

FACTORS ASSOCIATED WITH COMORBIDITIES AMONG DIABETIC PATIENTS OF JINJA REGIONAL REFERRAL HOSPITAL. A CROSS-SECTIONAL STUDY.

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Abstract

Background

Comorbidity is the occurrence of more than one chronic illness in a patient and can potentially make medical management complicated. The study aims to assess the factors associated with comorbidities among diabetic patients of Jinja Regional Referral Hospital.

Methodology

A descriptive cross-sectional study that employed quantitative data techniques was used. Simple random sampling was used to select participants in the study. Descriptive statistics was used to assess the frequency distribution of the three risk categories. A Chi-square test assessed the categorical variables and trends in the prevalence of diabetic comorbidities.

Results

The number of patients who had DM for less than 5 years was 92(32.4%) and for more than 5 years was 192(67.6%). The number of patients who were smoking was 32(11.3%) and 113(39.8%) were taking alcohol. In bivariate analysis, using chi-square tests for categorical variables and the Fishers Exact test where the chi-square assumptions were not fulfilled, a statistically significant relationship was found between age (OR=0.954, P=0.07), sex, (OR=0.194, P=0.019), type of DM (OR=0.464, P=0.015), smoking (OR=0.533, P=0.036), cholesterol level (OR=2.640, P=0.003). There was no statistical significance found between the type of treatment (OR=0.662, P=0.521), duration of DM (OR=0.8662, P=0.705), HIV status (OR=1.252, P=0.558), physical activity (OR=1.798, P=0.106), alcohol (OR=0.743, P=0.334) and BMI (OR=0.712, P=0.165)

Conclusion

Age, place of residence, and type of DM were the predominant factors associated with diabetes comorbidity.

Recommendations

The government should also establish care models that bring together healthcare providers, patients, and families to manage diabetes and its comorbidities.

Keywords: Factors, Comorbidities among diabetic patients, Medical management Jinja Regional Referral Hospital.

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Background

Comorbidity is the occurrence of more than one chronic illness in a patient and can potentially make medical management complicated. Diabetes comorbidity is the presence of one or more chronic diseases in patients living with DM, which can be divided into concordant and discordant comorbidities (YM Negussie, 2023). In East Africa, the prevalence of comorbidities in patients with diabetes was high in Tanzania and remains undiagnosed in an alarmingly high proportion of individuals. More prospective studies are required to quantify the magnitude, burden, and effective management of diabetes comorbidities across diverse African populations (Chiwanga et al., 2016)

Studies done on comorbid conditions in Canadian hospitalized patients because of diabetes in 2013–2014 in Canada found that there were 30,422 hospital separations with diabetes as the MRDx. Of these, 58.7% were males the median age group when diabetes was the MRDx was 60 to 64 among the 30,422 hospital separations with diabetes as the MRDx, 116,243 secondary codes were used to identify the comorbidities, an increase in hospital admissions resulting from type 1 and type 2 diabetes with age, particularly between the ages of 35 and 64 (A Wielgosz, 2018)

Among adults in rural Saskatchewan found that the influence of farm residence and agriculture-related exposures, people whose primary residence was on farms had significantly lower diabetes prevalence than those living

in non-farm locations. Diabetes risk increased with age and affected almost 17% of those older than 65 compared to those aged 18–45. Other known independent risk factors included a family history of diabetes, obesity, as well as lower socioeconomic status, minimal/no alcohol intake, and smoking (Dyck et al., 2013). In Egypt, comorbidities associated with Egyptian diabetic foot disease subtypes found that the coexistence of hypercholesterolemia, smoking, diabetes, and male sex appears to significantly increase the incidence of ischemic diabetic foot. Hypertriglyceridemia correlates positively to ischemic and neuroischemic ulcers whereas low HDL and proteinuria correlate positively to both neuropathic and neuroischemic ulcers (Rizk and Ameen, 2013).

Factors strongly associated with diabetes-cardiovascular disease comorbidity were older age, high household income versus low income, moderate and good self-rated health versus bad self-rated health, occasional and regular smokers versus non-smokers, and physical activity versus no physical activity (Mutyambizi et al., 2017). Diabetic complications and factors affecting glycemic control among patients with Type II Diabetes Mellitus attending the chronic Illness Clinics in Tabuk, Saudi Arabia found that a higher prevalence of poor glycemic control was reported among study participants with higher DM duration (Ghabban et al., no date). The study aims to assess the factors associated with comorbidities among diabetic patients of Jinja Regional Referral Hospital

Methodology

Study Design

A descriptive cross-sectional study that employed quantitative data techniques was used to enable the researcher to get information from the selected population and describe the functional relationships that describe the prevalence of comorbidities among patients with diabetes. This design enabled the researcher to collect data at a single point in time without follow-up.

Study setting

The research was carried out from Jinja Regional Referral Hospital in Jinja district because of the increase in the number of people with diabetes. The hospital is located in the South Eastern region of Uganda in Jinja Central Division, Jinja Municipal Council near the source of the Nile. The hospital was founded in 1962 and has a bed capacity of 600. The hospital serves several patients across the region some of who are referred from other hospitals and health center IVs while others are self-referred.

Among the services provided include Eye services, medical, surgical, orthopedic, private wing, gynecology, pediatric, dental, ENT, lab, X-ray, scan, immunization, HIV testing, counseling, reproductive health services, and safe male circumcision.

The hospital has 15 wards which include; surgical female/male, medical male/female, TB, Eye, Urological,

Grade A, An annex, psychiatric and children's wards, intensive care unit, postnatal, and maternity wards. The clinic for patients having diabetes is located in the patient Department. The diabetic clinic receives on average 100 patients every Thursday of the week and that gives approximately 400 patients monthly.

The patients who come to attend this clinic mainly reside in the areas neighboring Jinja town like Bugembe, Wanyange, Njeru, and Mafubira, and within the Municipality. The people in the Jinja area feed on staple foods like sweet potatoes, cassava, yams, and matooke. The main economic activities carried out by the people include subsistence farming, sugar cane planting, bricklaying, and fishing especially those staying near the lake shores.

Study population

The study was carried out among patients with diabetes at the diabetic clinic of Jinja Regional Referral Hospital.

Sample size determination

Since the outcome(dependent) of the prevalence of comorbidities will be reported in proportions, Kish and Leslie's sample size technique will be used to calculate the number of participants. The study will assume the use of a 95% confidence interval, a 5% margin of error, and use proportion of 50% will be used.

Therefore, sample size will be calculated as follows;

$$N = Z^2pq/d^2$$

n= target population

Z= 1.96 (the standard normal deviation at 95% confidence interval)

p= proportion that will give maximum sample size (50%)

q= 1-p, =1-0.5 = 0.5

d= level of confidence at 95% = 0.05

n= Z^2pq/d^2

= $1.96^2 \times 0.5 \times 0.5 / 0.05^2$

= 284

A sample size of 284 was used.

Sampling procedure

A simple random sampling method was used to select participants in the study. In this case, the researcher wrote numbers A and B on a paper, folded them, and put them in a box, and each respondent was allowed to choose. The respondents who chose A fell in the study population and those who chose B were eliminated from the study. Sampling was done for 14 days and 20 respondents were selected per day to get the required number of respondents.

Inclusion criteria

Patients having diabetes attending Jinja Regional Referral Hospital were included in the study

Exclusion criteria

The study excluded patients who were not of sound mind.

Variables

Barriers faced during the management of patients with comorbidities

Data collection instruments

The questionnaire used in this study was developed from the Canadian Diabetes Risk Assessment tool, commonly known as CANRISK developed to detect prediabetes and diabetes in a multi-ethnic population living in Canada and it is adapted for the Uganda population.

Quality control

It was done through pre-visiting, training of research assistants, and pretesting of data abstraction tools.

Storage

Data was stored on a computer and a flash disc.

Pre-testing

The study tool was tested on 5 patients in the diabetic clinic from JRRH and necessary adjustments were made to ensure validity and reliability. The researcher outlined his objectives, developed a test guide, conducted a pretest, analyzed data, interpreted it then summarized the findings. Its main purpose is to identify problems during data collection.

Pre -visiting

During pre-visiting, the researcher went to the clinic for patients having diabetes to check how the health workers record and receive the patients.

Data collection procedure

After receiving the introductory letter from James Lind Institute, the researcher took it and submitted it to the IRBS of Jinja Regional Referral Hospital for permission to carry out data collection in the hospital. The information from primary data was obtained through a paper-based questionnaire with 26 questions. As a researcher having the objectives of the study mentioned in the first chapter; this enabled me to explain certain items on the questionnaire to the respondents so that it would be properly filled. The questionnaire was administered by the researcher face to face to the respondents. When the researcher reached the diabetic clinic where there were many people, she talked to

those people by introducing both herself and the study, people received information about the purpose of the study, the criteria of the study, what the study looks for like responding to close questions and anthropometric measurements. Each person motivated and who met the criteria received the information sheet and signed consent then responded to the study questions.

Data management

This included data cleaning, entering, editing, and coding by the researcher before leaving the study setting to ensure that there were no mistakes and to ensure timely checking for completeness of the questionnaire before leaving the data collection site.

If any are found, they are corrected before leaving the study setting. The data was stored on the computer.

Data analysis and presentation.

Descriptive statistics was used to assess the frequency distribution of the three risk categories. A

The chi-square test assessed the categorical variables and trends in the prevalence of diabetic comorbidities. Further analysis was done using SPSS (Version 24). Blood pressure, smoking, and alcoholism were analyzed separately from the CANRISK questions as these parameters are not included in the eleven scored questions from the used tool.

quantifiable data was analyzed using graphs, tables, and pie charts. Descriptive statistics, frequencies, percentages, and mean/standard deviations were used.

Ethical considerations

Before the researcher went to collect data, a research proposal was submitted to the James Lind Institute research committee for approval. An introductory letter was given to the researcher to take to the relevant authority of their research area to seek permission to conduct the research.

The researcher ensured that informed consent was obtained from the respondents and coded the data collected for confidentiality. Privacy will be ensured by using initials for the names of participants who would have voluntarily consented to be part of the study.

Results

Socio-demographic characteristics of patients

Table 1 Sociodemographic characteristics of patients

Variable	category	frequency	Percentage (%)
sex	Male	99	34.9
	female	185	65.1
Place of residence	Urban	117	41.2
	rural	167	58.8
Occupation status	Employed	144	50.7
	unemployed	140	49.3
Marital status	Single	93	32.7
	Married	191	67.3

Table 1, The number of females was 185(65.1%) and males were 99(34.9%), majority of the patients came from rural areas 167(58.8%), majority of the patients were employed 144(50.7%), majority of the patients were also married 191(67.3%)

Table 2: Demographic and clinical characteristics of patients with diabetic comorbidities

Variable		Mean (±s.d)	+/-SD
Age		49.7	13.09
BMI		27	9
		Frequency	Percentage frequency
Sex	Male	99	34.9
	Female	185	65.1
Type of DM	Type 1	41	14.4
	Type 2	243	85.6
Type of treatment	insulin	32	11.3
	Oral	187	65.8
	both	65	22.9
Duration of DM	Below 5yr	92	32.4
	More than 5 years	192	67.6
Smoking	Yes	32	11.3
	No	203	71.5
	Quit	49	17.3
Alcohol	Yes	113	39.8
	No	128	45.1
	Quit	43	43
Adequate physical activity	Yes	105	37.0
	No	179	63.0
Cholesterol levels	Yes	94	33.1
	No	190	66.9
HIV Status	Positive	67	23.6
	Negative	217	76.4
Eye problems	Yes	64	22.5
	No	220	77.5
Kidney problems	Yes	51	18
	No	233	82

Heart or brain problems	Yes	78	27.5
	No	206	72.5
Footing problems	Yes	36	12.7
	No	248	72.5
Peripheral neuropathy	yes	75	26.4
	No	209	73.6

Table 2, the mean age was 49.7 and the mean BMI was 27, the number of patients who were females was 185(65.1%) and males were 99(34.9%). The number of patients with type 1 DM was 41(14.4%) and type 2 DM was 243(85.6%). The number of patients on oral treatment for DM was 187(65.8%) and insulin was 32(11.3%). The number of patients who had DM for less than 5 years was 92(32.4%) and for more than 5 years was 192(67.6%). The number of patients who were smoking was 32(11.3%) and 113(39.8%) were taking alcohol.

The number of patients who engaged in adequate physical activities was 105(37%). The number of patients with high cholesterol levels was 94(33.1%). The number of patients who were HIV positive was 67(23.6%). The patients who had eye problems were 64(22.5%). The number of patients with kidney problems was 51(18%) and heart or brain problems were 78(27.5%). The number of patients with footing problems was 36(12.7%). The number of patients with DPN was 75(26.4%).

Table 3; factors associated with comorbidities among diabetic patients

variable	P value	Odds ratio
Age	0.007	0.954
Sex	0.019	2.194
Type of DM	0.015	0.464
Type of treatment	0.521	0.662
Duration of DM	0.705	0.862
Physical activity	0.106	1.798
Smoking	0.036	0.533
Alcohol	0.334	0.743
Cholesterol level	0.003	2.640
HIV status	0.558	1.252
BMI	0.165	0.712

In bivariate analysis, using chi-square tests for categorical variables and the Fishers Exact test where the chi-square

assumptions were not fulfilled, a statistically significant relationship was found between age (OR=0.954, P=0.07),

sex, (OR=0.194, P=0.019), type of DM (OR=0.464, P=0.015), smoking (OR=0.533, P=0.036), cholesterol level (OR=2.640, P=0.003). There was no statistical significance found between the type of treatment (OR=0.662, P=0.521), duration of DM (OR=0.8662, P=0.705), HIV status (OR=1.252, P=0.558), physical activity (OR=1.798, P=0.106), alcohol (OR=0.743, P=0.334) and BMI (OR=0.712, P=0.165)

Discussion

Factors associated with diabetic comorbidities among diabetic patients

The factors significantly associated with diabetic comorbidities were age (OR=0.954, P=0.007), sex, (OR=0.194, P=0.019), type of DM (OR=0.464, P=0.015), smoking (OR=0.533, P=0.036), cholesterol level (OR=2.640, P=0.003). This is because as people grow, their immunity decreases and they become more susceptible to diseases. Their bodies become more resistant to insulin which makes it easier for other comorbidities to emerge. The degeneration of organs that occurs naturally with aging is a factor that can have a role in the development of a wide variety of diseases. These findings are similar to a study done by (Ejeta *et al.*, 2021) which found that age ≥ 55 years was associated with diabetic comorbidities.

Sex is also associated with the development of comorbidities because females experience increased fluctuations in estrogen and progesterone which affect glucose metabolism and increase the risk of comorbidities. Females are also more likely to experience depression and anxiety as a result of DM. these findings are in line with a study done by (Nowakowska *et al.*, 2019) which found that most patients were women (64%).

Type of diabetes also increases the risk of developing comorbidities especially type 1 DM because type 2 DM is associated with other conditions like obesity, hypertension, and dyslipidemia which can increase the risk of developing comorbidities. Type 2 DM also requires management with multiple drugs which can increase multiple drug resistance and interactions leading to comorbidities. These findings align with a study done by (Iglay *et al.*, 2016) which found that a high prevalence and co-prevalence of comorbidities and use of healthcare services were identified in patients with T2DM, especially in older adults.

Smoking was also found to increase the risk of comorbidities because smoking causes problems with insulin dosing and affects the management of DM hence increasing the risk of developing comorbidities.

High cholesterol levels were also associated with increased comorbidities among diabetic patients because it can lead to chronic inflammation which can damage insulin-producing beta cells and increase the risk of diabetes comorbidities. It also impairs blood vessels causing high blood pressure. These findings are in line with a study done by (Azmi, 2018) which found that dyslipidemia (OR:1.21) and the presence of IHD (OR:1.12) were associated with comorbidities.

Conclusion

Age, place of residence, and type of DM were the predominant factors associated with diabetes comorbidity.

Recommendations

The government should also establish care models that bring together healthcare providers, patients, and families to manage diabetes and its comorbidities.

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List of abbreviations

DM Diabetes mellitus

T2DM Type 2 Diabetes Mellitus

BMI Body Mass Index

Source of funding

The study was not funded

Conflict interest

The author did not declare any conflict of interest

Author Biography

Violet Alimwenda is a student of Masters of Public Health Management

References

1. Azmi, S. (2018) 'The Prevalence of Comorbidities and Its Association with Poor Glycemic Control in Malaysian Patients with Type 2 Diabetes Mellitus', *Value in Health*, 21, p. S70. Available at: <https://doi.org/10.1016/j.jval.2018.04.464>.
2. Chiwanga, F.S. *et al.* (2016) 'Urban and rural prevalence of diabetes and pre-diabetes and risk

- factors associated with diabetes in Tanzania and Uganda', *Global Health Action*, 9. Available at: <https://doi.org/10.3402/gha.v9.31440>.
3. Dyck, R. *et al.* (2013) 'Prevalence, risk factors and co-morbidities of diabetes among adults in rural Saskatchewan: the influence of farm residence and agriculture-related exposures', *BMC Public Health*, 13(1), p. 7. Available at: <https://doi.org/10.1186/1471-2458-13-7>.
 4. Ejeta, A. *et al.* (2021) 'Diabetes Concordant Comorbidities and Associated Factors Among Adult Diabetic Out-Patients at Hiwot Fana Specialized University Hospital, Harar, Eastern Ethiopia: a Cross-Sectional Study', *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 14, pp. 2281–2289. Available at: <https://doi.org/10.2147/DMSO.S308553>.
 5. Ghabban, S.J. *et al.* (no date) 'Diabetic Complications and Factors Affecting Glycemic Control Among Patients With Type II Diabetes Mellitus Attending the Chronic Illness Clinics at Tabuk, Saudi Arabia', *Cureus*, 12(11), p. e11683. Available at: <https://doi.org/10.7759/cureus.11683>.
 6. Iglay, K. *et al.* (2016) 'Prevalence and co-prevalence of comorbidities among patients with type 2 diabetes mellitus', *Current Medical Research and Opinion*, 32(7), pp. 1243–1252. Available at: <https://doi.org/10.1185/03007995.2016.1168291>.
 7. Mutyambizi, C. *et al.* (2017) 'The extent and determinants of diabetes and cardiovascular disease comorbidity in South Africa – results from the South African National Health and Nutrition Examination Survey (SANHANES-1)', *BMC Public Health*, 17(1), p. 745. Available at: <https://doi.org/10.1186/s12889-017-4792-8>.
 8. Negussie, Y.M., Getahun, M.S. and Bekele, N.T. (2023) 'Factors associated with diabetes concordant comorbidities among adult diabetic patients in Central Ethiopia: a cross-sectional study', *Frontiers in Clinical Diabetes and Healthcare*, 4. Available at: <https://www.frontiersin.org/articles/10.3389/fcdh.c.2023.1307463> (Accessed: 22 February 2024).
 9. Nowakowska, M. *et al.* (2019) 'The comorbidity burden of type 2 diabetes mellitus: patterns, clusters, and predictions from a large English primary care cohort', *BMC Medicine*, 17(1), p. 145. Available at: <https://doi.org/10.1186/s12916-019-1373-y>.
 10. Rizk, M.N. and Ameen, A.I. (2013) 'Comorbidities associated with Egyptian diabetic foot disease subtypes', *The Egyptian Journal of Internal Medicine*, 25(3), pp. 154–158. Available at: <https://doi.org/10.7123/01.EJIM.0000432184.51306.20>.
 11. Wielgosz, A. *et al.* (2018) 'Comorbid Conditions in Canadians Hospitalized Because of Diabetes', *Canadian Journal of Diabetes*, 42(1), pp. 106–111. Available at: <https://doi.org/10.1016/j.cjcd.2017.03.004>.

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