SOCIO-ECONOMIC CHARACTERISTICS AND FACTORS ASSOCIATED WITH ORAL HEALTH STATUS OF DIABETIC PATIENTS ATTENDING KIKUYU HOSPITAL, KENYA

Kenneth Kipkemoi Komen, Department of Epidemiology and Biostatistics, School of Public health, Mount Kenya University, P.O. Box 342-01000 Thika, Kenya, Dr. Eliab Seroney Some, Assistant Professor of Epidemiology & Biostatistics, School of Pharmacy and Health Sciences, United States International University of Africa, P.O. Box 146334-00800 Nairobi, Kenya, Dr.Jane Karonjo, Dean School of Nursing, Mount Kenya University, P.O. Box 342-01000 Thika, Kenya

Corresponding author: Kenneth Kipkemoi Komen, Department of Epidemiology and Biostatistics, School of Public health, Mount Kenya University, P.O. Box 342-01000 Thika, Kenya. Email: ktumek@gmail.com

SOCIO-ECONOMIC CHARACTERISTICS AND FACTORS ASSOCIATED WITH ORAL HEALTH STATUS OF DIABETIC PATIENTS ATTENDING KIKUYU HOSPITAL, KENYA

K. K. Kipkemoi, E. S. Some and J. Karonjo

ABSTRACT

Objectives: **To determine socio-economic characteristics and factors associated with oral health status of diabetic patients attending Kikuyu hospital, Kenya**

Methods: **The study design was cross-sectional with a questionnaire designed using Kobo Toolbox®. A Smartphone was programmed with the questionnaire and used collect data.**

Results: **Out of 349 respondents, 63.3% were females, 67.6% married, 49.5% aware of type of diabetes they had, 59% from rural areas, 62% used insulin to control blood sugar,79.4% had insurance cover, 88% and 99% used alcohol and non-curative drugs respectively and more than 80% had no negative experiences due to their oral health status. Overall, respondents had a DMFT index of 4.10±5.02. There was a statistically significant difference in DMFT index by level of education (p=0.005), marital status (p=0.003), means of transport (p=0.001), being worse to the higher level of the attributes.**

Discussion: **Majority of the respondents were females, married and elderly. Majority were not aware of the type of diabetes they had. Insulin was mostly used to control blood sugar. Majority of the respondents (about 70%) perceived their oral health status to have remained the same after diagnosis of DM while about 30% perceived a worsened status.**

Conclusion: **Approximately half of the patients were not aware of the type of diabetes they had. Oral health status remains the same or worsens after diagnosis of DM. A higher socio-economic status was associated with higher DMFT index suggesting, that oral health may be influenced by affluence of patients with DM.**

INTRODUCTION

Diabetes is a chronic disease that affects the pancreas, making it not to function as required. This leads to poor control of glucose levels in blood, affecting the body organs and tissues (International Diabetes federation-IDF, 2020). Diabetes mellitus (DM) has a possible association with apical periodontitis (Cabanillas-Balsera, Martin-Gonzalez, Montero-Miralles, Sanchez-Dominguez, Siminez-Sanchez, & Segura-egea, 2019). According to WHO (2016), it was estimated that 422million adults globally are living with diabetes mellitus (DM), where by 2030 it is projected to almost double (Asmelash, Abdu, Tefera, Baynes, & Derbew, 2019). In Africa in the year 2010, 12.1million people were estimated to have DM and by 2030 it is projected to increase to 23.9 million (Asmelash, Abdu, Tefera, Baynes, & Derbew, 2019). In 2015 it was estimated that there 415 million people aged 20-79 years DM (Hamzeh, et al., 2019). Developing countries are the most affected contributing an estimated 75% of p (Hamzeh, et al., 2019). By 2040 it was predicted that the number of diabetic patients to be 642 million (Hamzeh, et al., 2019). In the middle East and North Africa region have approximately 35.4 million people with DM according to press release in 2017 (Hamzeh, et al., 2019). Cumulatively in Kenya it was projected that there will be 480 000 cases of diabetes by 2015. In Kenya the prevalence of diabetes was 3.5-5% with higher proportion being those living in urban areas according to a previous population-based studies (Mohamed, Mwangi, Kamutua, Kibachio, Hussein, et. al., 2018) DM being a metabolic disorders characterised by hyperglycaemia, plays an important role in causing mortality and mobility through continued clinical consequence (Asmelash, Abdu, Tefera, Baynes, & Derbew, 2019). Patient's education is key elements in the management of DM since its management is largely dependent on the patient's ability to self-care in their day to day lives (Asmelash, Abdu, Tefera, Baynes, & Derbew, 2019).

Traditionally oral health is defined as oral status that is free from diseases which constitutes to normal function of mouth (Yufei, Xin, Changquing, & Qiany, 2019). According to Federal Dental international (FDI), Dental World Federation in 2016 redefined oral health as ability to touch, smell, chew, swallow, speak, smile, taste and convey a lot of emotions through facial expression with confident without pain, discomfort and disease of craniofacial region (Yufei, Xin, Changquing, & Qiany, 2019). Risk factors such as physical, environmental, biological and behavioural are involved in the development of caries (Verhulst, Loos, Gerdes, & Teelew, 2019). Good oral self-care practices and association between DM should be considered as priority (Weerasekera, et al., 2016). Oral health is hence important in people with DM (Weerasekera, et al., 2016). In 2009, IDF published the guidelines on oral health for people with diabetes which encourages implementation of oral care in diabetes care (Verhulst, Loos, Gerdes, & Teelew, 2019). There is still no literature reported concerning association between acute effects of DM and oral complications (Verhulst, Loos, Gerdes, & Teelew, 2019). It is therefore important to inform DM patients about this bidirectional interaction between DM and oral health for both control of periodontal disease, management of DM and the prevention (Cankaya, Guneri, Epstein, & Boyacloglu, 2018). There is an indication that due to increased high level of poor oral health and increased incidence of DM, hence, continuing need for education of DM patients by health care providers regarding interaction between DM and oral health (Cankaya, Guneri, Epstein, & Boyacloglu, 2018). Because of global prevalence of DM, the role of nurses is important in the

management of DM among the health care professionals involved (Cankaya, Guneri, Epstein, & Boyacloglu, 2018). Periodontal disease being the seventh complications of diabetes is the main cause of tooth loss (Kawamura & Matsuda, 2013). Preserving good tooth and maintaining oral hygiene and oral function prevent both onset and progress of periodontal disease and arteriosclerotic disease caused by periodontal disease (Kawamura & Matsuda, 2013). Both professional care and self-care are considered to be important in maintaining oral health (Kawamura & Matsuda, 2013). It is important to self-manage oral hygiene behaviours taking diabetes into account as well as attending dental examinations for treatment of diabetic complication for patients (Kawamura & Matsuda, 2013).

MATERIALS AND METHODS

Kobo toolbox® was used to design a questionnaire. Kobo is a free and open platform which involves collection of data in real time on a smart phone. Smartphone which was programmed with the questionnaire was used to collect data. After filling all the questions, the data is then centralized on the internet to the main server, then downloaded into Microsoft Excel and then to SPSS version 24 for analysis.

This study was a cross-sectional study involving 349 respondents out of a target sample of 423, given a coverage of 83% of diabetic patients attending outpatient clinic in PCEA Kikuyu Hospital between June and September 2016. The study first focuses on finding out the socio-economic and demographic, diabetic characteristics and substances uses of the respondents. It also focused on determining the factors associated with oral health status of diabetic patients. The target population for the study was all patients attending diabetic clinic in PCEA Kikuyu Hospital. This study used a systematic random sampling which involves drawing every 4th respondents, the 1st respondents being selected randomly from between 1st and the 4th. This was based on the expected number of diabetic patient during the three-month study period and the calculated sample based Fisher's formula for sample size calculation for a cross-sectional study. Ethical clearance for the study was given by Mount Kenya University Ethical Review Committee and National Commission for Science, Technology and Innovation (NACOSTI). Administrative clearance was obtained for the management of Kikuyu Hospital. Informed consent was sought from the respondents before the interview.

RESULTS

Socio-economic and Demographic Characteristics: From the study findings the females were 221 (63.3%) while males were 128 (36.7%) with a mean age of 60.9 years. Majority of the respondents were from rural 206 (59%), urban 143 (41%) who have attained a secondary education 37.8%, primary 29.2%, post-secondary 20.9% and no formal education 12.1%. Self-employment was the main source of income and farming 35%. 6% were government employees while 67.6% were married, 35% used public vehicle as the main source of transport and 31.5% earned above 40 thousands per month and 79.4% had an insurance cover as shown in Table 1.

Diabetic Characteristics: From the study findings 49.5% of the respondents didn't know the type of diabetes they are suffering from while 45% and 4.6% suffered from type 2 and type 1diabetes respectively. Duration of diabetes between 0-1 years was 11.5%, 2-5 years 21.8% while 11 and above was 40.4%. Majority of the respondents were overweight 43%, class 1 obese 32%. 62% had a family history of diabetes, 33% had no family history and 5% were not aware.

Insulin was mainly used to control blood sugar levels (62%) while those who do not use insulin were 38% as shown in Table 2.

Table 1

Socio-economic and demographic characteristics of diabetic patients attending Kikuyu Hospital, Kenya, June – September 2019

Attributes	Category	Frequency	Percentage
Sex	Male	128	36.7%
	Female	221	63.3%
Age	60 years and below	169	48.5%
	61 years and above	180	51.5%
Residence	Rural	206	59.0%
	Urban	143	41.0%
Educational level	Primary School and no formal	144	41.3%
	Secondary School and above	205	58.7%
Monthly income	≤ Ksh. 30,0000	153	43.9%
	Ksh. 30,001	196	56.1%
Main source of income	Employed	60	16.1%
	Self employed	122	35.0%%
	Farmer	122	35.0%
	Student and others	45	12.9%
Marital status	Married	236	67.6%
	Others (divorces, single, never married, widows/widowers)	113	32.4%
Use of health insurance cover	Yes	277	79.4%
	No	72	20.6%
Means of transport	Public service vehicle	132	35.0%
	Private vehicle and Walking	227	65.0%
	Total	**349**	**100%**

Table 2

Diabetic characteristics

Attributes	Category	Frequency	Percentage
Type of diabetes	Those aware	176	50.4%
	Those not aware	173	49.5%
Duration of diabetes	0-5 years	116	33.3%
	6 years and above	233	66.7%
BMI Index	Underweight and Normal weight	35	10%
	Overweight	149	43%
	Class I obese and Class II obese	165	47%
Family history of diabetes	Yes	216	62%
	No	116	33%
	Don't know	17	5%
Attributes	**Category**	**Frequency**	**Percentage**
Control of blood sugar level	With insulin	216	62%
	Without insulin	133	38%
	Total	**349**	**100%**

Substances used: Majority of the respondents did not smoke cigarette (97%), used alcohol (88%), Khat chewing (99%), traditional herbs (88%), or even tobacco (99%) as shown in Table 3.

Table 3

Substances used

Substance	Yes n(%)	No n(%)	Total N(100)
Smoking cigarette	12(3%)	337(97%)	349(100%)
Alcohol use	42(12%)	307(88%)	349(100%)
Khat chewing	5(1%)	344(99%)	349(100%)
Traditional herbs	43(12%)	306(88%)	349(100%)
Use of snuff (Tobacco)	3(1%)	346(99%)	349(100%)

Oral Health status: All respondents had a DMFT index of 4.10±5.02. By gender, there was a tendency for males to have a higher DMFT index (4.40±4.93) than females (4.10±4.67). There was no statistical association between gender and area of residence and DMFT index. There was a statistically significant difference in oral health status (measured by DMFT index) by level of education, marital status, and means of transport as shown in Table 4.

Table 4

The mean (SD) DMFT index by demographic characteristics

Variable	Attribute	Decayed	Missing	Filled	DMFT	Significance p-value (df)
Gender	Male	1.16±1.81	3.33±4.62	0.61±1.77	4.89±5.55	0.156(1)
	Female	1.05±1.64	2.73±4.01	0.35±0.92	4.10±4.67	
Residence	Rural	1.16±1.82	3.00±4.19	0.33±1.04	4.40±4.97	0.970 (1)
	Urban	0.99±1.52	2.87±4.35	0.61±1.59	4.38±5.11	
Educational level	Primary & below	1.04±1.60	2.42±3.40	0.33±0.89	3.76±4.12	0.005 (1)
	Secondary & above	1.12±1.77	3.32±4.72	0.52±1.55	4.83±5.54	
Marital status	Married	0.94±1.49	2.70±4.09	0.49±1.42	4.00±4.90	0.034(1)
	Others	1.41±2.05	3.47±4.54	0.35±0.83	4.39±5.02	
Means of transport	PSV	0.98±1.60	2.03±3.32	0.38±0.95	3.23±3.95	0.001(1)
	Private	1.16±1.76	3.51±4.65	0.48±1.47	5.10±5.46	
Gender	Male	1.16±1.81	3.33±4.62	0.61±1.77	4.89±5.55	0.156(1)
	Female	1.05±1.64	2.73±4.01	0.35±0.92	4.10±4.67	
Residence	Rural	1.16±1.82	3.00±4.19	0.33±1.04	4.40±4.97	0.970 (1)
	Urban	0.99±1.52	2.87±4.35	0.61±1.59	4.38±5.11	
Educational level	Primary & below	1.04±1.60	2.42±3.40	0.33±0.89	3.76±4.12	0.005 (1)
	Secondary & above	1.12±1.77	3.32±4.72	0.52±1.55	4.83±5.54	

Oral health status by sign and symptoms associated with state of teeth: Out of 349 respondents, 26.6% experienced difficulty in chewing, 33% dry mouth, 24.9% bleeding gums and 12.6% soreness of the gum as shown in Table 5.

Table 5

Oral health status by symptoms and sign associated with state of teeth

Variable	Very often n (%)	Fairly often n(%)	Sometimes n(%)	Never n (%)	Total N (%)
Chewing difficulties	18 (5.2)	26 (7.4)	49 (14)	256 (73.4)	**349 (100)**
Bleeding gums	11 (3.2)	22 (6.3)	54 (15.5)	262 (75.1)	**349 (100)**
Swollen red gums	4 (1.1)	6 (1.7)	35 (10)	304 (87.1)	**349 (100)**
Soreness of the gums	3 (0.9)	10 (2.9)	31 (8.9)	305 (87.4)	**349 (100)**
Dry mouth	12 (3.4)	23 (6.6)	80 (22.9)	234 (67)	**349 (100**

Experiences due to oral health status: Out of 349 respondents, 88% had no sleep interruption, 90% never absent from work due to painful tooth, 92.3% never had difficulties in doing usual activities, 83.3% never had reduced participation and 97.7% never had less tolerance to spouse as shown in Table 6.

Table 6

Experiences due to oral health status

Measurement	Very often n(%)	Fairly often n(%)	Sometimes n (%)	Never n (%)	Total N (%)
Sleep interruption	3 (0.9)	8 (2.3)	31 (8.9)	307 (88)	**349 (100)**
Absent from work due to painful tooth	2 (0.6)	21 (6.0)	12 (3.4)	314 (90)	**349 (100)**
Difficulties in doing usual activities	1 (0.3)	2 (0.6)	24 (6.9)	322 (92.3)	**349 (100)**
Reduced participation	1 (0.3)	2 (0.6)	20 (5.7)	326 (93.4)	**349 (100)**
Less tolerance to spouse	0 (0.0)	8 (2.3)	0 (0.0)	341 (97.7)	**349 (100)**

Comparison of health status of their teeth after being diagnosed with diabetes: After being diagnosed with DM, 69.1% (242/349) of the patients had same perceived oral health status as before, 28.3% (99/349) worse than before, and 2.6% (8/349) better than before.

DISCUSSION

The study population had diverse demographic and socio-economic characteristics. Out of 349 respondents, 63.3% were females, 67.6% married, 59% from rural areas and elderly (mean age of 60.43 years), Females were more than males because females have better health seeking behavior than males. Since the location of the hospital was in rural areas many respondents from this study live in rural areas. Majority of the respondents had formal education while only few who had no formal éducation. Main source of income in this area were farming and self-employment and many earning above 40,000 Kshs. (USD400) where some were government employees, and few were students. They also have health insurance cover.

Characteristics of respondents revealed a mixed picture of the status of diabetics at Kikuyu hospital. Approximately, half (50.5%) of the respondents were aware of the type of diabetes they had which was type 2 diabetes, but 62% used insulin to control blood sugar. Thos who had

insurance cover were 79.4% which was mainly National Hosptial Insurance Fund (NHIF). The duration of diabetes was 11 and above years while a good number of them were overweight and class one obese. More than half had family history of diabetes. Most of the respondents were not substance users as 88% and 99% did not use alcohol and traditional herbs, respectively.

Oral health status remains the same or worsens after diagnosis of DM. A higher socio-economic status was associated with higher DMFT index suggesting, that oral health may be influenced by affluence. With a DMFT index of 4.39±5.022, some of the respondents experienced difficulties in chewing, had bleeding gum and soreness of the gum. Majority did not have negative effects on their day-to-day daily basis due to their oral health status and they had the same experience even after visiting a diabetic clinic. Although there is no association between diabetic characteristics and oral health status by DMFT index, most of the respondents were aware of signs and symptoms associated with diabetes. This shows that regardless of their diabetic characteristics their DMFT index will still be affected. Higher DMFT index was associated with secondary education and higher, married status and using private means of transport. This was clearly seen to those who were married and other, those having secondary education and above and those who use public and private means of transport. Nevertheless, there is no significance between diabetic characteristics and substance abuse with DMFT index.

RECOMMENDATIONS

The study recommends to the policy makers to develop and implement of standardized oral health care guidelines and appropriate referral mechanisms to the dental clinics. Patients with diabetes should be encouraged to practice good oral health. Need for further studies to evaluate clinical measures and examination of periodontal index by the dentists.

CONCLUSIONS

Among the respondents in PCEA Kikuyu hospital were not aware of the type of diabetes they are suffering from although majority were found to be having type 2diabetes. Most of the patients have duration of diabetes of eleven and above years and they were found to be obese. The fact that they are diabetic did not hinder them from doing their daily activities due to oral health status. Oral health status remains the same or worsens after diagnosis of DM. A higher socio-economic status was associated with higher DMFT index suggesting, that oral health may be influenced by affluence of patients with DM.

ACKNOWLEDGEMENT

REFERENCES

1. Asmelash, D., Abdu, N., Tefera, S., Baynes, W. H., & Derbew, C. (2019). Kowledge, atitude and practicetowards glycemic Control and Its Associated FactorsAmong Diabetes Mellitus Patients. *Journal od Diabetes Research*, 3-6.

2. Cabanillas-Balsera, D., Martin-Gonzalez, J., Montero-Miralles, P., Sanchez-Dominguez, B., Siminez-Sanchez, M., & Segura-egea, J. (2019). Association between Diabetes and Non-rention of Root filled teeth: A sytematic Review and Meta-analysis. *International Endodontic Journal*, 297-306.

3. Cankaya, H., Guneri, P., Epstein, J. B., & Boyacloglu, H. (2018). Awareness of Oral complicationsand Oral Hygiene Habits of Subjects with Diagonised Diabetes Mellitus. *Balkan Journal of Dental Medicine*.

4. Hamzeh, A., Almhamni, G., Aljaber, Y., Alhasan, R., Alhasan, R., Alsammah, M. M., et al. (2019). Awareness od dabetes and Diabetic retinopathy among a group of Diabetic Patient in Main Public Hospitals in Damascus,Syria during The syrian Crisis. *BMC Health Service Research*.

5. International Diabetes federation-IDF. (2020, 9 21). *International Diabetes Federation.*

6. Kawamura, Y., & Matsuda, N. (2013, 01 29). Oral Health behaviours and Associated factors in Patients With Diabetes. *Bulletin of Health sciences kobe*, pp. 1-16.

7. Mohamed, F. S., Mwangi, M., Kamutua, M., Kibachio, J., Hussein, A., & Ndegwa, Z. (2018). Prevalence and Factors Associated with Pre-diabetes and Diabetes Mellitus in Kenya: results for a National Survey. *BMC Public Health*.

8. Verhulst, J. M., Loos, B. E., Gerdes, V. E., & Teelew, W. J. (2019, February 18th). Evaluating All Potential Oral Complication of Diabetes Mellitus. *Frontres in Endocrinology*.

9. Weerasekera, M., Gunasekara, C., Sampath, A., Fernando, N., Bulugahapitiya, U., Silva, T. D., et al. (2016). Patients With Diabetes;Their Perception and Practices Towards Oral Health. *World Journal of Phamaceutical research*, 149-158.

10. Yufei, Y., Xin, J., Changquing, L., & Qiany, G. (2019). Assessment of Oral health Behaviour, Knowledge and status among Dental and Medical Undergraduate students; a cross sectiona lstudy. *BMC Oral Health*, 2-8.