

Magnitude and factors associated with diabetic complication among diabetic patients attending Gurage Zone hospitals, South West Ethiopia.

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Research note

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Abstract

Objective To assess the magnitude of diabetic complication and associated factors among diabetes mellitus patients attending in Gurage zone hospitals. **Results** According to this study the magnitude of diabetic complication among diabetic patients were 61% and the marital status; divorced [AOR: 0.252(0.11, 0.59); p=0.002], poor glycemic control [AOR: 1.88(1.04, 3.39); p=0.036], Body Mass Index >25 [AOR: 4.42(1.32, 14.86); p=0.016] and duration of illness > 6years [AOR:1.79 (1.02, 3.17) ; p=0.044] and 10years [AOR: 4.68(2.07, 10.61); p=<0.001] were significantly associated with diabetic complication. **Key terms** Diabetic complications, magnitude, associated factor

Introduction

Background

Diabetes is a chronic disease marked by high level of blood glucose that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin that was produced. It is one of the chronic non communicable diseases which have emerged as a leading global health problem [(1),(2)]. In Africa it was estimated that 15.5 million adults aged 20-79 years were living with diabetes as according to International Diabetic Federation report (IDF) [(3)]and out of the estimated cases 69.2% of adults were living with DM but they are unaware of their condition. Ethiopia is one of the 32 countries of the IDF African region report. There were 2,567,900 cases of diabetes in adults in Ethiopia in 2015[(4)]. According World Health Organization (WHO) global report the number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014[(1)].

Complication of DM account for increased morbidity, disability and mortality and threats for the economies of all countries especially in the middle and low economic countries[(5)]. In 2016, an estimated 1.6 million deaths were directly caused by diabetes and 2.2 million deaths were attribute to high blood glucose in 2012 [(1)(2)]. Acute complication of DM consists diabetic ketoacidosis which is the most common acute complication and it mostly occur in type 1 diabetes mellitus (DM). Hyperglycemic hyperosmolar non ketosis syndrome mostly occurs in type 2 DM and hypoglycemia[(6)(7)]. The chronic complications are broadly classified in to macro vascular, micro vascular and other complication of DM. Macro vascular complication of DM are primarily disease of coronary artery, cerebrovascular, and peripheral vascular. Microvascular complication of DM is those that affect small blood vessels typically include retinopathy, neuropathy and nephropathy. Other complication of DM is bacterial and fungal infection which occurs due to direct effects of hyperglycemia on cellular immunity[(1),(8)]. DM can result in an increased risk of sever sight impairment, end stage kidney disease, cardiovascular disease and in some cases early death [(9)]. Since there is limited study in the study area, this study finding addresses to determine the magnitude of DM complication with its associated factor in the study area.

General objective

To assess diabetic complications and its predictors among diabetic patients at Gurage zone hospitals, south west Ethiopia from April 1 –30, 2019.

Specific objective

To assess prevalence of diabetic complications among diabetic patients attending Gurage Zone Hospitals.

To identify predictors of diabetic complication among diabetic patients attending Gurage Zone Hospitals.

Methodology

Study area and period

This study was conducted at Gurage zone hospitals which is located in Southern Nations Nationalities and Peoples' Region state (SNNPRs) of Ethiopia. The "Gurage"zone has three primary Hospitals, one general hospital and 72 health centers. All hospitals have chronic follow up clinic especially for diabetes mellitus and hypertension. Those four hospitals were "Attat" (private hospital), "Gunchire", and "Bui" are primary hospitals and Butajira is the only General hospital in the zone. The study was conducted from April 1- 30, 2019.

Study design

Were Institutional based cross sectional study.

Source population

Were all DM patients on follow up at Gurage Zone Hospitals.

Study population

All sampled diabetic patients attending "Butajira" general hospital, "Attat" and "Gunchire" primary hospitals follow up clinics during the study period.

Inclusion criteria

All diabetic patients who had follow up in sampled hospitals of Gurage zone having follow up during the study period.

Exclusion criteria

Were patients with less than three months durations and also who were unconscious and had mental illness during data collections were excluded.

Sample size and sampling technique

(See Sample size and sampling technique in the Supplementary Files)

Sampling techniques

Stratified sampling method was used to select the study sample from selected hospitals. First one general hospital was purposively selected and two primary hospitals were selected by simple random sampling using lottery method from three primary hospitals. Then stratified sampling and proportional allocation was done for one general hospital (Butajira general hospital) and two primary hospital (Gunchire and Attat primary hospital) from the total diabetic patients of each hospitals by $n = n/N * N_j$ equation. Number of study subjects in each stratum determined by proportion to population size from each hospital. This sampling procedure is presented schematically as follows. (Figure1).

Patients of each hospitals further selected by systematic sampling from follow-up registration books (sampling frame) after calculation of the sampling interval $=N/n$, $1540/338=5$. The patient`s card were used to get other medical condition and laboratory results for additional information.

Study variables

Independent variables

- Socio-demographic characteristics (age, sex, weight, educational status, place of residence, income)
- Medical conditions (type of DM, hyperlipidemia, duration of disease, BMI, infection, other comorbidities(hypertension, heart diseases))
- Type of medication (treatment adherence, insulin, oral hypoglycemic agent, and life style medication (diet, exercise), smoking)

Dependent variables

- Diabetic complication

Data collection procedure

Data collection instruments

The data were collected using structured questionnaire and by reviewing patients cards for laboratory results and other medical findings (hypertension, kidney failure, heart failure and infection). The questionnaire had three parts. These includes socio-demographic data, medical related factors and management related factors

Data collection process

Three diploma nurses were selected for data collection for each hospital with two BSc nurses for supervisors. Training were given for both data collectors and supervisors for two days before the actual data collections about the study procedure and data collection techniques go through the questionnaires

questions by questions, ways of data collection, supervision and finally clarification was given for each doubt.

Operational definition and definition of terms

DM complications: DM patients having both acute and chronic complications of type 1 and type 2 DM.

Diabetes ketoacidosis: ketonuria positive

Hyperglycemic hyperosmolar state – it is mental change confusion, lethargy or coma associated with diabetes especially with recent history of dehydration or poor oral intake of fluid associated with increased osmolality and blood glucose level.

Retinopathy- It is complication of diabetes which damages blood vessels in the retina due to leaking of blood and other fluid as a result of long standing diabetes mellitus.

Nephropathy- It is the complication of diabetes in people who have had diabetes for 20 years or more present with albumin in the urine.

Neuropathy- It is diabetic effect of the nerve damage due to high blood glucose which mostly affects nerves of legs and feet.

Diabetic control: Good 130 or RBS200 and Poor >130 of FBS/RBS>200[(12)].

Diabetic complication:

No: if the diabetic patients have neither acute nor chronic complication.

Yes: if the patients has one complication either acute(hypoglycemia, DKA and HHNS) or chronic complication (Macro vascular, micro vascular, neuropathy, nephropathy or diabetic foot ulcer) that rule out by laboratory investigation and physical examination during follow up.

Data quality management

To assure the quality of data, properly designed data collection tool (structured questionnaire) was prepared in English and translated to Amharic language and then back to English to check the consistency. The questionnaire was pre tested. Training was also given for both data collectors and supervisors before actual data collection on the data collection process.

Data processing and analysis

After data collection, responses were entered into EPI data Version 3.1 and exported to SPSS version 23 for clearing, coding and analysis. In descriptive statistics both frequency and proportion were calculated and in analytic logistic regression were made by considering diabetic complication as binary outcome

variable (yes/no). Those explanatory variable with p- value 0.2 at 95% CI in bivariate were eligible for multivariate and those variables with p value 0.05 were found to be significant

Ethical consideration

Before data collection, Ethical clearance letter was obtained from Wolkite University College of medicine and health science department of nursing and dispatch to each selected hospitals and Gurage zonal health office. The respondents were informed and their oral consent was obtained. The respondents had the right to refuse or with draw from participating were also maintained in addition to keep their response confidentially

Dissemination of finding

The result of the study was communicated to Wolkite University College of medicine and health science, department of nursing, "Butajira" general hospital, "Attat" primary hospital and "Gunchire" primary hospitals.

Results

From a total of 338 diabetic patients included in the study, the response rate was 100%. Among the total respondents, 192(56.8%) were male.

Among the total participants; 155(45.9%) used oral hypoglycemic agent, 160(47.3%) used insulin only and 23(6.8%) were used both oral hypoglycemic agent and insulin. Those who adhered to physical activity were 222(65.7%) and 245(72.5%) aterecommended dietary practice. From the participants 59.2% had taken their daily dose properly and 39(11.5%) had smoke cigarette in addition to anti diabetic drugs. Besides, 160(47.3%) were type1 diabetes mellitus and 178(52.7%) were type2 diabetes mellitus, 150(44.4%). Moreover; 27(8%) were under weight, and 34(10%) were overweight. Regarding their blood glucose level; 274(81.1%) had RBS 200mg/dl, 303(89.6%) had FBS 130mg/dl. From the participants; 168(49.7%) had low density lipoprotein (LDL) 130mg/dl, whereas, 82(24.3%) had high level lipoprotein (HDL) 60mg/dL.

Regarding acute complication of diabetes mellitus; 48(14.2%) had DKA, 21(6.2%) had HHNS and 22(6.5%) had hypoglycemia. But from chronic complication 50(14.8%) had Neuropathy, 49(14.5%) had visual impairment (retinopathy) and 57(16.9%) had diabetic foot ulcer, 69(20.4%). From the total of DM patients who had complication; 91(26.9%) had acute complication whereas 205(60.7%) had chronic complication

Factors associated with diabetic complication

Regard to factors affecting diabetes complication; Marital status, glycemic control, body mass index and duration of illness were found to associated (See table 1)

Discussion

This study showed that the magnitude of DM complication among diabetic patients in Gurage zone hospitals was 60.65% and it was relatively similar with study done in Northeast Ethiopia (59.7%) and Bahirdar (53.5%) in Ethiopia [(13),(14)]. So, designing strategy for early diagnose and management of DM should be crucial.

In this study finding; DM patients who live with DM between 6-10 years and above 10 years were 1.79 and 4.68 times more likely to develop diabetes complication respectively when compared with patients who had live with DM less than 5 years duration. This study was similar with study conducted in "Felegehiwot" referral hospital, Bahirdar, Arbaminch and Jimma [(15),(16)]. So, patients should be clinical managed properly by initiating early diagnose and treatment.

Regarding Body mass index in our study; those diabetes mellitus patients who had higher BMI ($>25\text{kg}/\text{cm}^2$) had 4 times more likely to develop diabetic complication when compared with patients who had BMI $<18\text{kg}/\text{cm}^2$. It was similar with study done in China [(17)] and Pacific Islands [(18)]. This will imply that having recommended dietary practice and exercising physical activity regularly will be strengthened.

In this study; those patients who were widowed marital status were 75% [AOR: 0.252; 95% CI: (0.11, 0.59)] less likely to develop diabetic complication when compared with patients who had married marital status and it was similar with study done in Iran ((0.74; 0.56–0.97)) [(19)].

This study finding suggest that those patients who had poor glycemic control were 2 times more likely to develop diabetic complication when compared with patients who had good glycemic control. This study finding was similar with study done in Arbaminch and Jimma [(16),(8)]. So, continuous follow up and checking patients FBS should be taken thoroughly.

Conclusion

The overall prevalence of diabetic complications among the Gurage zone hospitals was 60.65%. Being widowed, long duration of illness, having BMI greater than $25\text{kg}/\text{cm}^2$ and having poor glycemic control were found to be significantly associated with DM complication.

Recommendations

Based on the findings of this study; provision of health education, self-care practice and early diagnose and proper management of patient condition should be strengthened.

Limitation of the study

The study design was cross sectional nature of the study so it is snap shot and could not confirm cause and effect relationship.

Declarations

Ethics approval and consent to participate

The study was conducted after approval of the proposal by Ethical Review Committee of wolikite university ethical review board. Written informed consent was obtained from each study participant by assuring privacy and confidentiality throughout the data collection period in the hospitals. There was no risk or hazardous procedures putting the participants at harm..

Consent to publish

The consent to publish was reached with authors.

Availability of data and materials

The data supporting the finding had attached to editorial office if necessarily

Competing interests

There is no competing interest.

Funding

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Author's contribution

An author made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data

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List of acronyms and abbreviations

DM -Diabetes mellitus

FBG- fasting blood glucose

RBG- Random blood glucose

WHO- world health organization

JUSH- Jimma University Specialized Hospital

IDF- International Diabetes Federation

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Table

Table 1: Factors associated with diabetes complications among diabetes mellitus at Gurage Zone Hospitals, southwest, Ethiopia, 2019 (n=338).

bles		DM Complication		COR (95%) CI	AOR(95%)CI	P- value
		No	Yes			
al ;	Married	81(60.9%)	150(73.2%)	1:00	1:00	1:00
	Single	33(17.3%)	19(9.3%)	0.45(0.29, 0.87)	0.93(.43, 2.02)	0.931
	Divorced	13(9.8%)	21(10.2%)	0.87(0.42, 1.83)	0.523(0.23. 1.18)	0.120
	Widowed	16(12.0%)	15(7.3%)	0.51(0.24, 1.17)	0.252(0.11, 0.59)	0.002*
mic ol	Good	102(76.7%)	113(55.1%)	1:00	1:00	1:00
	Poor	31(23.3%)	92(44.9%)	2.68(1.65, 4.36)	1.88(1.04, 3.39)	0.036*
	<18.5	17(12.8%)	10(4.9%)	1:00	1:00	1:00
	18.5-24.9	108(81.2%)	169(82.4%)	2.66(1.174, 6.03)	2.26(0.91, 5.65)	0.08
	>=25	8(6.0%)	26(12.7%)	5.53(1.82, 16.8)	4.42(1.32, 14.86)	0.016*
ion ess	<5years	79(59.4%)	71(34.6%)	1:000	1:00	1:00
	6- 10years	42(31.6%)	73(35.6%)	1.93(1.18, 3.18)	1.79(1.02,3.17)	0.044*
	>10years	12(9%)	61(29.8%)	5.65(2.82, 11.34)	4.68(2.07, 10.61)	<0.001*

Figures

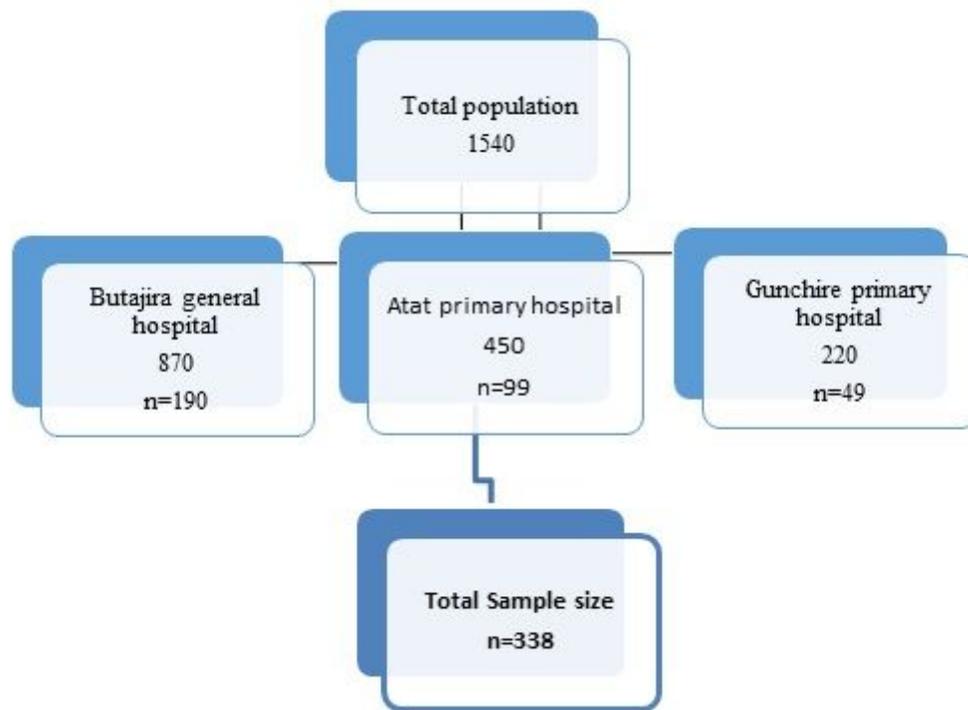


Figure 1

Schematic presentation of sampling procedure, Gurage zone hospitals in 2019.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SampleSizeandSamplingTechnique.jpg](#)