

# Trends on Prevalence of Diabetes Mellitus at Nedjo General Hospital, Western Ethiopia: Cross-Sectional Study

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#### Abstract

**Background and Objective:** Diabetes mellitus (DM) is the commonest of all metabolic diseases all over the world. It is estimated that between 5-10% of the population suffer from this disease. Ethiopia is one of the top five countries with the highest number of people affected by DM in sub Saharan Africa (SSA). Hence the study aimed to assess the trend in the prevalence of DM in Nedjo General Hospital (NGH).

**Methods:** A hospital-based cross-sectional study from patients' records was reviewed by using structured data extraction tool. Data were obtained from medical records of all registered diabetic patients in the Diabetic Follow up Clinic between 2012 and 2016. A Chi square was used as test of significance at 95% of confidence interval. A P value of 0.05 or less than 0.05 was used as the cut-of level for statistical significance.

**Result:** From the total of 299 diabetic patients, 175 (58.5%) were type-1 DM (T1DM) and 124 (41.5%) were type-2 DM (T2DM). The study revealed that trend of DM was increasing over the consecutive five years of the study period. Majority of the patients were males comprising 64.9% with female to male ratio of 1:1.8. DM was significantly associated with age of the patients ( $\chi^2$ =11.28, P=0.003) at 95% of confidence interval. Hypertension was the most common co morbid recorded in 61 (20.4%) of the total patients. About 169 (96.6%) of T1DM patients who were on insulin and 88 (71.0%) T2DM patients were on oral hypoglycemic agents (OHA).

**Conclusion and Recommendation:** The overall prevalence of diabetes mellitus was steadily increasing in patients who were attending at NGH over last five consecutive years. Adopting a healthy life style, balanced diet, and avoiding other risk factor from their life style is mandatory.

**Keywords:** Trend; Diabetes Mellitus; Prevalence; Nedjo General Hospital; Western Ethiopia

### Introduction

Diabetes mellitus is a chronic disease of absolute or relative insulin deficiency or resistance characterized by disturbances in carbohydrate, protein and fat metabolism [1-4]. It is a heterogeneous group of disorders characterized by persistent hyperglycemia. Both T1DM and T2DM are caused by a combination of genetic and environmental risk factors. However, there are other rare forms of diabetes that are directly inherited. These are gestational and other specific pathological categories of DM [1,2-5].

DM is the commonest of all metabolic diseases all over the world [4]. It is estimated that between 5-10% of the population suffer from this disease [6]. Based on the current trend more than 360 million individuals will have diabetes by the year 2030. World health organization estimates the number of cases of diabetics in Ethiopia to be about 800,000 in 2000 and projected that it would increase to about 1.8 million by the year 2030 [4].

All forms of diabetes have very serious effects on health. In addition to the consequences of abnormal metabolism of glucose (e.g.,

hyperlipidemia, glycosylation of proteins, etc.), there are a number of long-term complications associated with the disease [5,6]. These include cardiovascular, peripheral vascular, ocular, neurologic and renal complications, which are responsible for morbidity, disability and premature death in young adults [2,4-6].

Although improved glycemic control may decrease the risk of developing these complications, diabetes remains a very significant cause of social, psychological and financial burdens in populations worldwide [5]. Due to its chronic nature with severe complications, diabetes needs costly prolonged treatment and care. Consequently, its economic burden affects individuals, households and the whole society and raises the equity problem between and within countries [7].

Over the last 30 years, diabetes has changed from a relatively mild ailment to one of the major contemporary causes of premature mortality and morbidity in most countries [8]. Nearly 80% of these non-communicable diseases deaths occurred in low and middle income countries and mortality attributable to diabetes in SSA in 2010 [4-8]. Low income and developing countries are having the fastest growing numbers of newly diagnosed diabetes patients [9]. Thus, DM is a considerable cause of premature mortality, a situation that is likely to worsen and increasingly outstretching the health care resources available in the developing nations [10,11].

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#### Page 2 of 4

Ethiopia is one of the top five countries with the highest number of people affected by DM in SSA [10]. The burden of diabetes and diabetic related mortality and disability are rising in Ethiopia. This paper tried to show the trend in the prevalence of DM which is crucial input for planning health services for preventing premature adult deaths in our setup.

### **Methods and Materials**

The study was conducted at the NGH which is 525 km away from Addis Ababa. The hospital is the only center in the area and serves the populations by its various general and specialized departments. The actual data sources were diabetic patients' recorded data. The study was conducted from February 2016-April 2016. The trends of five year of diabetes prevalence from 2012 to 2016 were assessed conveniently.

A hospital-based cross-sectional study from patients' records was reviewed by using semi-structured data collection tool. The data collector was trained for two days on how to retrieve, abstract relevant data from the medical records, and keep records back in the original location. To ensure the quality of data ten percent of the data abstraction sheets was examined by the principal investigator for its completeness and consistency. All diabetics patient's records which have complete information that was requested by the check list and included in the specified period were included in the study. Trend of diabetes mellitus was the dependent variable and Socio-demographic factors and type of DM were the independent variables. The key independent variable of interest was time (in years) which allows the estimation of change over time in DM status.

### Results

From the total of 299 diabetic patients, 175 (58.5%) were T1DM and 124 (41.5%) were T2DM. The trends in each year showed that T1DM

Year of Type of DM	Total
(Table 1).	attending NGH
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Year of	Type of DM		lotal
diagnosis	Type 1 DM	Type 2 DM	
2012	12 (6.86%)	16 (12.90%)	28 (9.4%)
2013	26 (14.85%)	18 (14.52%)	44 (14.7%)
2014	25 (14.29%)	30 (24.19%)	55 (18.4%)
2015	44 (25.14%)	40 (32.26%)	84 (28.1%)
2016	68 (38.86%)	20 (16.13%)	88 (29.4%)
Total	175 (58.5%)	124 (41.5%)	299 (100%)

**Table 1:** Five years trends prevalence of DM at NGH, west Oromia, Ethiopia, from 2012 to 2016 (n=299).

This study showed that high proportion of type 1 DM were found below the age 30years accounting 122 (69.8%) and for T2DM above 30 years with 117 (94.3%). Majority of the patients were males comprising 64.9% with female to male ratio of 1:1.8. In both T1DM and T2DM the males predominate. In addition to this majority were married, 204 (68.2%) and rural residents, 166 (55.5%). Unlike T1DM, the T2DM was prevalent in urban resident patients. To assess the association of DM with socio-demographic variables of studied participants, we calculated Chi square test. It was found that DM was significantly associated with age of the patients ( $\chi^2$ =11.28, P=0.003) at 95% of confidence interval (Table 2).

Socio-demographic variables		Type of DM		Total	Chi-square	P value
				(n=299)		
		T1DM (n=175)	T2DM (n=124)			
Age (years)	1-18	47 (26.9%)	-	47 (15.7%)	11.28	0.003
	19-30	75 (42.9%)	8(6.5%)	84 (28.1%)		
	31-45	39 (22.3%)	50 (40.3%)	89 (29.8%)		
	46-65	11 (6.3%)	53 (42.7%)	64 (21.4%)		
	>65	2 (1.1%)	14 (11.3%)	16 (5.4%)		
Sex	Male	115 (65.7%)	79 (63.7%)	194 (64.9%)	0.42	0.302
	Female	60 (34.3%)	45 (36.3%)	105 (35.1%)		
Marital status of the	Single	89 (50.9%)	6 (4.8%)	95 (31.8%)	2.14	0.831
patent	Married	86 (49.1%)	118 (95.2%)	204 (68.2%)		
Address of the patient	Urban	61 (34.9%)	72 (58.1%)	133 (44.5%)	0.87	0.532
	Rural	114 (65.1%)	52 (41.9%)	166 (55.5%)		

**Table 2:** Five years trends prevalence of DM with respect to socio-demographic status of patients at NGH, west Oromia, Ethiopia, from 2012 to 2016 (n=299).

As indicated in Table 3, Hypertension was the most common co morbid seen in both T1DM and T2DM patients accounting 61 (20.4%) of the total patients. About 187 (62.5%) were on insulin therapy. About 169 (96.6%) of T1DM patients who were on insulin and 88 (71.0%) T2DM patients were on oral hypoglycemic agents (OHA).

Variables		Types of DM	Total (n=299)	
		T1DM (n=175)	T2DM (n=124)	
	Hypertension	16 (9.1%)	45 (36.3%)	61 (20.4%)
Co morbid disease	Foot ulcer	3 (1.7%)	5 (4.0%)	8 (26.8%)
	Ophthalmic disease	2 (1.1%	3 (2.4%)	5 (16.7%)
	Heart failure	-	1 (0.8%)	1 (0.3%)
	Renal failure	1 (0.6%	-	1 (0.3%)
	Other	8 (4.8%)	5 (4.0%)	13 (4.3%)
Medication	Insulin	169 (96.6%)	18 (14.5%)	187 (62.5%)
The	OHA	4 (2.3%)	88 (71.0%)	92 (30.8%)
ng	Both	2 (1.1%)	18 (14.5%)	20 (6.7%)

**Table 3:** Five years trends of DM with respect to clinical characteristics of patients at NGH, west Oromia, Ethiopia, 2012 to 2016 (n=299).

### Discussion

This study showed that majority of the patients were T1DM patients (58.5%) which comply with the study conducted at Gondar University Teaching Referral Hospital, Northwest Ethiopia showing more than half of the patients were T1DM patients [12]. The trend of DM was increasing for the five consecutive years which complies with the study conducted at Gondar University Teaching Referral Hospital showing there was average increase in the proportion of both Type 1 and Type 2 diabetes mellitus between 2000 and 2009 was 125% [12]. The finding was also in line with the study by J.E. Shaw et al revealing that between 2010 and 2030, there will be a 69% increase in numbers of adults with diabetes in developing countries and a 20% increase in developed countries [13]. This increasing trend of DM is due to increasing patterns of risk factors and other comorbidities with modified life style.

This study showed that high proportion of type 1 DM were found at age <30years particularly less than 18 years and for type 2DM above 30years which was in line with previous study conducted in La Barcia Mexico [14]. With this it was found that DM was significantly associated with age of the patients (p=0.003). Previous studies also reported that there is significant association of DM with age [4,12].

Among total number of diabetic patients attending NGH during last five years, majority of the patients were males which was not in line with the findings the study conducted in Mexican adult population [15]. Also study done in rural Bangladeshi show that prevalence of diabetes differed between males and females which were not statistically significant but, both increased with age in males as well as females [16]. The difference in variance of the DM with different in sex of the patients could be due to Socio-demographic characteristics of the patients. This study showed that there were more T1DM patients in rural area as compared to urban residents, and much more T2DM patients were from urban areas compared to rural areas. Similarly study done in Mexican adult population show that, the partial prevalence by urban/rural stratum of previously diagnosed T2DM was significantly higher in urban than in rural dwellers [15]. Similar to our finding study done in Mexican adult population the overall prevalence resulted also high in rural than in urban [15].

From these study findings hypertension was the most common comorbid diseases seen among study participants. Similarly, study done in India showed that the crude prevalence of hypertension (BP  $\geq$ 140/90), was 36.1% and adjusted for age and sex, DM was significantly associated with hypertension [17]. It is known that from the pathophysiology of the disease hypertension is risk factor for DM and vice versa.

About 169 (96.6%) of T1DM patients who were on insulin and 88 (71.0%) T2DM patients were on oral hypoglycemic agents (OHA). This finding was in line with the study conducted in Ethiopia [18].

# Limitation of the Study

It was over five years study period, there was the poor documentation (handling) of the health facility and incomplete patient card. Since the study design was cross-sectional study, we haven't assessed association and causality. Additionally, being single site study and small sample size may hamper some necessary data. Thus it may be difficult to generalize for majority of the patients.

### **Conclusion and Recommendation**

The overall prevalence of diabetes mellitus was steadily increasing in patients who were attending at NGH over last five consecutive years. But more urban population was found to be affected by T2DM than rural population. Health education as a national policy should start early in school and families. Adopting a healthy life style, balanced diet, and avoiding other risk factor from their life style is mandatory. The OHA was found to be prescribed for T1DM which is inappropriate and not scientifically justifiable. So that training should be given for health care providers who are working at diabetic clinic of the hospital. Finally extensive and prospective study at multicenter should be carried out further confirmation of the data.

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### **Authors' Contributions**

GF contributes in the proposal preparation, study design, analysis and write up the manuscript. SA made the Proposal preparation, analysis and manuscript write up. FB contributed to the design of the study and edition of the manuscripts. All authors read and approved the final version of the manuscript.

### Ethics Approval and Consent-to-Participate

A formal letter of permission was written from Wollega University pharmacy department to the Hospital medical director in order to get permission after approval by institutional review board of the

#### Page 3 of 4

department. For the sake of privacy and confidentiality no personal identifiers, such as names, were collected from patient records.

## **Consent for Publication**

Not applicable. No individual person's personal details, images or videos are being used in this study.

# Availability of Data and Materials

The datasets used and/or analysed during the current study were included in the article.

# **Competing Interests**

No competing interests exist.

### Funding

None

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