ASRAT WELDEYES HEALTH SCIENCE CAMPUS

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF PUBLIC HEALTH

MAGNITUDE AND ASSOCIATED FACTORS OF DIABETIC PERIPHERAL NEUROPATHY AMONG TYPE TWO DIABETIC PATIENTS ATTENDING FOLOW-UP OUT PATIENT DIABETIC UNIT OF CHRONIC ILNESS CLINIC IN DEBRE BERHAN COMPREHENSIVE SPECIALIZED HOSPITAL NORTH SHOWA, AMHARA, ETHIOPIA, 2023.

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School of Public Health

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Magnitude and Associated factors of Diabetic Peripheral Neuropathy among type two Diabetic Patients who attending follow up outpatient diabetic unit of chronic illness clinic in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia, 2023.

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Acronyms and Abbreviations

ADC	American Diagnostic Corporation
AWHSC	Asrat Woldeyes Health Science Campus
BMI	Body Mass Index
DBCSH	Debre Berhan Comprehensive Specialized Hospital
DM	Diabetes Mellitus
DPN	Diabetic Peripheral Neuropathy
FBG	Fast Blood Glucose
IDF	International Diabetic Federation
IRB	Institute Review Board
LDL	Low Density Lipoprotein
MNSI	Michigan Neuropathy Screening Instrument
NIDDK	National Institute of Diabetes and Digestive and Kidney disease
OHGA	Oral Hypoglycemic Agent
AOR	Adjusted Odd Ratio
PBG	Post prandial Blood Glucose
TC	Total Cholesterol
WHO	World Health Organization

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Abstract

Background: Diabetic Peripheral Neuropathy is a well-known micro vascular complication of type 2 Diabetes Mellitus and it is the critical risk factors for developing foot ulceration, infection and foot amputation. Hence, early screening of Diabetic Peripheral Neuropathy and identifying associated factors is very crucial.

Objective: To assess the magnitude and associated factors of diabetic peripheral neuropathy among type 2DM patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia, 2023.

Method: Institution based cross-sectional study was conducted among 290 type 2 diabetic patients who were under routine follow-up and attending out-patient diabetic unit of chronic illness clinic of DBCSH from May/03/ 2023 to June/08/2023 G.C. Systematic random sampling technique was used to select each study participants. Data were collected by face-to-face interviewer administer questionnaire and entered using epi data version 3.1 and exported to STATA version 14 for analysis. Bi-variable and multivariable logistic regression analysis was performed and the strength of association was declared by calculating an adjusted odds ratio at 95% confidence interval with $P < 0.05$.

Result: A total of 290 type 2 DM patients were participated in the study with the response rate of (98.64%). The magnitude of diabetic peripheral neuropathy among type two diabetic patients was found to be 46.89% (95% CI: 41.12, 52.68). The mean age of the respondents was 55.77$\pm$11.85 years. According to multivariate logistic regression: age 60 year and above (AOR=13.19; 95%CI: 1.56, 111.5), duration of DM more than 10 years (AOR=16.21; 95% CI: 4.19,62.6), hypertension (AOR=4.76; 95% CI: 1.67, 13.6), BMI of overweight (AOR=3.16; 95% CI: 1.04, 8.74), alcohol drinking(AOR=2.69, 95% CI: 1.08, 6.68) and not doing physical exercise (AOR=9.1;95% CI: 3.72, 22.25) were significantly predictors of DPN.

Conclusion and Recommendations: This study showed that; the magnitude of DPN was high compared to other studies. Age of patient (>=60 years), duration of DM (>10 years), not doing physical exercise, overweight, hypertension, and history of alcohol consumption were predictors of DPN. Therefore, strengthen health education focusing on lifestyle modification and self-care to prevent and control Diabetic Peripheral Neuropathy.

Key words: Diabetic Peripheral Neuropathy, type two DM, magnitude

1. Introduction

1.1 Background

Diabetes Mellitus (DM) is one of the largest global health emergencies of the 21st century and the number of cases has been increasing worldwide. Globally, According to International Diabetes Federation (IDF) estimation, 537 million adults (20-79 years old) were living with DM in 2021. This number is estimated to rise to 643million by 2030 and 783 million by 2045 [1].Type two diabetes (T2DM) is the most common type of diabetes and accounts for about 90% to 95% of all diabetic cases worldwide [2].

Diabetes and its complications are rapidly becoming the world's most significant cause of morbidity and mortality. Diabetic Peripheral Neuropathy is one of chronic micro-vascular complications in diabetic patients. According to Toronto Diabetic Neuropathy Expert Group definition, DPN is defined as a distal symmetrical, length dependent sensorimotor polyneuropathy attributable to metabolic and micro vessel alteration as a result of chronic hyperglycemia exposure (DM) and cardiovascular risk covariates [3].

Diabetic peripheral neuropathy (DPN) is the most common complication of DM, and it is estimated that 30% to 50% of diabetes patients are affected by this disorder [4]. Neuropathy is a frequent encountered complication of diabetes and diabetic Peripheral neuropathy is the most common form of neuropathy, affecting the outer nerves of the limp, particularly those of feet and accounting for about 75% of all the neuropathies. Diabetic foot and lower limp complications are sever and chronic and they affect 40 to 60 million people with diabetes globally [5].

Diabetic peripheral neuropathy is a type of nerve damage that typically affects the feet and legs and sometimes affects hand and arms and this type of neuropathy is very common; about one- third to one- half of people with diabetes have peripheral neuropathy [6].The classical progression of DPN is insidious, starting with symptoms affecting the distal lower limbs, and then slowly progressing proximally [7]. The clinical presentation of DPN can be quite variable. Patients can present with "positive" or "negative" symptoms. Positive symptoms are those that patients complain of (subjective findings), including paresthesia (tingling, hyperesthesia, burning, allodynia or formication). Negative symptoms (objective findings), they could consist of numbness, dead/asleep feeling, or muscle weakness in the lower limbs [8].

1.2. Statement of the problem

Patients with DPN might suffer from pain and discomfort in the lower extremities, loss or absence of protective sensation in the lower extremities leading to balance problems, risk of foot ulcerations, and a reduced quality of life in adults with diabetes patients [9]. Risk factors play an important role for the development of DPN. The most commonly known risk factors are, increasing age of diabetic patient, cholesterol, longer duration of hyperglycemia, smoking, hypertension, dyslipidemia, high body mass index (overweight& obese) and physical activity [10, 11].

DPN affects about half of the diabetic patients, particularly type 2 DM patients are more affected than type 1DM patients. A case-control study conducted in Saudi Arabia showed that, from DPN cases about 90.4% is type 2DM as compared with the remaining 9.6% type 1DM [12]. As the incidence of diabetes increases globally, Diabetic Peripheral Neuropathy also become more prevalent. A nationwide cross-sectional study conducted in mainland China indicated that DPN affects about 57.2% of T2DM patients [13].

A systematic review and meta-analysis study conducted in Brazil indicated that, on average globally 35.78% of diabetic patients developed DPN and with a variation from 8.43% to 78.83% and the proportion of DPN is higher in Europe 48.14%, than in Asia 32.24%, Americas 31.61%, and Oceania 23.20% [14]. According to systematic review and meta-analysis study conducted in Ethiopia showed that on average 22% of diabetic patients developed DPN and Based on the subgroup analysis of that study the distribution of DPN through the country has variation that in Addis Ababa, it was 23%, in Oromia 27%, in South Nation and Nationalities'16% and in Amhara 15% [15].

Diabetic Peripheral Neuropathy can cause a range of complications, including chronic pain, foot ulcers, foot infection, and amputation and finally leading to death. It is critical risk factors for developing foot ulcer, and foot ulceration is the critical risk factor for foot infection and amputation [16, 17]. Approximately 25% of people with diabetes will develop a foot ulcer during their lifetime [18], which can progress to infection and limb amputation. About 90% of hospital admissions for diabetic foot ulcers are related to DPN and infection. Diabetes Mellitus account for 83% of all major amputation in the United States [19]. According to a systematic review and meta-analysis study conducted in 2017, the proportion of foot ulcers among diabetic patients ranges from 3% to 13% [20]. A cross-sectional study conducted in Southwest Ethiopia, has reported that the diabetic foot ulcer is about 11.6% among diabetic patients and Diabetic patients who had peripheral neuropathy are 11.2 times more likely to develop diabetic foot ulcer as compared with those who had no peripheral

neuropathy [21]. DPN has humanistic and economic burden on diabetic patients. They have reduced Health Related Quality of Life (HRQoL), that it affects social, physiological and psychological functioning of an individual and incur high health care cost due to hospitalization and outpatient visits and its impaired work productivity [22]. Most diabetic patients become depressed due to foot ulcers and amputation.

Depression is common among diabetic patients due to diabetes and diabetic related chronic complication like diabetic peripheral neuropathy. According to an institution based cross-sectional study conducted in Addis Ababa; about 21.3% of diabetic patients have been affected by depression due to diabetic complication [23]. Due to increasing the incidence of type 2 diabetes over the years, it is recommended that early detection and prevention of DPN should be prioritized at the primary care level [24].

Once DPN occur; it is irreversible and currently there is no medicine to cure it except symptom relieving drug. Hence, early screening of DPN and identifying associated factors is very crucial especially for developing countries with low resource settings and low literacy rate [25]. The current management strategy for DPN focuses upon the early detection of the DPN and prevention of diabetic foot syndromes [26]. A Report from systematic review and meta-analysis study revealed that there is variation among studies regarding to magnitude and risk factors of DPN; particularly associated actors were inconsistent [27]. Moreover, there is no data compiled using screening tool; indicating the magnitude and associated factors of DPN among diabetic population in North Showa, Amhara Regional State. Having evidence on the magnitude of DPN and its associated factors among diabetic patients is very important; particularly in the study area it will provide evidence about the condition.

Therefore the aim of this study is to assess the magnitude and associated factors of Diabetic Peripheral Neuropathy among type two Diabetic patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Amhara Regional State, Ethiopia, 2023.

1.3. Significance of the study

This study is aimed at pointing out that screening of all DM patients for DPN is essential strategy for identifying, managing and preventing its complication. There is a practical gap on screening of all DM patients for DPN using screening tool. Therefor the result of this study is important for different stakeholders, such as, health care providers, health institutions, diabetic patients, community and researchers.

For health care providers: It will help them to consider different strategies like screening all DM patients to detect DPN early and to prevent its complication and to focus more on diabetic complication prevention strategy, particularly on diabetic peripheral neuropathy.

For health institution: Health institutions can also use the result of this study as baseline for their diabetic management plan.

For diabetic patients: Identifying the diabetic peripheral neuropathy early has benefit for diabetic patients to take self-preventive care, tackle DPN progression and to preserve their quality of life.

For researchers: It will help others who are interested to conduct further studies on the same title.

2. Literature review

2.1. Overview of diabetic peripheral neuropathy

The definition of neuropathy is nerve disease or damage and an internationally recognized definition of DPN is "the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after exclusion of other causes [28]. Peripheral neuropathy may manifest as an inability to detect temperature changes, vibration, proprioception, pressure, and, most seriously, pain, burning sensation, numbness. In diabetic foot disease; diabetic peripheral neuropathy (DPN) is the primary risk factor for the development of diabetic foot ulcers [29].

2.2. Prevalence of Diabetic Peripheral Neuropathy

Chronic complications of diabetes (DM) are a major cause of mortality and morbidity. Of these, diabetic peripheral neuropathy (DPN) is the most common. Many studies have been conducted to assess the prevalence of diabetic peripheral neuropathy among diabetic patients across the world. Some of the studies indicated that the reported prevalence of diabetic peripheral neuropathy ranges from 16% to as high as 66% [30].

According to the estimate of INTERPRET-DD study conducted in China, which is an international study, conducted in 14 different countries showed, that the prevalence of

diabetic peripheral neuropathy is different among those countries, ranging from 0.58% (Kenya) to 79.55% (Ukraine) and the overall prevalence is 26.71% [31], this indicates that the occurrence of DPN has significance difference that may be due to geographical difference. According to a multi-center cross-sectional study conducted at primary health care settings among both type 1 and type 2 diabetic patients in Saudi Arabia, showed that the prevalence of DPN is 30.1% in type 2 diabetic patients and 25.9% in type 1diabetic patients with an overall prevalence of 29.1% [32], likewise; the other multicenter cross-sectional study conducted in China among type 1and type 2 diabetic patients, reported that the prevalence of DPN in type 1 and type 2 is 21.92% and 35.34%, respectively [33], as we can see from both findings in these studies, DPN has also a variation in DM types, that type 2 DM patients are more affected than type 1 DM patients, it may be due to causative factors of each type .

A systematic review and meta-analysis study conducted on 28 studies in Latin America and Caribbean countries, found that the pooled prevalence of DPN is 46.5% [34]. Based on a cross-sectional study conducted in Libya, indicated that the overall prevalence of DPN is 30.5% [35]. The other systematic review and meta-analysis study conducted on 23 studies from different African Countries revealed that the pooled prevalence of DPN in Africa is about 46% and based on subgroup analysis; the highest prevalence of DPN is reported from West Africa 49.4% [36].A cross-sectional study conducted in Ethiopia; Jima University Medical Center and Bahr Dar indicated that the overall prevalence of DPN among diabetic patient is 53.6%, 37.3 % and 52.2% among the study population respectively [37], [38], [39].

2.3. Factors associated with Diabetic Peripheral Neuropathy

2.3.1. Socio demographic factors

Risk factors are something that increases or decrease the chance of developing a disease. There are many factors which play an important role for the development of diabetic peripheral neuropathy in diabetic patients. Socio demographic factors are some of these factors which might have an important role in DPN. Different studies across the globe have been conducted to identify factors associated with diabetic peripheral neuropathy among diabetic patients. Age of diabetic patient is the most significantly associated socio demographic factor identified in many studies; that being an older age is more significantly associated with DPN among DM patients [40, 41, 42, 43, 44, 45, 46, 47, 48, 11]. All of these studies indicated that when the age of diabetic patient increase, the probability of DPN to occur is also increase.

A cross-sectional study conducted in Abbottabad, showed the association of gender with DPN occurrence, that being male is more likely risky to develop DPN than being female [49]. Educational level also has significant effect on diabetic peripheral neuropathy occurrence among diabetic patients, that being illiteracy or having low education level is more likely risky to develop DPN than being literate or well educated [50, 51]. A study conducted in Jordan also indicated the association of occupation with diabetic peripheral neuropathy that being unemployed is more likely to develop DPN as compared with employed one [52]. A residency of diabetic patient also has effect to develop DPN, as case-control study conducted in Ethiopia; indicated the association of residency and family history of DM complication with DPN, that being urban dweller and having family history of DM complication are more likely risky to develop DPN as compared with Rural dweller and with no family history of DM complication among DM patients [53].

2.3.2. Behavioral factors

Behavioral factors also have an important role to affect the health condition of individuals. Some of behavioral factors are smoking, alcohol drinking, chat chewing, and physical activity. As findings indicate, Physical activity also determine the occurrence of diabetic peripheral neuropathy among diabetic patients, that being physically inactive or doing irregular exercise is more likely risky to develop DPN as compared with those who are active or doing regular physical exercise T2DM patients [54, 55]. Other cross-sectional study conducted in Ethiopia also indicated the association of cigarette smoking history of diabetic patient with diabetic peripheral neuropathy occurrence that being smoker (former or current) is more risky for developing DPN as compared with those who never smoke [56].

2.3.3. Clinical factors

Clinical factors are factors that might be related to medical management and a disease condition. These factors also play an important role in the development of DPN. Identifying those factors which are significantly associated with DPN is important. A cross-sectional study revealed that having hypertension, living longer duration with diabetes and poor glycemic control has more probability of developing DPN as compared with the counterpart [57].

A systematic review and meta- analysis study conducted in china shown that living with diabetic disease for a longer duration and high level of HbA1c (HbA1C>=7.0%) is more likely to develop DPN as compared with short duration of DM and low level of HbA1c (HbA1c <7.0%) [58]. An INTERPRET-DD study conducted in 14 different countries indicated that a diabetic patient with longer duration of diabetes, poor glycemic control, and

history of hypertension, cardiovascular disease and depressive symptoms is at high risk of developing DPN as compared with diabetic patients without these conditions [31]. A study conducted in China, showed that high level of Fast Blood Glucose (FBG), Postprandial Blood Glucose (PBG), high level Low Density Lipoprotein(LDL), HbA1C, Total Cholesterol(TC) and BMI(overweight, obesity) were identified associated factors with DPN [59].

The other cross-sectional study conducted in Shanghai, china, revealed that, those diabetic patients with high 2-hours postprandial plasma glucose level are more likely to develop DPN than those with normal 2-hours postprandial plasma glucose level [60]. A nested case-control study conducted in Saudi; revealed that diabetic patients with peripheral vascular disease and chronic kidney disease are at risk of developing DPN [61].

A case-control study conducted in Taiwan, found that the presence of moderately and severely increased albuminuria and greater glycemic variability are important predictors of DPN [62]. The other cross-sectional study conducted in Libya, found that diabetic patients with longer duration of diabetic disease, insulin treatment, uncontrolled hypertension, poor glycemic control, diabetic retinopathy and diabetic nephropathy are more likely risky to develop DPN [63]. A cross-sectional study conducted in Uganda, indicated that diabetic patients with a history of ever having foot ulcers and hypertension were more risky to develop DPN than patients without these factors [64]. Descriptive Cross-Sectional Study conducted in North Eastern Tanzania, demonstrated that increase in BMI (overweight& obesity), longer duration of DM (above 7 years), OHGA, Hypertension and Dyslipidemia were risk factors significantly associated with DPN [65].

Another institution based cross-sectional study conducted at Jimma University Medical Center, Ethiopia, revealed that living with diabetic disease for longer duration of time (5-10 years, and above 10 years) has high risk of developing DPN [66].

Overall, what we can understand from this literature review that the occurrence of DPN is different among DM type and different countries this might be due to geographical or ethnic factors. Some factors consistently associated with DPN like age of diabetic patient and duration of diabetic disease, these factors almost in all studies have significant association with DPN. But other many factors lack consistency in many studies.

Conceptual framework

Conceptual framework is a written or visual representation that explains the study variables and their relationship with each other. This Conceptual framework represents the relationship between dependent and independent variables.

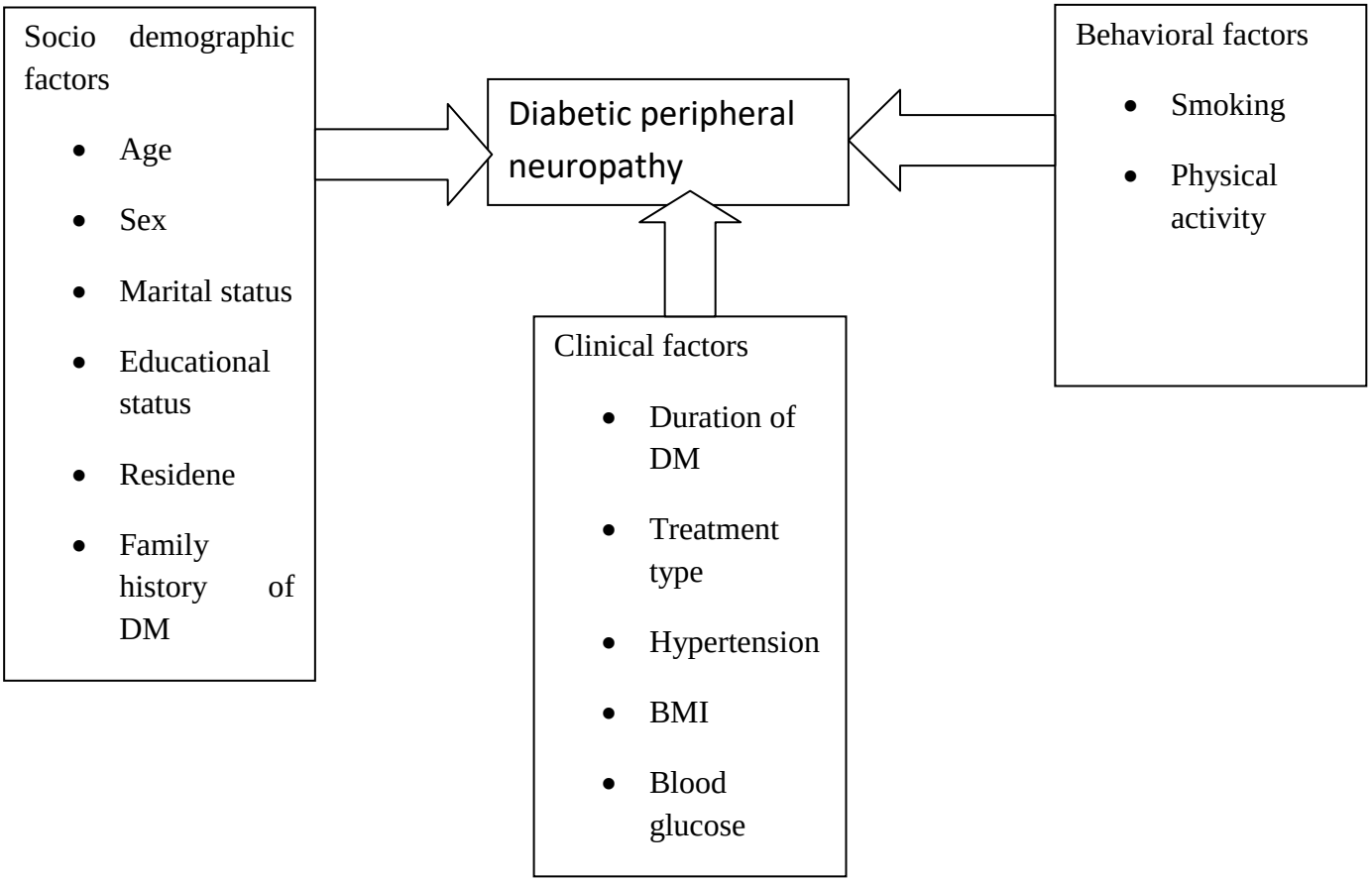

Figure 1: Conceptual framework to assess the magnitude and associated factors of Diabetic Peripheral Neuropathy among type 2 Diabetes Mellitus patients attending in DBCSH, Debre Berhan, Ethiopia, 2023. Which is adopted from different literatures [67, 68, 69, 70].

3. Objective

3.1. General objective

- To assess the magnitude and associated factors of diabetic peripheral neuropathy among type 2DM patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia, 2023.

3.2. Specific objective

- To determine magnitude of diabetic peripheral neuropathy among type 2DM patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia, 2023.
- To identify factors associated with diabetic peripheral neuropathy among type 2DM patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia, 2023.

4. Method

4.1. Study Area

The study was conducted in Debre Berhan Comprehensive Specialized Hospital, North Showa Zone, Amhara Regional State, Ethiopia. Debre Berhan is the capital city of North Showa Zone located at about 130_km away from Addis Ababa the capital city of Ethiopia and at about 696 km from Bahir Dar a capital city of Amhara Regional State. According to the national census of 2007, conducted by the Ethiopian Central Statistical Agency, this zone has a total population of 2,051,738, of which 1,041,061 are males and 1,010,677 are females [71]. Debre Berhan Comprehensive Specialized Hospital is one of the largest Referral Hospitals in Ethiopia and it covers a very large catchment area and providing service for about 1.2 million people in the catchment area and it provides service for 400-450 patients daily through both direct and referral system. There are a total of 152 beds for inpatient service and about 570 health professionals and it provides preventive, curative and rehabilitative services. It also provides outpatient and follow-up service for chronic illness such as DM, Hypertension. There are about 1050 type 2 diabetic patients who have follow-up in chronic illness follow-up clinic of DBCSH [72].

4.2. Study design and period

An institution based cross-sectional study was conducted from May/03/ 2023 to June/08/2023 G.C.

4.3. Source population

All type 2 diabetic patients who were attending in follow-up outpatient diabetic unit of chronic illness clinic in DBCSH were source population of the study.

4.4. Study population

All type 2 diabetic patients who were eligible and attending in follow-up outpatient diabetic unit of chronic illness clinic in DBCSH during data collection period were the study population.

4.5. Study unit

All randomly selected type 2 DM patients were study unit.

4.6. Inclusion criteria

Type 2 diabetic patients with the age of ≥18 years old and who were attending follow-up outpatient diabetic unit of chronic illness clinic in DBCSH were included in the study.

4.7. Exclusion Criteria

Type 2 DM patients who were critically ill and with infectious disease (TB, HIV), PAD, leprosy, mentally retarded patients and bilateral lower extremity amputees were excluded.

4.8. Sample Size determination

The sample size was calculated using a single population proportion formula by considering the prevalence of diabetic peripheral neuropathy among diabetic patients attending at Jima University Medical Center, Ethiopia, as 37.3% [73], at 95% CI and a margin of error 5%.

$$n = \frac{(Z\ a/2)^2\ P\ (1\text{-}P)}{d^2} = \frac{(1.96)2 * 0.373\ (1\text{-}\ 0.627)}{(0.05)^2} = 359$$

Based on the assumption of infinite population formula it gives the initial sample size of 359. Since the source populations of diabetic patients at the hospital were less than10, 000, a population correction/adjustment formula for a finite population was employed. Then it has given the sample size of 267. By adding 10% nonresponse rate the final sample size was calculated to be 294.

$n= 1+ \left(\frac{\frac{(Z\,a/2)2\ P\ (1-P)}{d2}}{\frac{(Z\,a/2)2\ P\ (1-P)}{d2\ N}} \right)$ it is finite population formula and N is source population.

So Sample size for the first objective was 294.

Whereas Sample size for the second objective was determined by using Epi-info by considering the following assumptions 95% of confidence interval and 80% of power by considering exposed to unexposed ratio of 1:1taking significant factors from the study conducted on DPN

Table 1: sample size estimation, to identify associated factors of diabetic peripheral neuropathy among type 2DM patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia, 2023.

Variables	Parameter used for estimation	Estimated Sample size	Nonresponse rate10%	Final sample size & reference
Age >= 70years	CI= 95% Power=80% Ratio=1:1 P=11.3%	134	13	147 [74].
Duration of diabetes>=10 years	CI= 95% Power=80% Ratio=1:1 P=18.9%	192	19	211 [74].
BMI(overweight)	CI= 95% Power=80% Ratio=1:1 P=15.1%	170	17	187 [75].

Since the sample size of the second objective was smaller than the sample size of the first objective, the largest sample size (294) calculated by first objective was taken as the final sample size for the study.

4.9. Sampling procedure

According to report from chronic illness follow up clinic on average 110 T2DM patients visit the clinic per week, then the number of T2DM patients during data collection period was estimated as 110*5week and 550 type two diabetic patients were estimated to visit the clinic within 5 weeks of period. Then each study subject was selected in every K^{th} value.

k= $\frac{550}{294}$=1.87 approximately 2. The first participant was selected from the first 2 randomly available patients by simple random sampling method. Then using systematic random sampling technique every 2^{nd} individual, who was randomly available during data collection

time, was selected to participate in the study. If the selected participant refused to be included in the study; then that participant would be considered as non-responder.

4.10. Variables of the study

4.10.1. Dependent variable

Diabetic Peripheral Neuropathy

4.10.2. Independent Variable

Socio-demography factors: Age, Sex, Marital status, Educational status, Religion, family history of DM, Residency and Occupation.

Behavioral factors: physical exercise, cigarette smoking, alcohol consumption, and chat chewing.

Clinical factors: duration of diabetic disease, Body Mass Index, type of treatment, Chronic comorbid disease, blood sugar level, weight and height

4.11. Operational Definition

Diabetic Peripheral Neuropathy: Diabetic peripheral neuropathy is present if the patient's history version of the Michigan Neuropathy Screening Instrument questionnaire total score is ≥4 positive responses from 15 yes or no questions regard to lower extremities **[76]**.

Amputation: Amputation is the surgical removal of the whole or a part of the limb including its distal end.

DM Duration: The duration of DM was estimated as <5 years, 5-10 years and >10 years.

Physically exercise: To determine whether an individual do or not do physical exercise in a week.

Body Mass Index: is derived from a person's weight in kilogram divided by the height (squared) in meters.

Cigarette smoking: to determine the smoking status of individuals like never smoke, previous smoker or current smoker.

Alcohol intake: To know alcohol consumption status of an individual like never, previous or current alcohol user.

4.12. Data Collection Tool and Procedure

Data were collected by using a structured questionnaire through face-to-face interviews and weight and height measurements. The questionnaire was adapted from the WHO stepwise approach for surveillance of chronic disease risk factors [76] and from different scientific journals [77, 78]. The questionnaire contains socio-demographic factors, Michigan neuropathy screening instrument, behavioral factors, and clinical factors.

Michigan neuropathy screening instrument (MNSI) was used to evaluate the presence of DPN. It is a well-known instrument used to assess peripheral neuropathy among T2DM patients with a sensitivity of 80% and a specificity of 95%. It is a validated, noninvasive, and inexpensive measurement tool that evaluates sensory and motor components of neuropathy which contains history and physical assessment parts [79, 80]. This tool was implemented in previous studies in Ethiopia to evaluate the presence of DPN [37], [38], [39].

MNSI questionnaire: It contains 15 items which was administered by the interviewer; responses were added to obtain a total score. 'yes' response to questions 1–6, 8-12 and 14-15 each were counted as one point and 'No' response to questions 7 and 13 likewise counted as one point. According to a recently published algorithm; a new cutoff point of MNSI questionnaire ≥4 is considered as presence of DPN and all 15 items are included in scoring. A large study conducted on diabetic patients suggested that a lower threshold to define abnormal MNSI questionnaire could significantly increase the accuracy of this test. They recommend a cutoff point of ≥4 instead of ≥7 for defining presence of DPN [81].The total score ranges from 0 to 15 points and a score of ≥4 indicates the presence of DPN.

In this study, MNSI examination part was excluded from data collection due to availability of the tools. So MNSI questionnaire was employed to assess the presence of DPN. According to study conducted to evaluate the performance of MNSI in detecting distal symmetrical peripheral neuropathy in diabetic patients, revealed that When used separately, the MNSI questionnaire (AUC 0.73) and MNSI examination (AUC 0.76) performed similarly in predicting confirmed clinical neuropathy. Based on multivariate logistic regression of the study to derive an MNSI questionnaire index, MNSI examination index and combined index to predict confirmed clinical neuropathy, the values of AUC were 0.75, 0.76 and 0.81, respectively [81]. Therefore, the MNSI questionnaire alone can predict the presence of DPN.

Anthropometric measurement: Anthropometric measurements were conducted to measure height and weight of the study subjects. Weight was measured by the mechanical weighing scale in kilograms to the nearest 0.5 kg, without footwear with the scale being placed on a flat firm surface and Height was measured by a measuring tape against a flat vertical surface and recorded in meter; to the nearest 0.1 cm. then BMI was calculated as kg/m^2 to determine the nutritional status of the study subjects. Based on WHO classification BMI was categorized as Underweight (<18.5), Normal weight (18.5 to <25), Overweight (25 to<30) and Obese (>=30).

4.13. Data Quality Assurance

Data quality was ensured through standardized data collection materials. The items were prepared in English and translated into the local language (Amharic) and then re-translated to English to verify consistency. The original and translated questionnaires were compared, and the discrepancies were reviewed and resolved accordingly. Pretest on 5% (15 subjects) was conducted at Arerti primary district Hospital which is one of the nearest district hospitals for DBCSH in North Showa Zone. After analyzing pretest results, there was no need of modifications and corrections. Two data collectors from DBCSH with qualification of medical doctor (GP) and one BSc nurse conducted data collection. Two days of training was given for data collectors about the aim of the study, on the ways of data collection, and how to measure, and record readings before data collection undertaken. Continuous follow-up and supervision was made by one supervisor and principal investigator throughout the data collection period. The collected data were checked on daily basis for accuracy and completeness by principal investigator and supervisor.

4.14. Data Entry, Processing, and Analysis

After coding and checking for completeness and consistency, data were entered into EpiData version 3.1 and then was exported to Stata SE 14.0 software for analysis. Descriptive statistics was generated and presented in narrations, figurative and tabular forms. First, frequency distributions of variables were explored, and descriptive statistics was used to summarize and present the information in the form of mean, percentages, and tables with 95% confidence intervals for prevalence estimates. A binary logistic regression model has been used to examine factors associated with DPN among the study participants. Variables which showed association with a dependent variable in the bivariate analyses at $p<0:25$ were entered into the multivariate logistic regression model. Multivariate logistic regression analysis has been used to examine the association between independent variables and dependent variable adjusting for other potential confounders and a p-value of ≤ 0.05 was used to define statistical significance. p value ≤ 0.05 was taken as statistically significant.

4.15. Ethical considerations

Ethical approval was obtained from the IRB of AWHSC, Debre Berhan University, Ethiopia. A supportive formal letter was written to DBCSH outpatient unit leader. Then the respondents were well informed about the purpose and benefit of the study. Then information was collected after written informed consent from each participant was obtained. The

information was recorded anonymously and confidentiality was assured through the study period.

4.16. Dissemination plan

The finding of the study was presented to DBU, Asrat Woldeyes Health Science Campus. The result of the study will be disseminated to DBCSH and zonal health office. It will be tried to publishing on reputable and peer reviewed journal.

5. Result

5.1. Socio demographic characteristics of participants

A total of 290 participants with response rate of 98.64% were included in the study. Almost more than half (51.38%) of the respondents were males. The mean age of the respondents was 55.77±11.85 years (sd). Majority (79.66%) of participants were Orthodox Christians' and more than three fourth (78.97%) of participants were married. Majority of participants (84.48%) were urban dwellers (Table 2).

Table 2: Socio demographic characteristics of patients with type two diabetes mellitus at DBCSH, Debre Berhan, Ethiopia, 2023. (n=290).

Variable	Category	Frequency n	%
Sex	Male	149	51.38
	Female	141	48.62
Residency	Urban	245	84.48
	Rural	45	15.52
Religion	Orthodox	231	79.66
	Muslim	27	9.31
	Protestant	27	9.31
	Catholic	5	1.73
Marital status	Single	8	2.76
	Married	229	78.97
	Divorced	16	5.51
	Widowed	37	12.76
Education status	Unable to read &Write	21	7.24
	Able to read & write	61	21.04
	Primary school	65	22.41
	Secondary school	77	26.55
	College & Above	66	22.76
Occupation	Employee	74	25.52
	Merchant	61	21.03
	Farmer	42	14.48
	Housewife	59	20.34
	Others*	54	18.62

Family history of DM	Yes	59	20.34
	No	231	79.66

*Pensioner, daily labor, student and private workers

5.2. Clinical and Behavioral characteristics

A total of (94.48%), (60.34%) and (58.2%) of participants were none smokers, none alcohol users and not doing any physical exercise respectively. Almost all (97.93%) of participants were none chat users and three-fourth (76.55%) of participants were on oral hypoglycemic agent treatment. More than half (57.24%) of respondents were in healthy weight range whereas (34.48%) of participants were in overweight range. Among the study participants (22.07%) were diagnosed with diabetes for more than 10 years (Table.3).

Table 3: Method Study setting Clinical and behavioral characteristics of patients with type two diabetes mellitus at DBCSH, Debre Berhan, Ethiopia, 2023. (n=290).

Variable	Category	Frequency n	%
Cigarette Smoke	Yes	16	5.52
Never smoke	No	274	94.48
Current smoke	Yes	1	6.25
Previous smoker	No	15	93.75
Alcohol Consumption	Yes	115	39.66
Never consume	No	175	60.34
Current Consumption	Yes	36	31.30
Previous consumer	No	79	68.70
Physical Exercise	Yes	121	41.72
	No	169	58.28
Physical Exercise/week	Every day	27	22.31
	4-5 days	17	14.05
	2-3 day	52	42.98
	1 day	25	20.66
Chat Chewing	Yes	6	2.07
Never chewing	No	284	97.93
Current Chat Chewing	Yes	2	33.33
Previous chewers	No	4	66.67
Duration of DM	<5 years	113	38.97
	5-10 years	113	38.97
	>10 years	64	22.07

Treatment Type	Insulin	55	18.97
	OHGA	222	76.55
	Both	13	4.48
Hypertension	Yes	72	24.83
	No	218	75.17
Body Mass Index	Underweight	2	0.69
	Healthy weight	166	57.24
	Overweight	100	34.48
	Obese	22	7.59
Fast Blood Sugar	<126mg/dl	106	36.55
	>=126mg/dl	184	63.45

5.3. Magnitude of Diabetic Peripheral Neuropathy

This study revealed that the magnitude of diabetic peripheral neuropathy among type two diabetic patients was 46.89 % (95% CI: 41.12, 52.68).

5.4. Factors Associated with DPN

To see the effect of independent variable on the dependent variable, bivariate logistic regression analysis was carried out with 95% confidence interval at P-value ≤ 0.25 and all factors which show significant association were entered into multivariable logistic regression analysis. Finally, predictors of DPN were identified.

In multivariate logistic analysis, Age of the respondent, duration of diabetic disease, hypertension, BMI of overweight, alcohol drinking habit and not doing physical exercise were significantly associated with DPN.

Participants in their 6th decade of age (>=60 years) were 13.19 times (AOR=13.19; 95%CI: 1.56, 111.5) more likely to develop DPN compared with patient's age less than 40 years.

Diabetic patient with duration of more than 10 years were 16.21 times (AOR=16.21; 95% CI: 4.19, 62.6) more likely to develop DPN as compared with the patients living with the disease for less than 5 years.

Diabetic patients with hypertension were 4.76 times (AOR=4.76; 95% CI: 1.67, 13.6) more likely to develop DPN as compared to hypertension-free diabetic patients.

Patients with a BMI of overweight were 2.86 times (AOR=2.86; 95% CI: 1.07, 7.60) more likely to develop DPN as compared with patients who have health weight.

Patients with a history of alcohol consumption were 2.69 times (AOR=2.69, 95% CI: 1.08, 6.68) more likely to develop DPN as compared with those who never consume an alcohol.

Diabetic patients who were not doing any physical exercise were 9.1 times (AOR=9.1; 95 % CI: 3.72, 22.25) more likely develop DPN compared with patients who were doing physical exercise.

Table 4 : factors associated with DPN among type two diabetic patients at Debre Berhan Comprehensive Specialized Hospital by bivariate and multivariate logistic regression analysis, Debre Berhan, Ethiopia, June 2023. (n=290).

Variable	Category	DPN		COR(CI)	AOR(CI)	p-value
		Absent	present			
Age	<40	29	2	1	1	1
	40-49	53	17	4.65(1.003, 21.55)	5.69(0.73, 44.25)	0.096
	50-59	55	40	10.55(2.37, 46.77)	3.28(0.44, 24.20)	0.242
	>=60	17	77	65.67(14.27, 302.13)	**13.19**(1.56, 111.5)	0.018
Sex	Male	81	68	1		
	Female	73	68	1.11(0.69, 1.76)		
Education	Unable to read & write	5	16	5.6(1.8, 17.2)	3.69(0.39, 34.37)	0.250
	Read &write	31	30	1.69(0.83, 3.44)	0.39(0.06, 2.40)	0.313
	Primary school	32	33	1.8(0.89, 3.63)	0.9(0.18, 4.45)	0.902
	Secondary school	44	33	1.3(0.66, 2.58)	0.35(0.73, 1.66)	0.187
	College & Above	42	2	1	1	1
Family hx ofDM	Yes	25	34	1.7(0.96, 3.06)		
	No	129	102	1		
Residency	Urban	126	119	1.55(0.80, 2.98)		
	Rural	28	17	1		
Cigarette smoking	Yes	2	14	8.7(1.94, 39.11)		
	No	152	122	1		
Alcohol drinking	Yes	46	69	2.4(1.49, 3.9)	**2.69** (1.08, 6.68)	0.033
	No	108	67	1	1	1
Chat chewing	Yes	4	2	0.56(0.10, 3.1)		
	No	150	134	1		
Phy. Exercise	Yes	100	21	1	1	1
	No	54	115	10.14(5.7, 17.95)	**9.1**(3.72, 22.25)	0.000

Duration of DM	<5 years	86	27	1	1	1
	5-10	64	49	2.4(1.38, 4.31)	1.93(0.83, 4.48)	0.125
	>10	4	60	47.77(15.89, 143.6)	**16.21**(4.19, 62.6)	0.000
Hypertension	Yes	11	61	10.57(5.25, 21.29)	**4.76** (1.67, 13.6)	0.004
	No	143	75	1	1	1
Treatment type	Insulin	38	17	1	1	1
	OHGA	113	109	2.15(1.14, 4.04)	2.86(0.94, 8.72)	0.064
	Both	3	10	7.45(1.8, 30.56)	6.19(0.6, 63.8)	0.059
Body Mass Index	Underweight	1	1	2.32(0.14, 37.8)	3.23(0.06, 163.45)	0.559
	Healthy weight	116	50	1	1	1
	Overweight	31	69	5.16(3.0, 8.84)	**2.86** (1.07, 7.60)	0.035
	Obese	6	16	6.18(2.28, 16.7)	0.8(0.16, 3.94)	0.790
Fast Blood Sugar	<126 mg/dl	71	35	1	1	1
	>=126mg/dl	83	101	2.46(1.49, 4.06)	2.06(0.86, 4.93)	0.104

1=reference variable, **bold** numbers are significantly associated factors.

6. Discussion

The current study aimed to assess the magnitude and associated factors of DPN among adult type two diabetic patients. This study revealed that the magnitude of DPN was 46.89% with 95% CI (41.12, 52.68).

The magnitude of this study was in line with studies conducted in Jima 52.6% [37] and Bahr Dar 52.2% [39] this might be due to that each of the studies was conducted in single study setting and using the same diagnosing tool in defining presence of DPN. Similarly this study was in line with the result of systematic review and meta-analysis studies 46.5% [34] and 46% [36]. The reason for similarity might be that those systematic review studies reviewed the articles with the same study design and diagnostic materials with the current study.

In contrast, the result of this study was higher than studies conducted in Saudi Arabia 29.1% [32] and China 30% [33], the reason for the difference might be due to study setting and DM type that the previous studies were conducted in multicenter setting and on both type 1 and type 2 DM, but the current study was conducted in single study setting and on type 2 DM only. In addition the studies used different diagnostic materials.

The magnitude of this study also higher than the average prevalence 26.71% [31]of INTERPRET-DD study which is an international study conducted in 14 different countries. The possible reason for the difference is that the previous study was conducted in different

countries which have different population, Geography and lifestyle.The difference in the prevalence of DPN across the studies maybe attributed to differences in study design, type of population included, resource of hospital set up and type of tool used to assess the magnitude of DPSN in different study settings.

In binary logistic analysis, Age of the respondent, duration of diabetic disease, hypertension, BMI of overweight, alcohol drinking habit and not doing physical exercise were significantly associated with DPN.

This study revealed that participants with the age of 60 years and above were 13.19 times more likely develop DPN compared with patient's age less than 40 years. This report was supported by previous studies conducted in different countries and populations [40, 41, 42, 43, 44, 45, 46, 47, 48, 11]. The posible reason for the similarity among studies is that increasing age is a risk factor for many neurological disorder, probably reflecting the limited regenerative capacity of the nervous system after any insult. The effect of aging combined with deleterious effects of chronic hyperglycemia can result in increased development of DPN as one gets older. Other possible reasons could be; peripheral nerve system by their length and size are known to have increased vulnerability with aging due to continual metabolic stress and degenerative nature of physiological well-being [39].

The study also showed that participants who are not doing any physical exercise were 9.1 times more likely develop DPN compared with those who are doing physical exercise. This finding was supported by other studies [37, 39]. The posible explanation for the association of the factor and DPN could due to physical exercise can increase micro-vascular circulation, prevent aging, boosts immune system, gives strength to muscle and cardiovascular system as well as physiological well-being of the body so as to negatively affect the occurrence of DPN.

Respondents who diagnosed diabetes melitus more than 10 years of duration were 16.21 time more liikely develop DPN compared with those diagnosed for less than 5 years of duration.Which is supported by the studies[31,57,58,63,65,66]. This association can be explained by longer duration of diabetes with chronic hyperglycemia which causes activation of multiple biochemical pathways which induces oxidative stress in diabetic neurons and leads to nerve damage and neuronal ischemia [37] and it can also be explained by possible late diagnosis.

In the current study overweighted participants were 2.86 times more likely develop DPN as compared with healthy weighted participants. This finding was supported by other studies [39, 59, and 65]. The reason for this association is that the accumulation of fat in the body

can affect the circulation of blood in the body that blood flow to peripheral part become decreased resulting in ischemmic for peripheri blood vessels due to this peripheral neuron become damaged.

This study also revealed that diabetic patients with hypertension were 4.76 times more likely to develop DPN as compared with diabetic patients who were free from hypertension. This report was also supported by other studies[31,61,63,64,65]. The posible reason for the assoiation of the factor and DPN was that thypertension had negative effect on large and small nerve fibers result in develop of DPN.

The current study also revealed that type two diabetic patients with the habit of Alohol consumption were 2.69 times more likely develop DPN as compared with those who never consume alcohol.The posible explanation for the association of a variable was that alcohol could couse neuronal injury and neurodegeneration.

7. Conclusion

In the current study; the magnitude of DPN was higher as compared to other studies and age of patient (>=60 years), duration of DM (>10 years), not doing physical exercise, overweight, Hypertension, and history of alcohol consumption were significantly associated factors of DPN.

8. Limitation of the study

This study was conducted in a single study setting due to the nature of the case that it is complication of DM. due to that Debre Berhan Comprehensive Specialized Hospital was selected for this study. Lack of available examination tool to conduct pressure and vibration sense test that is used to predict the risk of foot ulcer. Due to that MNSI examination was not conducted. Due to lack of resource lab examination was not conducted in this study which is useful to analyze lipid profile and HbA1c level that might be used to identify farther associated factors. Duration of DM was estimated based on the first diagnosed time that may not be the beginning time of the disease. This might leads to bias.

9. Recommendation

The finding of the study pointed out, that the DM management plan of health institutions should consider DPN that aiming to reduce its occurrence. Health institutions, health care providers and DM patients themselves should give more attention to those associated factors. This can be prevented through Strengthen health education focusing on lifestyle modification to prevent and control Diabetic Peripheral Neuropathy.

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Annexes

Annex I: Information sheet

My name is Melese Shimelis, I am a post graduate student in DBU AWHSC Public health department and now I am conducting post graduate academic research.

Research topic: assessing the magnitude and associated factors of DPN among T2DM patients attending in DBCSH follow-up clinic, North Showa, Amhara Regional State.

Procedure and time: to present important information for study, I make interview with you using structured questioner and it takes about 15 mints.

Risk and Benefit of study for participant: except time it takes there is no any risk for you participating in the study and also there is no any payment to participate in the study. But the finding of this study may indicate important information for you and other patients. In addition you can get an awareness relating to DPN and associated factors.

Right and confidentiality of participants: participating in this study is based on voluntary. You have the right to decide whether or not to participate in study. If you don't want to respond any question, there is no obligation to respond that. In the information you give for us, there is no indication that shows your identity.

Are you volunteer to participate? 1. Yes 2. No

I would like thank you for your voluntariness

Participant's code:——————

Annex II: Consent Form

Address of the principal investigator:

Name: Melese Shimelis

Cell phone: 0910390665, E-mail: melebelete16@gmail.com

Are you satisfied with the information provided so far?

1. Yes…….. Continue to the next page

2. No …… I won't participate

In undersigning this document, I am giving my consent to participate in the study entitled as "Assessing the magnitude and associated factors of diabetic peripheral neuropathy among type 2DM patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia" I have been informed that the purpose of this study is to the magnitude and associated factors of diabetic peripheral neuropathy among type 2DM patients in Debre Berhan Comprehensive Specialized Hospital, North Showa, Ethiopia. I have understood that involvement of in this study is completely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve risks. I understood that Asrat Kassaw is the contact person if I have questions about the study or about my rights as a study participant.

Respondent's signature_____

Interviewer

Name_____ _Signature____ _____Date_____

Thank you!!!

Annex III: English version questionnaire

Part I: Socio demographic Characteristics

S.No	Question	Response	Remark
101	Age of study participants	————— in year	
102	Sex of study participants	1.Male 2.Female	
103	Marital Status of study participants	1.Single 2.Maried 3.Divorced 4.Widowd	
104	What is your Religion?	1.Orthodox 2.Muslim 3.Catholic 4.Protestant 5.Others	
105	Educational status of study participants	1. Unable to read and write 2. Read and write 3. Primary school 4.Secondary school 5. College and above	
106	What is your Occupation?	1.Employee 2.Merchant 3.Farmer 4.Housewife 5.Others, Specify_____	
107	Where is your residency?	1.Urban 2.Rular	
108	Is there a person who has DM in your family?	1.Yes 2.No	

PART II: Michigan Neuropathy Screening Instrument Question

A (200)	**History part of MNSI(To be completed by the person with diabetes)**		
201	Do you ever feel numbness in your leg/feet?	1. Yes 0. No	
202	Do you ever have any burning pain in your legs and/or feet?	1. Yes 0. No	
203	Are your feet too sensitive to touch?	1. Yes 0. No	
204	Do you get muscle cramps in your legs and/or feet?	1. Yes 0. No	
205	Do you ever have any prickling feelings in your legs or feet?	1. Yes 0. No	
206	Does it hurt when the bed covers touch your skin?	1. Yes 0. No	
207	When you get into the tub or shower, are you able to tell the hot water from the cold water?	0. Yes 1. No	
208	Have you ever had an open sore on your foot?	1. Yes 0. No	
209	Has your doctor ever told you that you have diabetic neuropathy?	1. Yes 0. No	
210	Do you feel weak all over most of the time?	1. Yes 0. No	
211	Are your symptoms worse at night?	1. Yes 0. No	
212	Do your legs hurt when you walk?	1. Yes 0. No	
213	Are you able to sense your feet when you walk?	0. Yes 1. No	
214	Is the skin on your feet so dry that it cracks open?	1. Yes 0. No	
215	Have you ever had an amputation?	1. Yes 0. No	

Part III: Behavioral characteristics

S.N (300)	Questions	Response	Remark
301	Have ever smoked cigarette?	1. Yes 2.No	
302	If your response is yes for **Qs** 301, are you currently smoking?	1. Yes 2. No	
303	Have you ever chewed Khat?	1. Yes 2. No	
304	If your response for **Qs** 303 is yes, are you chewing it now?	1. Yes 2. No	
305	Have you ever drunk alcohol beverage?	1. Yes 2. No	
306	If your response for **Qs** 305 is yes, are you		

	drinking it now?	1. Yes 2. No	
307	Do you do physical exercise?	1. Yes 2. No	
308	If your response for Q 307 is yes, about how many days a week is that?	1. every day 2. 2-3 days 3. 4-5 days 4. 1 day	

IV: Clinical characteristics

S.no (400)	Question	Response	Remark
401	How long have you known that you have diabetes?	————year or month	
402	Have you been told that you have other diagnosed comorbid disease?	1. Yes 2. No	
403	If your response for Q 402 is yes, what is its type?	1. hypertension 2. heart disease 3. renal disease 4. others————	
404	What type of drug are you taking for your diabetes?	1. Insulin 2. Noninsulin 3. Both	
405	How much was your blood sugar level before you eat a food?	————g/dl	
406	Height of patient	————Meters	
407	Weight of a patient	———— Kg	

Annex IV: Amharic Version of Questionnaire

አባሪ I: - መግለጫ

ሠላም ፡- ስሜ መለሰ ሽመልስ እባላለሁ። በደብረ ብርሃን ዩኒቨርሲቲ አስራት ወልደየስ ጤና ሳይንስ ካምፓስ በህብረተሰብ ጤና ት/ት ክፍል የድህረ ምረቃ ተማሪ ስሆን በስኪር ሕመምተኞች መካከል በነርቭ ጫፍ ችግርና ተዛማጅ ምክንያቶችን በተመለከተ ጥናት ለማድረግ በሚል ርዕስ የሁለተኛ ድግሪ ማሟያ የሚሆን ጥናትና ምርምር ዕየሰራሁ ዕገኛለሁ።

<u>የጥናቱ ርዕስ</u>

በአማራ ክልል ሰ/ሸ/ዞን ደብረ ብርሃን አጠቃላይ ስፔሻላይዝድ ሆስፒታል በሚገኙ ተመላላሽ የስኪር ሕመምተኞች መካከል የነርቭ ጫፍ ችግር ያለአባቸውን ብዛት ና ተዛማጅ ምክንያቶችን ጥናት ለማድረግ ነው።

<u>የአሠራር ሂደት እና የቆይታ ጊዜ</u>፡- ለጥናቱ ጠቃሚ መረጃን ለማቅረብ የተዋቀረ መጠይቅ ተጠቅሜ ቃለ መጠይቅ የማደርግ ሲሆን የቆይታ ጊዜው 15 ደቂቃ ያህል ይወስዳል።

<u>የጥናቱ አደጋ እና ጥቅም</u>፡- በዚህ ጥናት ውስጥ በመሳተፍዎ ከቆይታ ጊዜዎ ውጭ የሚደርስብዎ አደጋ የለም። በተመሳሳይ በዚህ ጥናት ውስጥ ለመሳተፍ ምንም ክፍያ አይኖርም ።ነገር ግን ከዚህ ጥናት የሚገኙ መረጃዎች ለእርስዎ እና ሌሎች ታካሚዎች አስፈላጊ መረጃዎችን ሊጠቁሙ ይችላሉ ። በሌላ በኩል ደግሞ የነርቭ ችግርና ተዛማጅ ምክንያቶችን በተመለከተ ብዙ መረጃዎችን መገንዘብ ይችላሉ ።

<u>የተሳታፊዎቹ መብትና ሚስጥራዊነት፡-</u> የዚህ ጥናት ተሳትፎ ሙሉ በሙሉ በፈቃደኝነት የሚደረግ ነው። በዚህ ጥናት ውስጥ ለመሳተፍ ወይም ላለመሳተፍ የመወሰን መብት አለዎት። ለመመለስ የማይፈልጉትን ማንኛውንም ጥያቄ የመመለስ ግዴታ የለብዎትም:: ለእኛ የሚሰጡን መረጃዎች ላይ እርስዎ መሆንዎን የሚያሳይ መረጃ አይኖርም ።

ለመሳተፍ ፈቃደኛ ነዎት 1. አወ 2. አይደለሁም

በጥናቱ ለመሳተፍ ፈቃደኛ ስለሆኑ ምስጋናየን አቀርባለሁ።

የጥናቱ ተሳታፊ መለያ ኮድ_____

ክፍል አንድ፡ አጠቃላይ መረጃ/ዳራ

መለያ ኮድ	መጠይቅ	መልስ	ምርመራ
101	እድሜዎ ስንት ነው (በዓመት)	----------	
102	ፆታ	1. ወንድ 2. ሴት	
103	የጋብቻ ሁኔታ	1. ያላገባ/ች 2. ያገባ/ባች 3. የተፋታ /የተፋታች 4. ባል/ሚስት የሞተባት/ችበት	
104	የሚከተሉት ሀይማኖት ምንድን ነው?	1. ኦርቶዶክስ 2. ካቶሊክ 3. ፕሮቴስታንት 4. ሙስሊም 5. ሌላ ካለ ይጥቀሱ--	
105	ከቤተሰብዎ ውስጥ ሌላ የስኪር ታማሚ አለ?	1. አወ 2. የለም	
106	የመኖሪያ ቦታዎ የት ነው?	1. ከተማ 2. ገጠር	
107	የት/ት ደረጃ?	1.ማንበብና መፃፍ የማይችል/ትችል 2.ማንበብናመጻፍ የሚችል/ትችል 3.የመጀመሪያ ደረጃ 4.ሁለተኛ ደረጃ 5.ኮሌጅና ከዛበላይ	
108	ስራዎ ምንድን ነው?	1.ተቀጣሪ 2.ነጋዴ 3.ግብርና 4.የቤትእመቤት 5.ሌላ_____	

ክፍል ሁለት፡ ሚቺጋን የነርቭ ስራ መቋረጥ መለያ መሳሪያ(መጠይቅ)

U (200)	የታሪክ መጠይቅ (በታካሚዎች የሚሞላ)	መልስ	ምርመራ
201	እግርዎን ደንዘዎት ያውቃል?	1. አወ 0. የለም	
202	በእግርዎ ላይ የሚያቃጥል ህመም ተሰምቶዎት ያውቃል?	1. አወ 0. የለም	
203	እግርዎ ሲነካ በቀላሉ ይሰማወታል?	1. አወ 0. የለም	
204	በእግርዎ ላይ የጡንቻ መሸምቀቅ አጋጥሞዎት ያውቃል?	1. አወ 0. የለም	
205	በእግርዎ ላይ እንደሾህ ጠቅ ጠቅ የሚያረግ ስሜት ተሰምቶዎት ያውቃል?	1. አወ 0. የለም	
206	አንሶላ ወይም ብርድልብስ ቆዳዎን ሲነካዎት የህመም ስሜት ይሰማወታል?	1. አወ 0. የለም	
207	ወደ መታጠቢያ ገንዳ ወይም ገላ መታጠቢያ ሲገቡ ሙቅ እና ቀዝቃዛ ውሃ መሆኑን መለየት ይችላሉ?	0. አወ 1. የለም	
208	በእግርዎ ላይ የተከፈተ ቁስለት አጋጥሞዎት ያውቃል?	1. አወ 0. የለም	
209	ዶክተርዎ በስኪር በሽታ ምክንያት የመጣ የነርብ መደንዘዝ አለብዎ ብሎ ነግሮዎት ያውቃል?	1. አወ 0. የለም	
210	ብዙ ጊዜ የድካም ስሜት ይሰማዎታል?	1. አወ 0. የለም	
211	ማታ ማታ የህመም ስሜትዎ ይጨምራል?	1. አወ 0. የለም	
212	በሚጓዙበት ሰዓት እግርዎን የህመም ስሜት ይሰማወታል?	1. አወ 0. የለም	

213	በሚጓዙበት ሰዓት የእግርዎን ስሜት ያውቁታል?	0. አወ 1. የለም	
214	የእግርዎ ቆዳ እስኪሰነጣጠቅ ድረስ የመድረቅ ሁኔታ አጋጥሞት ያውቃል?	1. አወ 0. የለም	
215	በስኪር ህመም ምክንያት እግርዎ እንዲቆረጥ ተደርጓል?	1. አወ 0. የለም	

ክፍል ሶስት፡ የባህርይ መለኪያ ጥያቄዎች

መለያ ቁጥር	ጥያቄ	መልስ	ምርመራ
301	ሲጋራ አጭሰው ያውቃሉ	1. አወ 2. የለም	
302	ለተራ ቁጥር 301መልስዎ አወ ከሆነ አሁንም ያጨሳሉ?	1. አወ 2. የለም	
303	አልኮል ጠጥተው ያውቃሉ?	1. አወ 2. የለም	
304	ለተራ ቁጥር 303 መልስዎ አወ ከሆነ አሁንም ይጠጣሉ?	1. አወ 2. የለም	
305	ጫት ይቅማሉ?	1. አወ 2. የለም	
306	ለተራ ቁጥር 305 መልስዎ አወ ከሆነ አሁንም ይቅማሉ?	1. አወ 2. የለም	
307	የአካል ብቃት እንቅስቃሴ ይሰራሉ?	1. አወ 2. የለም	
308	ለተራ ቁጥር 307 መልስዎ አወ ከሆነ በሳምንት ስንት ቀን ይሰራሉ?	1. በየቀኑ 2. ከ 2-3 ቀን 3. ከ 4-5 ቀን 4. 1 ቀን	

ክፍል አራት፡ በህክምና የተለዩ ምርመራዎች መጠይቅ

ተቁ(400)	መጠይቅ	መልስ	ምርመራ
401	ስኪር ዕንዳለበዎ ካወቁ ምን ያክል ጊዚየ ሆነዎት?	_____ዓመት/ወር	
402	በህክምና የተረጋገጠ ሌላ ተጋዳኝ በሽታ አለብዎ ተብሎ ያውቃሉ?	1. አወ 2. የለም	
403	ለተራ ቁጥር 402 መልስዎ አወ ከሆነ የበሽታው ዓይነት ምን ነበር?	1. የደም ግፊት 2. የልብ በሽታ 3. የኩላሊት በሽታ 4. ሌላ ካለ ይገለጽ	
405	ምን አይነት መድሐኒት ነው የሚወስዱት?	1. የሚወጋ 2. በአፍ የሚወሰድ	

		3. ሁለቱንም	
406	ምግብ ሳይወስዱ የስኪርዎ መጠን ምን ያህል ነበር?	_____ግም/ዲል	
407	ቁመትዎ	_____ሜትር	
408	ክብደትዎ	_____ኪግ	

Annex V: Declaration

This is the declaration of the student as the work is their original work and any of the information presented are true.

Annex VI: Assurance of Principal Investigator

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of AWHSC, in effect at the time of grant is forwarded as the result of this application.

Name of the investigator: _____Date. _____ Signature _____