could 'ease' their oral health problems and, conversely, maintaining good oral health would help them maintain their blood sugar levels. Others were sceptical about the relationship: *"As for me, I don't believe it. This is because I really take good care of my oral health but to no avail—I still suffer."* Yet, a few focus group participants did recognise the connection between diabetes and oral health. For example, one participant said, *"Because as diabetes patients if we don't control it well, there are some bacteria who feed on sweets so if you allow sugar to accumulate in the body, you will end up promoting them. For that matter we have to promote good oral health."* Others observed the link through personal experiences or their family history of diabetes.

Medical informants do not acknowledge the relationship between diabetes and oral health. As one medical practitioner purported: *"I don't really know the prevalence of periodontal problems;"* while another said: *"I rarely inquire about the dental health. I don't think patients are particularly bad that way."* Dental School informants further supported this by revealing that while they refer patients to the Centre for uncontrolled sugar levels, the Centre rarely reciprocates by referring patients to the Dental School for oral health problems such as bleeding gums and tooth pain. Thus, dental health professionals in Ghana advocated for additional oral health training for medical professionals treating patients with diabetes. As one Dental School informant said: *"[Doctors and nurses] need to be trained, they need to be taught something [about oral health]. Until that is done they probably see dentistry as an irrelevant subject."*

Data from Dental School informants indicate that oral medicine is a part of the curriculum at the Dental School. Yet scant oral health information regarding the interrela-

tionship between diabetes and oral health is taught at the medical school and/or practiced at the Centre. In querying the Centre health providers and reviewing their health posters and educational material, no references/queries to the mouth or oral manifestations were made. When asked about oral health education and screenings, Centre personnel indicated that they lack time and personnel to screen for oral health problems and repeatedly questioned the incidence of oral problems and related impact.

Based on subjective reports of their well-being, participants reported compromised oral health-related quality of life, and most agreed that education is needed regarding the link between diabetes and oral health. Some patients complained that they are referred to dieticians and optometrists during their diabetes care, but not dentists: *"What I want to say is that, if you can advocate on our behalf, you should advise the doctors that when they realise that someone needs to see a dentist they should refer us to one just as they refer us to either a dietician or an eye specialist."*

Most focus group participants expressed interest in oral health education and care. More specifically, participants listened intently at the dental education session incorporated into the close of the focus group sessions that described proper dental care and answered participants' questions about oral health manifestations. Participants claimed during these dental education sessions that if they were referred to the Dental School, they would go. Dental School informants also advocated screening for periodontal disease and other oral conditions among patients with diabetes.

Oral Health Behaviours and Utilisation

The majority of focus group participants had little knowledge about what constitutes good oral health and had only visited a dentist for emergency care. In general, dental care among study participants was sporadic and centered on acute problems. For example, one young focus group participant said, *"Me, for instance, they told me to report yearly but I have not been there for about three years now. I have begun getting problems so I will be coming."* Another participant said that *"people who are not diabetic hardly go [to the dentist],"* implying that the oral health behaviours of people with diabetes are not different from the rest of the population.

Participants reported using various strategies, including "chewing sticks" and Moringa leaves (herbal preparation), to maintain oral hygiene. Most participants reported tooth brushing and using mouthwash daily. Very few used dental floss and some participants had no knowledge of it. Most of the health professionals also indicated a lack of regular oral health check-ups and rarely, if ever, used floss.

Discussion

This study successfully used a two-pronged qualitative approach to understand factors surrounding oral health and diabetes in Ghana. In short, the triangulation of data provides insight into our research questions: 1, most participants with diabetes are unaware of the relationship between diabetes and oral health; 2, oral health care utilisation among focus group participants is minimal and usually associated with reparative and emergency care; 3, health providers generally do not use a holistic approach to patient care that incorporates oral health into diabetes treatment.

Consistent with other underdeveloped countries (Mirza *et al*., 2007), we find that oral health knowledge and practices among patients with diabetes in Ghana (and specifically in the city of Accra) is limited. Our findings support prior studies indicating that health literacy and/or health knowledge is often dependent upon contextual factors like traditional ideas and structural barriers (Andrzejewski *et al*., 2009; Launiala, 2009). Given the reportedly high rate of diabetes in Ghana (Amoah *et al*, 2002), increasing oral health knowledge among Ghanaians and health professionals is likely to have a positive effect. This issue is crucial as oral health information is neither obtained nor disseminated at the Centre despite the standard of care at health facilities in other locations that incorporates the connection between periodontal disease and uncontrolled diabetes (Grossi and Genco, 1998; Stegeman, 2005). In summary, the socio-cultural and contextual understanding gained suggests possible future research directions for oral health intervention approaches for patients with diabetes in Ghana.

A limitation of this study is that the participants represented a convenience sample and only included adults with diabetes from one location. Additionally, the self-reported oral health history is not validated with clinical data and only subjective data are available regarding the uncontrolled nature of the participants' diabetes. Thus, further research into this underserved area and population is indicated.

Based on the study data, some recommendations are worth considering. First, ongoing dialogue among the Diabetes Centre, UG Dental School, and UG School of Public Health professionals is important for promoting oral health in patients with diabetes. Secondly, additional oral health education is warranted for Centre health professionals given their scepticism regarding the connection of the mouth with the rest of the body. Training for health professionals could address the known link between oral health and immune function and foster multi-disciplinary care for people with diabetes. Thirdly, oral health screening and related education for Centre patients is suggested given the high rate of oral health issues among the focus group participants (Bowyer *et al*., 2011; Eldarrat, 2011) and the receptivity of study participants to education initiatives. Since Centre informants identified specific structural barriers to their implementation (e.g. lack of time, space, and personnel), creating oral health screenings at the Centre would require creative problem-solving. Given the proximity of the Dental School and Centre, monthly screenings by dental residents could possibly be accomplished at the Centre or Dental School. Such patient education efforts/screenings are congruent with comprehensive diabetes treatment facilities (Lalla and Papapanou, 2011) and may also help determine the rates of periodontitis among patients with uncontrolled diabetes who are at high risk for oral health problems and reduced well-being.

In conclusion, oral health knowledge and practices for comprehensive care among Ghanaian patients with diabetes appear to be limited. Despite the sentiments of medical personnel interviewed, self-reported oral health

manifestations and negative impact were reported by the focus group participants. Providing education and training to oral health and medical professionals is crucial to serve the holistic needs of and enhance the oral health-related quality of life among Ghanaians with diabetes.

Acknowledgements

The research team thanks Dr. Robert Berne, Executive Vice President for Health at NYU, for initiating the relationship between New York University and University of Ghana and providing financial support for the NYUCD to undertake this project. A special thanks to Professor Albert G. Amoah of the Diabetes Centre, Professor Grace Parkins and other members of the UG Dental School and medical community at Korle Bu for their time and effort.

References

Aikins, A.D. (2005): Healer shopping in Africa: new evidence from rural-urban qualitative study of Ghanaian diabetes experiences. *British Medical Journal* **331**, 737-742.

Amoah, A.G.B., Owusu, S.K. and Adjei, S. (2002): Diabetes in Ghana: a community based prevalence study in Greater Accra. *Diabetes Research and Clinical Practice* **56**, 197-205.

Andrzejewski, C.S., Reed, H.E. and White, M.J. (2009): Does where you live influence what you know? Community effects on health knowledge in Ghana. *Health & Place* **15**, 228-238.

ATLAS.ti, (2012): ATLAS.ti Berlin: Scientific Software Development GmbH.

Bowyer, V., Sutcliffe, P., Ireland, R., Lindenmeyer, A., Gadsby, R., Graveney, M., Sturt, J. and Dale, J. (2011): Oral health awareness in adult patients with diabetes: a questionnaire study. *British Dental Journal* **211**, E12.

Burawoy, M. (1998): The extended case method. *Sociological Theory* **16**, 4-33.

Charmaz, K. (2006): *Constructing grounded theory: a practical guide through qualitative analysis*. Thousand Oaks: Sage.

Dunbar-Jacob, J. and Mortimer-Stephens, M.K. (2001): Treatment adherence in chronic disease. *Journal of Clinical Epidemiology* **54** Suppl 1, S57-60.

Eldarrat, A.H. (2011): Awareness and attitude of diabetic patients about their increased risk for oral diseases. *Oral Health and Preventive Dentistry* **9**, 235-241.

Glaser, B.G. and Strauss, A.L. (1967): *The discovery of grounded theory: strategies for qualitative research*. Chicago: Aldine Publishing Company.

Grossi, S.G. and Genco, R.J. (1998): Periodontal disease and diabetes mellitus: a two-way relationship. *Annals of Periodontology* **3**, 51-61.

International Diabetes Federation (2012): *IDF Diabetes Atlas, 5th ed*. idf.org/sites/default/files/attachments/5E_IDFAtlas-Poster_2012_EN.pdf.

Krueger, R.A. and Casey, M.A. (2009): Focus *groups: a practical guide for applied research, 4th ed*. Thousand Oaks, CA: Sage Publications.

Lalla, E. and Papapanou, P.N. (2011): Diabetes mellitus and periodontitis: a tale of two common interrelated diseases. *Nature Reviews. Endocrinology* **7**, 738-748.

Launiala, A. (2009): How much can a KAP survey tell us about people's knowledge, attitudes, and practices? Some observations from medical anthropology research on malaria in pregnancy and Malawi. *Anthropology Matters* **11**, 1-13.

Loe, H. (1993): Periodontal disease. The sixth complication of diabetes mellitus. *Diabetes Care* **16**, 329-334.

Mealey, B.L. and Oates, T.W. (2006): Diabetes mellitus and periodontal diseases. *Journal of Periodontology* **77**, 1289-1303.

Mirza, K.M., Khan, A.A., Ali, M.M. and Chaudhry, S. (2007): Oral health knowledge, attitude, and practices and sources of information for diabetic patients in Lahore, Pakistan. *Diabetes Care* **30**, 3046-3047.

Patton, M.Q. (1999): Enhancing the quality and credibility of qualitative analysis. *Health Services Research* **34**, 1189-1208.

Pooler, J. (2013): Approaches to qualitative research in dentistry. *Journal of Dental, Oral and Craniofacial Epidemiology* **1**, 17-25.

Ship, J.A. (2003): Diabetes and oral health: an overview. *Journal of the American Dental Association* **134** Spec No, 4S-10S.

Stegeman, C.A. (2005): Oral manifestations of diabetes. *Home Healthcare Nurse* **23**, 233-240.