

ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE



**DYSLIPIDEMIA AND ITS ASSOCIATED RISK FACTORS AMONG ADULT TYPE-2
DIABETIC PATIENTS ON FOLLOW UP AT TIKUR ANBESSA SPECIALIZED
HOSPITAL: A CLINIC BASED CROSS SECTIONAL STUDY**

BY:

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Assessment of dyslipidemia and its associated risk factors among adult type-2 diabetic patients on follow up at Tikur Anbessa Specialized Hospital: a Hospital based cross sectional study, 2021

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DECEMBER, 2021
ADDIS ABABA, ETHIOPIA

Declaration

This is to certify that the thesis entitled Assessment of dyslipidemia and its associated risk factors among adult type-2 diabetic patients on follow up at Tikur Anbessa Specialized Hospital. A Hospital based cross-sectional study was carried out by my self and has not been submitted in part or in full for any other degree or university

The thesis comprises only my original work for specialty certificate in internal medicine .The thesis is submitted for the qualification of “specialty in internal medicine “compiles with regulations of the university and meets the accepted standards wth respect to originality and quality.

Name: Wondwosen Addis signature_____date_____

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TABLE OF CONTENTS

ACKNOWLEDGMENT.....	i
TABLE OF CONTENTS.....	ii
LIST OF TABLES.....	iv
LIST OF FIGURES	v
ABBREVIATIONS	vi
ABSTRACT.....	vii
1. INTRODUCTION	1
1.1 Background	1
1.2 Statement of the problem	2
1.3 Significance of the study.....	2
2. LITERATURE REVIEW	3
2.1 Prevalence of dyslipidemia in T2DM patients.....	3
2.2 Associated risk factors of dyslipidemia in T2DM	4
3. OBJECTIVES OF THE STUDY	5
3.1. General objectives	5
3.2. Specific objectives.....	5
4. METHODS AND MATERIALS.....	6
4.1 Study setting.....	6
4.2 Study period	6
4.3 Study Design	6
4.4 Source and study population	6
4.5 Eligibility criteria	6
4.6 Sample Size Determination.....	7
4.7 Sampling techniques and sampling procedure	7
4.8 Study variables	7
4.9 Data collection techniques	8
4.10 Data quality and management.....	9
4.11 Data processing and Analysis	10
4.12 Operational definition	10
4.13 Ethical Considerations.....	11
4.14 plan for dissemination of research finding.....	11

5. RESULT	12
5.1 Socio-demographic characteristics of participants.....	12
5.3 Lipid profile and other biochemical results.....	14
5.4 Patterns of lipid profile.....	15
5.5 Prevalence of Dyslipidemia	17
5.5 Factors associated with dyslipidemia	17
6. DISCUSSION	19
7. LIMITATIONS OF THE STUDY.....	21
8. CONCLUSION AND RECOMMENDATION.....	22
REFERENCES	23
ANNEXES	27

LIST OF TABLES

Table 1 : Socio-demographic characteristics of participants to assess the prevalence and associated factors of dyslipidemia among adult type 2 diabetes patients attending in TASH diabetic clinic in 2021.	12
Table 2: Life style and comorbiditis of study participants to assess the prevalence and associated factors of dyslipidemia among patients with type 2 diabetes attending in TASH diabetic clinic, 2021	13
Table 3: Lipid profile and other biochemical results of adult type 2 diabetes patients attending in TASH diabetic clinic, 2021	14
Table 4: Bivariate and multivariate analysis to identify factors of dyslipidemia among adult T2DM patients in TASH, 2021.....	18

LIST OF FIGURES

Figure 1: Total Cholesterol level of study participants in TASH among type 2 DM patients, in 2021	15
Figure 2: LDL level of study participants in TASH among type 2 DM patients, in 2021	15
Figure 3: HDL level of study participants in TASH among type 2 DM patients, in 2021	15
Figure 4: Serum triglyceride level of study participants in TASH among type 2 DM patients, in 2021	16
Figure 5: Prevalence of Dyslipidemia in TASH among type 2 DM patients, in 2021	17

ABBREVIATIONS

AAU	Addis Ababa University
AOR	Adjusted Odds Ratio
BMI	Body Mass Index
COR	Crude Odds Ratio
CI	Confidence Interval
CVD	Cardiovascular Disease
FBS	Fasting Blood Sugar
HDL	High Density Lipoprotein
HTN	Hypertension
LDL	Low Density Lipoprotein
TASH	Tikur Anbessa Specialized Hospital
WHO	World Health Organization

ABSTRACT

Background: Dyslipidemia is one of the major modifiable risk factors for cardiovascular diseases (CVD) in a type-2 diabetic (T2DM) patient. Dyslipidemia in T2DM patients is attributed to increased free fatty acid flux secondary to insulin resistance. Globally burden of dyslipidemia in diabetic patients is continuously increasing. Intensive management of dyslipidemia and its associated factors is required to prevent cardiovascular disease.

Objective: The study was designed to assess the prevalence and associated factors of dyslipidemia among adult patients with type 2 diabetes at Tikur Anbessa Specialized Hospital (TASH), Addis Ababa, Ethiopia.

Method: An institution-based- cross-sectional study was conducted from July 10 to November 10, 2021. A convenience sampling technique was used to recruit 208 T2DM patients. Data on socio-demographic characteristics, behavioral, and clinical factors were collected using a structured questionnaire through face to face interview. Anthropometry and blood pressure were measured. Laboratory data were retrieved from patients chart. Data was entered and analyzed using SPSS version 25. To identify determinant factors of dyslipidemia, bivariate and multivariate binary logistic regression analyses were done. Statistical significance was considered at the level of significance of 5%, and adjusted odds ratio (AOR) with 95% confidence interval (CI) was used to present the estimates of the strength of the association.

Results: The overall prevalence of dyslipidemia among study participants was 78.4%. Hypertriglyceridemia was found in 42.8%, hypercholesterolemia in 25.1%, high low-density lipoprotein in 30.3%, and low high-density lipoprotein in 36.5% study participants. Longer duration of diabetes & physical inactivity were significantly associated with dyslipidemia. Patients who have more than 10 years duration of diabetes had five times (95% CI, 1.24-20.149) more risk of dyslipidemia as compared with less than 5 years duration. Type2 DM patients who don't perform moderate physical activity had nearly three times (95% CI, 1.077-7.767) increased risk of dyslipidemia as compared with those who perform 5-7 days moderate physical activity in a week.

Conclusion: A high prevalence of dyslipidemia was found among T2DM patients in the study area. Physical inactivity and longer duration of diabetes were significantly associated with dyslipidemia among T2DM patients. Clinicians need to screen, treat, and educate diabetic patients about dyslipidemia and its associated risk factors.

Key words: *Type 2 diabetes mellitus, prevalence, Dyslipidemia, risk factors, cross-sectional study*

1. INTRODUCTION

1.1 Background

Diabetes is a chronic illness characterized by elevated levels of blood glucose, accompanied by disturbed metabolism of fats and proteins, due to lack of insulin production by the pancreas or the inability of the cells to effectively use the insulin that is being produced. (1). Diabetes mellitus is a global public health problem, affected nearly half a billion people (463 million) in the world and around 5 million adult people died from diabetes and diabetes-related complications in 2019(2).

Globally, about 1 in 11 adults have diabetes mellitus (90% have type 2 diabetes mellitus (T2DM)), and Cardiovascular complication is one of the leading causes of diabetes-related morbidity and mortality in T2DM (3, 4).Dyslipidemia is one of the major risk factors for CVD in a T2DM patient(5). A study conducted in Ethiopia found that dyslipidemia, physical inactivity, and hypertension were the most common cardiovascular disease risk factors among diabetic patients (6).

In T2DM patients the most common pattern of dyslipidemia was hypertriglyceridemia, reduced HDL cholesterol levels, and an increased concentration of LDL particles (7,8). Dyslipidemia is involved in T2DM due to increased free fatty acid flux secondary to insulin resistance. The etiology leading to hypertriglyceridemia in T2DM directly relates to insulin resistance and hyperglycemia, which results in an overproduction of triglyceride-rich lipoproteins from the liver, decreased clearance of triglyceride-rich lipoproteins, and, in some cases, an altered postprandial lipoprotein metabolism (9,10).

Insulin resistance in a T2DM is associated with reduced inhibition of hormone-sensitive lipase in adipose tissue by insulin, resulting in an increased lipolysis, and thereby augmented portal flux of free fatty acid to the liver. Elevated free fatty acids can directly disrupt the activity of lipoprotein lipase by causing it to detach from the endothelial surface (11). The increased hepatic availability of free fatty acids leads to decreased degradation of apoB, thus causing an overproduction of very-low-density lipoprotein in insulin-resistant states. An increase in triglyceride-rich lipoproteins is commonly associated with a reduction in HDL and an increase in small dense LDL levels (4,12).

1.2 Statement of the problem

Globally burden of dyslipidemia in diabetic patients is continuously increasing due to increased consumption of unhealthy diets, reduced physical activity, and urbanization as well as obesity (12–14). The studies reported, 85.1%, 78.9%, and 80%, of the burden of dyslipidemia in Kenya (14), Thailand (15), and Jordan (16) respectively in type 2 DM patients.

Dyslipidemia is prevalent among type 2 diabetic patients in different parts of Ethiopia, studies showed 90.6% in eastern Ethiopia (6), 65.6% in Durame, southern Ethiopia (17), 63.5% in Jimma, south western Ethiopia (18). The major risk factors for dyslipidemia were hypertension, high body mass index, aging, high FBS, physical inactivates, and longer duration of diabetes mellitus (17,18,).

Without timely and effective control, the rate of dyslipidemia will continue to rise, leading to a heavy burden of CVD. Therefore, it is important to identify the potential associated factors and reduce the burden of CVD.

1.3 Significance of the study

Due to high prevalence and related complication of dyslipidemia in T2DM patients, timely detection and characterization of dyslipidemia in T2DM patients help clinicians to estimate future risk of cardiovascular disease and take appropriate preventive measures. Determination of associated factors can help to reduce occurrence as well as proper management of these factors which prevents future complications and morbid effects of diabetic patients. This study assessed determinants of dyslipidemia among T2DM patients at TASH diabetic clinic.

2. LITERATURE REVIEW

2.1 Prevalence & pattern of dyslipidemia in T2DM patients.

Studies in different parts of the world showed high prevalence of dyslipidemia in T2DM patients (16,19,20). Multicenter study in endocrine clinics of china showed the prevalence of dyslipidemia is high(67.1%), and the study also showed awareness, treatment, and control of dyslipidemia are relatively low in Chinese T2DM patients(21). A study done at Saudi Arabia which assessed prevalence and associated factors of dyslipidemia showed 66.5% prevalence of dyslipidemia in T2DM(22). Of the sampled outpatients, 47.8% had high TC levels, 39.0% had high LDL-C, 35.5% had low HDL-C, 42.8% had high TG levels, and 66.5% had a minimum of one abnormal lipid level (dyslipidemia). African studies also showed high prevalence of dyslipidemia among T2DM patients. In a Study done at north western Nigeria prevalence is 69.3%(23),in this study mixed dyslipidemia of high triglyceride (TG) and high low-density lipoprotein cholesterol (LDL-C) was present in 41.0%; high TG and low high-density lipoprotein cholesterol (HDL-C) in 2.8%; and high LDL and low HDL in 2.5%. Atherogenic dyslipidemia, isolated hypercholesterolemia and isolated low HDL-cholesterol were present in 3.4%, 2.5% and 23.6% respectively . In a study done among diabetic outpatients in Ghana the prevalence of dyslipidemia, was 63.8%(24).A study done in western cape ,south Africa, showed dyslipidemia prevalence of 89% (25). In this study Out of the 100 patients, 56%, 64%, 61%, and 65% were recorded to have high total cholesterol (TC), hypertriglycemia, increased low-density lipoproteins cholesterol (LDL-C), and reduced high-density lipoproteins cholesterol (HDL-C), respectively. In male diabetic patients, a marked prevalence of (94%) dyslipidemia was noted, of which 52% were affected by high TC , with 70% having a high level of triglyceride (TG) , while 60% had a high LDL-C (3.1–5.5 mmol/L), and 78% low HDL-C . In comparison, 84% of diabetic females had dyslipidemia.

In Ethiopia a cross sectional study done at Hawassa university hospital showed significantly high prevalence of lipid abnormalities in T2DM patients (26). The most common dyslipidemia in this study was high level of serum LDL followed by hypercholesterolemia and hypertriglyceridemia, among all of the diabetic patients, 34.9% had high serum LDL, 34.6% had hypercholesterolemia, 29.8% had hypertriglyceridemia and 12.2% had low HDL Another cross sectional study done at Durame hospital, southern Ethiopia showed dyslipidemia prevalence of 65.6% with Individual lipid abnormality of elevated LDL-C, TC, TG, and reduced HDL-C in 43.8%, 23.7%, 40.6%, and 41.9% of study subjects(17).

South western Ethiopian study done at Jimma university hospital showed dyslipidemia prevalence of 68.1%(27). Isolated lipid profile abnormality of hypertriglyceridemia was found in 48%, hypercholesterolemia in 13.7%, high level of low-density lipoprotein (LDL-C) in 28.6%, and low level of high-density lipoprotein (HDL-C) in 50.8% study participants.

2.2 Associated risk factors of dyslipidemia in T2DM

Poor glycemic control was strongly associated with dyslipidemia in a study done at Kuwait (28). Another study also showed significant association of dyslipidemia with glycemic control(29). In Saudi Arabian study the risk factors associated with dyslipidemia were an age of >40 years ,family history of T2DM , having had T2DM for >7 years , and overweight , or obesity (22).

Based on a study done at Turbo sub-country Kenya Employment status, BMI, FBS and physical inactivity are important factors associated with dyslipidemia(30). In this study physical inactivity was significantly associated with Dyslipidemia with [OR 4.8; (95% CI 1.1-21.2); p=0.04] .Being women,intake of fatty diet,obesity and lack of physical exercise had significant association with dyslipidemia in one Rwandan study done at one district hospital in Kigali city(31).

In Ethiopia a cross sectional study done at southern Ethiopia ,Durame Hospital showed that prevalence of dyslipidemia was significantly associated with high BP, high body mass index, aging, and longer duration of diabetes mellitus(17) .In this study diabetic patients with duration between 6–10 years and >10 years were, respectively, ~8.5 times (AOR =8.5; 95% CI =2.405–30.258) and 13.8 times (AOR =13.8; 95% CI =3.080–61.973) more likely to develop dyslipidemia compared with lower duration.In another prospective study done at Jima university hospital, south-west Ethiopia being in an age group ≥ 30 years, physical inactivity, being obese, and high blood pressure(27). Older T2DM patients (age ≥ 30 years) were ~ 4 times more likely to develop dyslipidemia (AOR: 3.9, 95% CI: 1.6–9.48) than lower age groups. Diabetic patients who are physically inactive had higher odds of dyslipidemia (AOR: 2.46, 95% CI: 1.3–4.5) than physically active diabetic patients. Obese T2DM patients were more likely to develop dyslipidemia (AOR: 5.6, 95% CI: 1.3–23.9) compared to non-obese diabetic patients. Hypertensive T2DM patients had higher odds of dyslipidemia compared to non-hypertensive patients (AOR: 2.65, 95% CI: 1.4–4.9). Diabetic patients with higher blood glucose values were 3 times more likely to develop dyslipidemia (AOR: 3.1, 95% CI: 1.3–7.2) than those with lower blood glucose values.

3. OBJECTIVES OF THE STUDY

3.1. General objectives

- To assess dyslipidemia and its associated risk factors among adult patients with type 2 diabetes mellitus on follow up at diabetic clinic in Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia.

3.2. Specific objectives

- To assess prevalence of dyslipidemia among T2DM patients in the study area
- To determine pattern of lipid abnormalities among T2DM patients in the study area
- To identify factors associated with dyslipidemia among T2DM patients in the study area

4. METHODS AND MATERIALS

4.1 Study setting

The study was conducted in the diabetic clinic of Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. Tikur Anbessa Specialized Hospital is the largest tertiary referral hospital in Ethiopia. It is also the main teaching hospital for the College of Health Sciences, Addis Ababa University. The hospital launched digital record system since 2018 where in the clinical data and other pertinent profiles of the patients be stored and retrieved when needed.

It has several specialty clinics providing service for more than half a million clients from all corners of the country. The diabetes clinic, where this study was done, serves patients with diabetes on all working days of the week. This clinic provides outpatient services to about one thousand patients a month.

4.2 Study period

It was conducted from July 10 to November 10 ,2021

4.3 Study Design

An institution based cross sectional study design was used for this study.

4.4 Source and study population

The source population comprises all patients with type 2 diabetes attending the diabetic clinic in TASH
The study population is patients with type 2 diabetes attending the diabetic clinic in TASH during the study period.

4.5 Eligibility criteria

4.5.1 Inclusion criteria

- All type 2 diabetes mellitus patients.
- Age>18 years old
- Give verbal consent for interview.

4.5.2 Exclusion criteria

- Those patients with incomplete medical records.
- Pregnant mothers because of difficulty of interpreting anthropometry
- Those patients taking lipid lowering drugs

4.6 Sample Size Determination

Based on previous study dyslipidemia prevalence among T2DM patients 85.1%(14).based on this sample size will be calculated as follows

$$n = \frac{Z_{\frac{\alpha}{2}}^2 P (1 - P)}{d^2}$$

Where;

n = required sample size

$Z_{\alpha/2}$ = critical value for normal distribution at 95% confidence interval= 1.96 ($\alpha = 0.05$).

P = Proportion = 68%

d = margin of error= 5%

$$\text{So, } n = \frac{(1.96)^2 * (0.85)(1-0.85)}{(0.05)^2} = 197$$

Taking 5% non-responders rate, a total sample will be **208**

4.7 Sampling techniques and sampling procedure

A convenience sampling technique was used.

4.8 Study variables

4.8.1 Dependent variable

- Presence of dyslipidemia

4.8.2 Independent variables

- Socio demographic variables: age, sex, educational status, marital status, occupation, household income and residence.

- Life style factors: cigarette smoking, alcohol use, diet, physical activity
- Clinical and laboratory measures:
History of HTN, duration of DM, BMI, waist circumference, hemoglobin A1C.

4.9 Data collection techniques

Data on socio-demographic and behavioral factors was collected by face to face interview using “WHO STEPS Instrument for Chronic Disease Risk Factor Surveillance (32). Data on clinical and laboratory profiles of the participants was obtained through review of digital records. Once the data was collected from the record, it was marked to prevent duplication of the information. A structured questionnaire was prepared in English and translated to Amharic. Finally, it was translated back to English to check its consistency.

Data was collected by 4 trained BSc nurses. Besides, anthropometric data including BP, BMI & waist circumference was collected by direct measurement as described below. Appropriate explanation was given on definition of some terms, purpose and importance of the research to participants.

Anthropometric and BP Measurements

Blood pressure was measured using mercury sphygmomanometer (adult size) and stethoscope. BP was taken in sitting position from the left arm with feet on the floor and arm supported at heart level after the patient rested for at least 5 minutes. Those patients who have taken caffeine during the hour preceding the reading were let to stay for at least 1 hour from the time of the event since it may affect the BP readings and falsely elevate the result. To reduce inter-observer bias and within patient variability, 3 measurements were taken 2 to 3 minutes apart, and the average value was used for the analysis.

Weight of participants was taken using standard beam balance and the scale was checked and calibrated to zero before each measurement. Participants’ weight was measured after removing heavy clothes and recorded to the nearest 0.1KG. Height measurement of participants was taken using the standard measuring scale. Participants’ took off their shoes, stand erect, and look straight in horizontal plane. The occiput, shoulder, buttocks, and heels touched measuring board and height was recorded to the nearest 0.1cm. To determine nutritional status, BMI was calculated, and categorized as under-weight ($BMI < 18.5$), normal weight ($BMI = 18.5-4.9$), over weight ($BMI = 25-29.9$) and obese ($BMI \geq 30$).

Waist circumference was measured at midpoint between lowest margin of the last palpable rib and the top iliac crest while the patient is breathing and standing. The result was categorized according to the WHO standards. The abnormal WC is ≥ 94 and ≥ 80 cm for male and female respectively.

4.10 Data quality and management

Training was given to data collectors to ensure data quality. The collected data was being checked for completeness and consistency on each day of data collection. Supervision and monitoring were made every day by the assigned supervisors and principal investigators.

4.11 Data processing and Analysis.

After data collection by using structured questionnaire each completed was checked for completeness and entered to SPSS software for analysis. Mean, median, standard deviation, and proportion were used to describe the data.

To identify determinants of dyslipidemia among type 2 diabetic patients, binary logistic regression analysis was done. First, bivariate analysis was done to identify the variables associated with dyslipidemia among T2DM patients. Variables with P-value < 0.2 in bivariate analysis were selected as candidate variables to be entered together in to multivariate analysis in order to control for confounders. Variables with p-value < 0.05 in multivariate analysis were employed as statistically significant and AOR with 95% CI was identified to measure the strength of the associations. The result was presented by using text, tables and graphs, and finally interpreted in to valuable information.

4.12 Operational definitions

- Hypertension: elevated average BP of 3 measurements (SBP $\geq$ 140 mmHg and/or DBP $\geq$ 90 mmHg) or taking antihypertensive medication.
- Vigorous-intensity physical activity -activity that causes large increases in breathing or heart rate for at least 10 minutes continuously.
- Moderate-intensity activity –activity that causes small increases in breathing or heart rate for at least 10 minutes continuously.
- Dyslipidemia: presence of at least one or more lipid profile abnormalities from the following; high TC $\geq$ 200 mg/dl, high LDL $\geq$ 130 mg/dl, high TG $\geq$ 150 mg/dl, or low HDL $\leq$ 40 mg/dl(32).
- Normal waist circumference –WC < 94 cm for males and < 80 cm for females.
- Abnormal waist circumference-WC $\geq$ 94 cm for males and $\geq$ 80 cm for females.
- Obesity –BMI $\geq$ 30
- Over weight-BMI 25-29.9

4.13 Ethical Considerations

The study was done in conformity with the ethical guidelines. Ethical approval was obtained from the department's research and ethics committee. The purposes and importance of the study were explained and informed verbal consent was obtained from each study participant. All study participants were informed that participation in this research project has no incentives nor direct benefits. Participants who were unwilling to participate in the study and those who wish to quit their participation at any stage were informed to do so without any restriction.

4.14 plan for dissemination of research finding.

The finding of this study will be submitted to AAU College of health science, and department of Internal Medicine. All effort will be made to publish it on peer reviewed journals.

5. RESULT

5.1 Socio-demographic characteristics of participants

About 208 type 2 diabetes patients are enrolled in this study. Majority of study participants were female. The mean age of participants was 55 years with standard deviation of 12.2. Nearly three forth of participants were in the age group of 40-70 years and minimum and maximum age was 28 and 85 years respectively (Table 1).

Table 1 : Socio-demographic characteristics of participants to assess the prevalence and associated factors of dyslipidemia among adult type 2 diabetes patients attending in TASH diabetic clinic in 2021.

Variable		Frequency	Percentage
Sex of study participant	Female	142	68.3
	Male	66	31.7%
Age category	18-40 years	24	11.6%
	40-70 years	164	79.2%
	> 70 yrs	19	9.2%
Residence of study participant	Urban	198	96.6%
	Rural	7	3.4%
Marital status	Single	7	3.4%
	Married	142	68.3%
	Divorced	29	13.9%
	Widowed	30	14.4%
Work status	government employee	19	9.6%
	self employed	34	17.3%
	house wife	94	47.7%
	Farmer	2	1.0%
	Other	48	24.4%
Educational level	no formal education	33	16.8%
	primary school	39	19.8%
	secondary school	74	37.6%
	higher education	50	25.4%

5.2 Life style and comorbidities of study participants

Around 42% of study participants have diabetic duration of greater than 10 years. More than half (60%) of participants had hypertension (**Table 2**).

Table 2: Life style and disease history of study participants to assess the prevalence and associated factors of dyslipidemia among patients with type 2 diabetes attending in TASH diabetic clinic, 2021

Variable		Frequency	Percentage
Diabetic duration	< 5 years	53	25.5%
	5-10 years	67	32.2%
	>10 years	88	42.3%
Hypertension	Yes	116	59.5%
	No	79	40.5%
Days of fruit diet in a week	<once a week	65	33.3%
	1-2 days	92	47.2%
	3-4 days	31	15.9%
	5-7 days	7	3.6%
Days of vegetable diet in a week	< once a week	17	8.7%
	1-2 days	90	46.2%
	3-4 days	58	29.7%
	5-7 days	30	15.4%
What type of oil is mostly used for meal preparation	vegetable oil	187	95.9%
	butter or ghee	7	3.6%
	other	1	0.5%
Does the study participant do vigorous physical activity	Yes	43	20.8%
	No	164	79.2%
Days of vigorous intensity activity in a week	0 days	164	79.2%
	1-2 days	7	3.4%
	3-4 days	4	1.9%
	5-7 days	32	15.5%
Days of moderate intensity activity in a week	0 days	70	35.9%
	1-2 days	11	5.6%
	3-4 days	37	19.0%
	5-7 days	77	39.5%
BMI category	< 18.5	1	0.5%
	18.5-24.9	77	39.5%
	25-29.9	68	34.9%
	>30	49	25.1%
Waist circumference range	Normal	27	13%
	Abnormal	181	87%

5.3 Lipid profile and other biochemical results

One fourth of the participants had hypercholesterolemia. About 1/3 of patients had elevated LDL level. The commonest lipid abnormality is hypertriglyceridemia (42.8%). The prevalence of isolated elevated LDL & TG level is 5.8% & 11.5% respectively. The median triglyceride value is 141 mg/dl (**Table 3**):

Table 3: Lipid profile, other lab results and treatment history of adult type 2 diabetes patients attending in TASH diabetic clinic, 2021

Variable		Frequency	Percentage
HGA1C level in %	< 7%.	37	19.5%
	> or= 7%	153	80.5%
FBS level by mg/dl	< 130 mg/dl	56	28.8%
	>or =130 mg/dl	149	71.2%
Total cholesterol level in mg/dl	< 200 mg/dl	155	74.9%
	>or= 200 mg/dl	52	25.1%
LDL-level in mg/dl	<70mg/dl	18	8.7%
	70-100 mg/dl	56	26.9%
	100-130 mg/dl	71	34.1%
	> 130 mg/dl	63	30.3%
HDL level in mg/dl	<or = 40 mg/dl	76	36.5%
	> 40 mg/dl	132	63.5%
Serum triglyceride level in mg/dl	<150 mg/dl	119	57.2%
	150-499 mg/dl	85	40.9%
	>or = 500 mg/dl	4	1.9%

5.4 Patterns of lipid profile

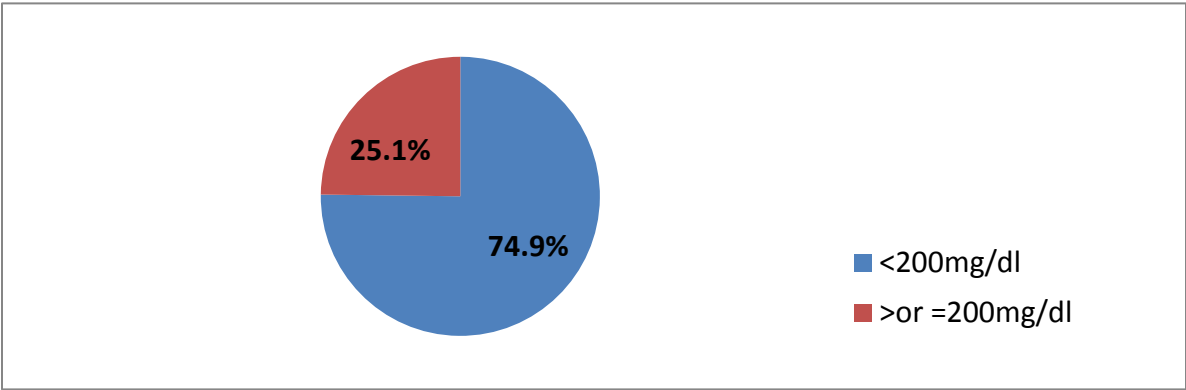


Figure 1: Total Cholesterol level of study participants in TASH among type 2 DM patients, in 2021

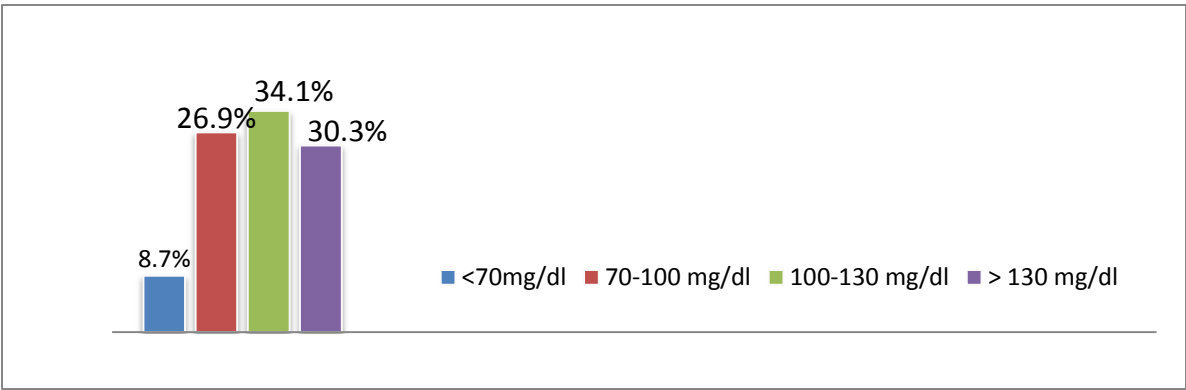


Figure 2: LDL level of study participants in TASH among type 2 DM patients, in 2021

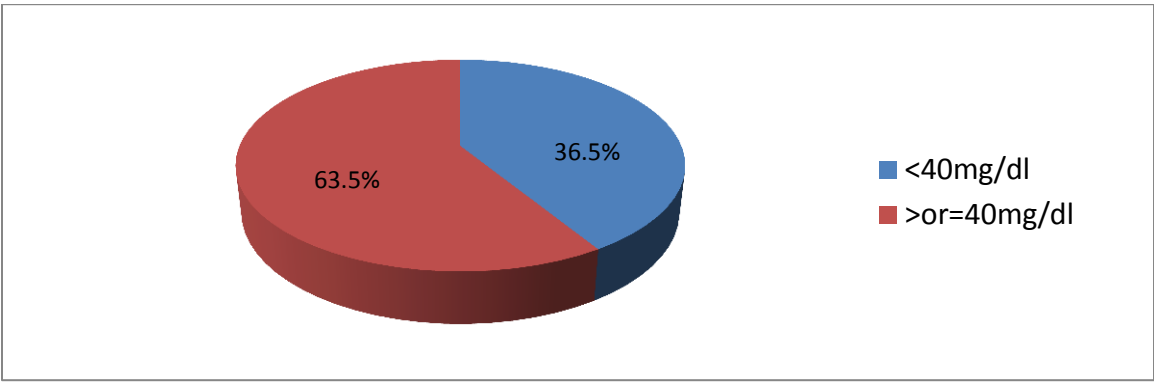


Figure 3: HDL level of study participants in TASH among type 2 DM patients, in 2021

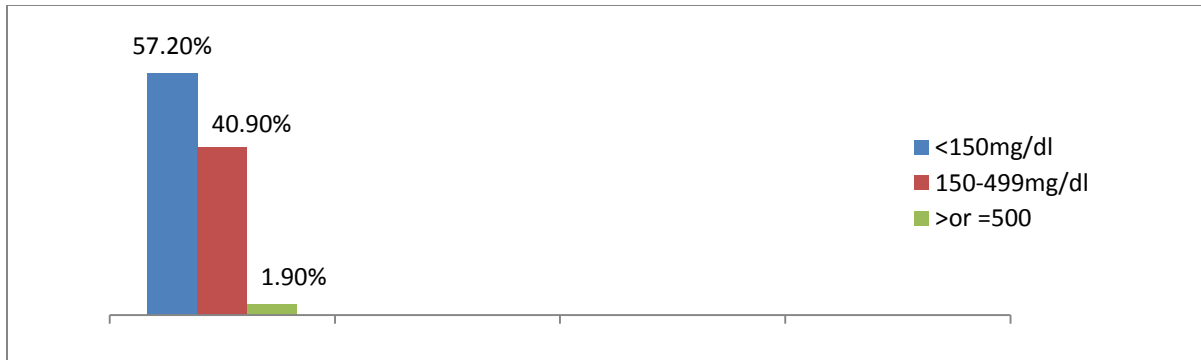


Figure 4: Serum triglyceride level of study participants in TASH among type 2 DM patients, in 2021

	Minimum	Maximum	Mean	Std. Deviation
TC in mg/dl	77	352	173.56	48.061
LDL-C in mg/dl	43	224	115.73	36.978
HDL - C in mg/dl	16	87	45.21	10.811
Triglyceride(mg/dl)	41	577	158.34	90.244

5.5 Prevalence of Dyslipidemia

More than three forth (78.4%) of type2 diabetic patients had dyslipidemia in the study area (95% CI 72.6-83.7) (**Figure 2**).

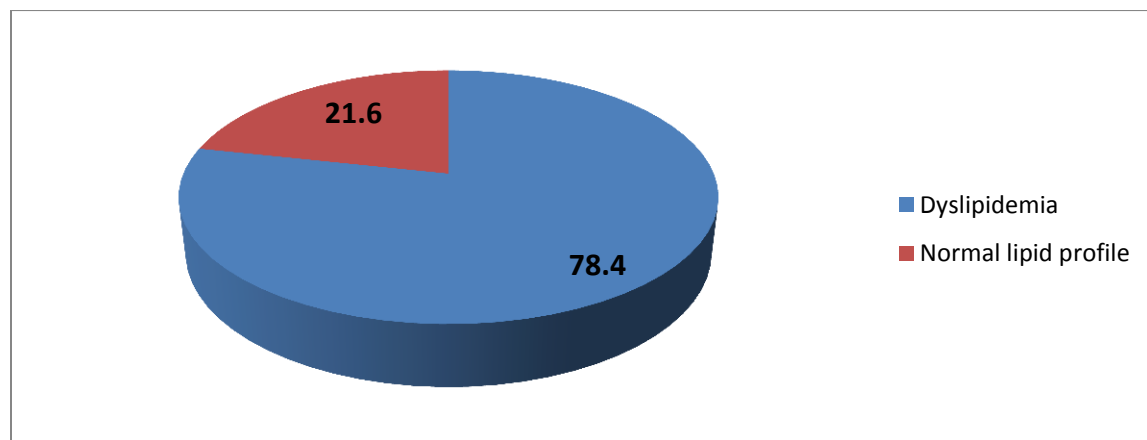


Figure 5: Prevalence of Dyslipidemia in TASH among type 2 DM patients, in 2021

5.5 Factors associated with dyslipidemia

In bivariate logistic regression analysis gender, diabetic duration, Vegetable consumption per week, lack of vigorous physical activity ,lack moderate physical activity were eligible (P value <0.2) to be fitted in multivariable logistic regression analysis. Since the eligible variables were few, back ward method of multivariable binary logistic regression model was applied to identify factors associated with dyslipidemia.

After adjusting other variables using multivariate binary logistic regression, duration of diabetics, lack of vigorous physical exercise , and lack of moderate physical activity were significantly associated with dyslipidemia. Patients who have greater than ten years duration of diabetes have, five times (95% CI, 1.24-20.149) more risk for dyslipidemia as compared with less than five years.

Type 2 DM patients who don't practice vigorous physical activity had 2.5 times increased risk of dyslipidemia as compared with patients who perform vigorous physical activity. Similarly, type2 DM patients who have no moderate physical activity were nearly three times (95% CI, 1.077-7.767) at increased risk for dyslipidemia as compared with those having 5-7 days moderate physical activity. (**Table X**)

Table 4: Bivariate and multivariate analysis to identify factors of dyslipidemia among adult T2DM patients in TASH, 2021

Variable		Dyslipidemia		COR	P	AOR	95% C.I	
		Yes	No				Lower	Upper
Sex	Male	56	10	1		1		
	Female	107	35	.546	.065	.316	.093	1.073
Age	18-40	18	6	1.07	.790	1.287	.201	8.237
	40-70	130	34	1.366	.257	2.197	.563	8.566
	>70 Years	14	5	1	.402	1		
Residence	Urban	135	43	1.91	.833	1.334	.092	19.426
	Rural	6	1			1		
DM- duration	< 5 years	40	13	1	.077	1		
	5-10 years	52	15	1.42	.186	2.118	.697	6.437
	>10 years	69	19	2.46	.024	4.998	1.240	20.149*
Hypertension	Yes	130	33	1.196	.819	1.095	.645	2.317
	No	33	12	1		1		
Vegetable consumption per week	< once a week	10	7	.343	.339	.418	.070	2.497
	1-2 days	21	16	1.215	.853	.878	.221	3.490
	3-4 days	44	15	.704	.196	.408	.105	1.588
	5-7 days	25	6	1	.334	1		
Vigorous physical exercise	Yes	26	17	1	.199	1		
	No	113	30	1.658	.032	2.673	1.653	6.687*
Moderate activity	0 days	63	14	1.89	.035	2.892	1.077	7.767*
	1-2 days	10	1	3.89	.270	3.621	.368	35.674
	3-4 days	30	8	1.46	.415	1.635	.502	5.326
	5-7 days	59	23	1	.168	1		
Waist-circumference	Normal	23	4	1.68	.401	.516	.111	2.412
	Abnormal	140	41	1		1		
HGA1 (%)	<7	28	9	1	.385	1		
	>or =7	122	31	2.538		2.114	.391	11.23

*Indicate variables which have significant association with dependent variable.

6. DISCUSSION

Dyslipidemia is one of the major modifiable risk factors for CVD in T2DM patients. The current study attempted to assess the prevalence of dyslipidemia and associated risk factors among T2DM patients at diabetic clinic of TASH.

The overall prevalence of dyslipidemia among T2DM patients in the current study was 78.4%. Physical inactivity and longer duration of diabetes were independent predictors of dyslipidemia in T2DM patients in this study. The individual lipid profile abnormality obtained in this was 25.1%, 42.8%, 30.3%, and 36.5% high TC, TG, LDL-C, and low HDL-C, respectively.

In the present study, prevalence of dyslipidemia was comparable with studies done in Thailand and Jordan. It is higher than the studies done in China (67.1%), Saudi Arabia (66.5%), Nigeria (69.3%), Ghana (63.8%), Durame hospital (65.6%), and Jimma (68.9%) (17,21-24,27). This difference may be due to physical activity and dietary differences. In the present study, prevalence of dyslipidemia was lower than study done in South Africa (89%) (25). This difference may be due to genetic differences.

Hypertriglyceridemia and low HDL level was the most frequent lipid abnormality found in this study. The hypertriglyceridemia found in this study is comparable with a study done at Saudi Arabia (42.8%) (22). Elevated triglyceride levels in T2DM might be due to increased production and decreased clearance of triglyceride-rich lipoproteins as a result of insulin resistance and hyperglycemia. The prevalence of high LDL-C obtained in this study was 30.3% and it is comparable with a study done in China (28%) and Jimma Ethiopia (28.6%) (21, 27). However the prevalence is lower than a study done in Saudi Arabia (35.5%) and Hawasa, Ethiopia (34.9%) (22, 26). This could be due to use of different LDL cut of value to define dyslipidemia.

The current study revealed that there is a statistically significant association between dyslipidemia and physical inactivity. Those who don't perform vigorous physical activities were about 2.5 times at increased risk of dyslipidemia as compared with those who perform vigorous physical activity. Those who don't do any form of moderate physical activity had 3 times more risk of dyslipidemia than patients who practiced 5 -7 days of moderate physical activity. Similar findings were reported from in Kenya, Rwanda and Jimma Ethiopia (30, 31, 27). In the Kenyan study physical inactivity was significantly associated with Dyslipidemia with [AOR 4.8; (95% CI 1.1-21.2); p=0.04].

In the current study, longer duration of diabetics, was significantly associated with dyslipidemia. Patients with diabetic duration of more than 10 years had 5 times increased risk of dyslipidemia as compared with less than 5 years duration. Similar observations were found in Saudi Arabia and Durame, Ethiopia (17, 22). The latter study showed diabetic patients with duration between 6–10 years and >10 years were, respectively, ~8.5 times (AOR =8.5; 95% CI =2.405–30.258) and 13.8 times (AOR =13.8; 95% CI =3.080–61.973) more likely to develop dyslipidemia compared with lower duration.

In other studies aging, obesity, poor glycemic control, being female & high BP were significantly associated with dyslipidemia (17, 22, 31) but not in the current study.

7. LIMITATIONS OF THE STUDY

As the research design was cross-sectional, no causal associations could be inferred between dyslipidemia and the risk factors it examined.

Because the results were obtained from data which was gathered from a non-random convenience sample, the extent to which the results can be regarded as representative of the local population or of other geographic locations remains unclear.

Laboratory data was retrieved from patients chart.

8. CONCLUSION AND RECOMMENDATION

A high prevalence of dyslipidemia was found among T2DM patients in the study area. Physical inactivity and longer duration of diabetes were significantly associated with dyslipidemia among T2DM patients.

Clinicians need to screen, treat, and educate diabetic patients about dyslipidemia and its associated risk factors..

Type 2 diabetes patients should be regularly advised to do moderate as well as vigorous physical activity.

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ANNEXES

Annex 1: Assurance of Principal Investigators

My name is Wondwosen Addis. I am the researcher. I put my signature below to confirm that I take over the responsibility for the scientific, ethical and technical conduct of the research project and for provision of progress reports for all stakeholders of the research project.

Signature: _____ Date:-----

Contact Address of PIs:

Phone number: +251967770892

Email: wondosenad601@gmail.com

TASH, ADDIS ABABA, ETHIOPIA

Annex 2: information and consent sheet

Information sheet

Dear participant,

The purpose of this study is to assess the dyslipidemia and associated factors among type 2 diabetes patients. Since the findings of this study is very important in determining future decisions regarding management of dyslipidemia and prevention of CVD, I kindly request your genuine participation.

You have full right to participate throughout, or to discontinue at any time, or never participate in the study. The information you give will be used only for the purpose of this study confidentially.

Thank you for your valuable time.

Consent form

I, the undersigned, have heard the information in the information sheet and understood the purpose and significance of the study.

I agree to participate in the research voluntarily with the hope of contributing to the effort to assess dyslipidemia and associated factors among type 2 diabetes patients

Signature----- date-----

Annex 3: Questionnaire

English version

MRN_____Date of interview_____interviewer name_____

Ser. No	Questions	Response and coding	Skip
Section 1: demographic data			
101	How old are you?	_____yrs	
102	Sex	1. Male 2. Female	
103	Where is your residence?	1. Urban 2. Rural	
104	What is your current marital status?	1. Single 2. Married 3. Divorced 4. Widowed	
105	Which of the following best describes your main work status over the past 12 months?	1. Government employee 2. Self-employed 3. House wife 4. Farmer 5. Others (specify).....	
106	What is your level of education	1. No formal education 2. Primary school 3. Secondary school 4. Higher education	
107	What is your average household monthly income?	_____(Birr)	

Section 2: cardiovascular history			
201	How long have you been diagnosed with diabetes	_____ years	
202	Have you been diagnosed with hypertension	1,yes 2,No	301
203	If yes to Q20, for how long	_____ years	

Section 3: life style factors			
DIET: The next questions ask about diet that you usually eat. As you answer these questions, please think of a typical week in the last year.			
301	In a typical week, on how many days do you eat fruit ?	_____ days/wk	
302	How many servings of fruit do you eat on one of those days?	_____ servings/day	
303	In a typical week, on how many days do you eat vegetables?	_____ days/wk	
304	How many servings of vegetables do you eat on one of those days?	_____ servings/day	
305	What type of oil or fat is most often used for meal preparation in your household?	1. Vegetable oil 2. Cholesterol oil 3. Butter or ghee 4. Other specify.....	
306	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.	_____ meals /wk	
Physical Activity: Next I am going to ask you about the time you spend doing different types of physical activity in a typical week..			
307	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?	1.Yes____ 0. No____	321

308	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	_____days	
309	How much time do you spend doing vigorous-intensity activities at work on a typical day?	_____:____Hr:min /day	
310	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously?	1. Yes____ 0. No____	324
311	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	_____days	
312	How much time do you spend doing moderate-intensity activities at work on a typical day?	_____:____Hr:min /day	
Now I would like to ask you about sports, fitness and recreational activities (leisure)			
313	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football or lifting weight] for at least 10 minutes continuously?	1. Yes____ 0. No____	330
314	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities?	_____days	
315	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	_____:____Hr:min /day	
316	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart	1. Yes____ 0. No____	333

	rate such as brisk walking, [cycling, swimming, volleyball] for at least 10 minutes continuously?		
317	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	_____ days	
318	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	____:____ Hr:min	
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping.			
319	How much time do you usually spend sitting or reclining on a typical day? (Sedentary behavior)	____:____ Hr:min	
320	How many hours of actual sleep do you get in a 24-hour period?	_____ hr	

Section 4: physical exam			
401	Office BP	_____ mmHg	
402	Weight	----- kg	
403	Height	_____ cm	
404	Waist circumference	_____ cm	
405	Hip circumference	_____ cm	
Section 5: lab tests			
501	HgA1c	_____ %	
502	FBS	_____ mg/dl	
503	Total cholesterol		
504	LDL-C		
505	HDL-C		
506	Triglycerides		

507	Serum creatinine		
508	Albuminuria	1. None 2. +1 3. +2 4. +3	

Section 6: current medications		Specify drug, dose, duration	
601	ant diabetics		
602	Antihypertensive		
603	others		

የአማርኛ መጠይቅ

የጥናቱ ተሳታፊ ኮድ.....የተጠየቀው ቀን.....

ተ.ቁ	ጥያቄዎች	መልስ እና ምስጢር ቁጥር	ዝላል
	አጠቃላይ መረጃ		
101	ዕድሜዎ ስንት ነው?	_____ ዓመት	
102	ጾታ (በማየት ይመዝግቡ)	1. ወንድ 2. ሴት	
103	መኖሪያዎ የትነው?	1. ከተማ 2. ገጠር	
104	የአሁኑ የጋብቻ ሁኔታዎ ምንድነው?	1. ያለገባ/ች 2. ያገባ/ች 3. የተፋታ/ች 4. ባል/ሚስት የሞተበት	
105	የሥራዎ ሁኔታ ባለፉት 12 ወራት ምንድን ነበር?	1. የመንግስት ሠራተኛ 2. የግል ሥራ 3. የቤት እመቤት 4. አርሶአደር 5. ሌላ (ጥቀስ)_____	
106	የትምህርት ደረጃዎች ምንድን ነው?	0. አልተማርኩም 1. የመጀመሪያ ደረጃ 2. ሁለተኛ ደረጃ 3. ከፍተኛ ትምህርት	
107	የቤታችሁ የወር ገቢ ምን ያህል ነው?	_____ ብር በወር	

ክፍል 2፡ ከጤና ጋር የተያያዙ መረጃዎች			
201	የስኳር በሽታ እንዳለብዎት ካወቁ ምን ያክል ጊዜ ሆነ?	_____ ዓመት	
202	የደም ግፊት አለበዎት?	1. አዎን 2. የለም	204
203	ለጥያቄ ቁጥር 202 መልስዎ አዎ ከሆነ የደም ግፊት እንዳለበዎት ካወቁ ስንት አመት ሆነው?	_____ ዓመት	
ክፍል III የህይወት ዘይቤ እና የባህሪ ምክንያቶች አሁን ስለ የተለያዩ የጤና ጠባይ አንዳንድ ጥያቄዎችን ልጠይቅዎት እፈልጋለሁ። ይህ እንደ ማጨስ፣ አልኮልን መጠጣት፣ አመጋገብ እና የአካል እንቅስቃሴ ያሉ ነገሮችን ያጠቃልላል። ከትንባሆ እንጀምር።			
301	እንደ ሲጋራና የመሳሰሉ ማናቸውንም ዓይነት የትምባሆ ምርቶች አጭሰው ያውቃሉ?	1. አዎን 0. አይደለም- (ወደ 307 ይሂዱ)	
302	በአሁኑ ጊዜ የትምባሆ ምርቶችን በየቀኑ ያጭሳሉ?	1. አዎን 0. አይደለም	
303	በየቀኑ ማጨስ ሲጀምሩ ዕድሜዎ ስንት ነበር?	_____ ዓመት። ምታወቅ ከሆነ ወደ 305	
304	ማጨስ የጀመርከው ከምን ያክል ጊዜ በፊት እንደ ነበር ታስታውሳለህ?	_____	
305	በአማካይ በየቀኑ ከሚከተሉት ውስጥ ምን ያህል ያጭሳሉ? የትኞችን የትንባሆ ዓይነት ከሆነ (ከአንድ በላይ መመለስ ይቻላል)	በፋብሪካ የተመረቱ ሲጋራዎች _____ በእጅ የተጠቀሱ ሲጋራዎች _____ ጋያ _____ ሌላ _____ እባክዎ ሌላ ከሆነ ስሙን ይጥቀሱ _____	

306	ማጨስ አቁመው ከሆነ ያቆሙት በስንት ዓመት ያሳልፈዋል? ማጨስ ስያቆሙ ዕድሜዎ ስንት እንደነበረ ካላወቁ ማጨስ ካቆሙ ምን ያክል ጊዜ ሆነው_____	_____ ዓመት ካላወቁ ምን ያክል ጊዜ ሆነው_____	
አልኮሆል: የሚቀጥሉት ጥያቄዎች ስለ አልኮሆል ፍጆታ ይጠይቃሉ ::			
307	የአልኮል መጠጥ ጠጥተው ያውቃሉ? (ቢራ ፣ ወይን ፣ ጠላ፣ጠጅ፣ አረቄ...)	1. አዎን 0. አይደለም	
308	በአለፉት 12 ወራት ውስጥ ቢያንስ አንድ የአልኮል መጠጥ የሚጠጡት ስንት ጊዜ ነበር?	1. በየቀኑ 2. 5-6 ቀናት በሳምንት 3. 1-4 ቀናት በሳምንት 4. 1-3 ቀናት በወር 5. በወር አንዴ 6. ጠጥቼ አላውቅም	311
309	የአልኮል መጠጥ በሚጠጡበት ጊዜ በአማካይ ስንት አልኮሆል መጠጦች በአንድ የመጠጥ ጊዜ ውስጥ ይጠጣሉ?	_____	
310	በአንድ የመጠጥ ጊዜ ትልቁ የጠጣሪው የአልኮል መጠጦች ሁሉንም የአልኮል መጠጦችን በመቁጠር ስንት ነበሩ?	ትልቁ የጠጣሪው _____	
311	በተለመደ ወር ውስጥ ወንድ 5 እና ከዚያ በላይ ሴት 4 እና ከዚያ በላይ የአልኮሆል መጠጥ በአንድ የመጠጥ ጊዜ የወሰዱት ምን ያህል ጊዜ ነው?		
አመጋገብ: የሚቀጥሉ ጥያቄዎች አብዛኛውን ጊዜ ስለሚመገቡት የፍራፍሬና የአትክትልት አመጋገብ ይጠይቅዎታል። እባክዎን መልስዎን ሲመልሱ ባለፈው ዓመት ውስጥ የእርስዎን አመጋገብ ስለ ሚወክለው ሳምንት ያስቡ።			

312	በተለመደው ሳምንት ምን ያክል ቀን ፍራፍሬ ትመገባለህ?	_____ ቀን	
313	ከእነኚህ ቀናቶች በአንዱ ላይ ምን ያክል የፍራፍሬ ገበታ ይመገባሉ?	_____	
314	በተለመደው ሳምንት ምን ያክል ቀን አትክልት ትመገባለህ?	_____ ቀን	
315	ከእነኚህ ቀናቶች አንዱ ላይ ምን ያክል የአትክልት ገበታ ይመገባሉ?	_____	
316	ብዙ ጊዜ ምግብ ለማብሰል ምን አይነት ዘዴት ነው የምትጠቀሙት?	1. የአትክልት ዘዴት 2. የምረጋ ዘዴት 3. ቂቤ 4. ሌላ.....	
317	በሳምንት ከቤት ውጪ በአማካይ ምን ያክል ጊዜ ይመገባሉ? ቂርስ፣ምሳና እራት ተቆጥረው ማለቴነው	_____ ጊዜ በሳምንት	
የአካል ብቃት እንቅስቃሴ -ቀጣይ በተለመደ ሳምንት ውስጥ የተለያዩ የአካል ብቃት እንቅስቃሴ ዓይነቶችን በመሥራት ያሳለፉትን ጊዜ እጠይቅዎታለሁ። ምንም እንኳን እርስዎ አካላዊ እንቅስቃሴ የሚያደርጉ ሰው ባይሆኑም እባክዎን እነዚህን ጥያቄዎች ይመልሱ። ሥራን ስለሚሰሩበት ጊዜ በጀመሪያ ያስቡ። እንደ ደመወዝ ወይም ያልተከፈለ ሥራ፣ ጥናት ስልጠና፣ የቤት ውስጥ ሥራዎች፣ ምግብ / ሰብሎች መሰብሰብ፣ ዓሳ ማጥመድ ወይም ምግብ መፈለግ ላይ እንደ መሰማራት ያሉ መሥራት ያለብዎት ነገሮችን ያስቡ።			
318	ሥራዎ አነፋፈሉን ወይም ልብምትዎን በጣም ሊጨምር የሚችል ከባድ እንቅስቃሴ እንደመሸከም ከባድ ነገርን እንደማንሳት ወይም እንደ ግንባታ ሥራ ቢያንስ ለ10 ደቂቃ ያለ ማቋረጥ መስራትን ያካትታል?	0. አዎን _____ 1. አይደለም _____	321
319	እንዲህ አይነት ከባድ ስራዎችን በሳምንት ምን ያክል ቀን ይሰራሉ?	_____ ቀን	

320	በሥራዎ ውስጥ በአንድ በተለመደ ቀን ከባድ እንቅስቃሴዎችን በመከወን ምን ያህል ጊዜ ያሳልፋሉ?	_____:	
321	ሥራዎ የመተንፈስ ወይም የልብ ምት በትንሹ የሚጨመሩ መካከለኛ እንቅስቃሴን እንደ [ፈጣን እርምጃ ወይም ቀላል ጭነቶችን እንደመሸከም] ያሉ እንቅስቃሴን ያለማቋረጥ ቢያንስ ለ 10 ደቂቃዎች መሥራትን ያካትታል?	0. አዎን _____ 1. አይደለም _____	
322	በተለመደው ሳምንት ውስጥ እንደ ስራዎ አንድ ክፍል እንዲህ አይነት መካከለኛ-እንቅስቃሴዎችን ስንት ቀናት ያደርጋሉ?	_____ ቀን	
323	በሥራዎ ውስጥ በአንድ በተለመደ ቀን መካከለኛ እንቅስቃሴዎችን በመከወን ምን ያህል ጊዜ ያሳልፋሉ?	_____:	

የሚቀጥሉት ጥያቄዎች ቀደም ሲል እርስዎ የገለጹትን በስራ ላይ ያሉትን የአካል ብቃት እንቅስቃሴዎችን አያካትቱም። አሁን ወደ **ቦታዎች ለመሄድ እና ከቦታዎች ለመመለስ** ስለ ሚጓዙበት የተለመደ ጉዞ ልጠይቅዎ እፈልጋለሁ። ለምሳሌ ለመስራት፣ዕቃ ለመግዛት፣ለገበያ፣ለአምልኮ ቦታ፣ለታክሲ መያዝ

324	ወደ ቦታዎች ለመሄድ እና ለመመለስ ብስክሌትን ወይንም የእግር ጉዞን ያለማቋረጥ ቢያንስ ለ 10 ደቂቃዎች ይጠቀማሉ?	0. አዎን _____ 1. አይደለም _____	
325	በተለመደው ሳምንት ወደ ቦታዎች ለመሄድ እና ለመመለስ ብስክሌትን ወይንም የእግር ጉዞን ያለማቋረጥ ቢያንስ ለ 10 ደቂቃዎች ስንት ቀን ይጠቀማሉ?	_____ ቀን	
326	በተለመደው ቀን ለጉዞ ብስክሌትን በመንዳት ወይንም የእግር ጉዞን በመጓዝ ምን ያህል ጊዜ ያሳልፋሉ?	_____:	

የሚቀጥሉት ጥያቄዎች እርስዎ ቀደም ሲል የጠቀሷቸውን የሥራ እና የትራንስፖርት እንቅስቃሴዎችን አያካትቱም። አሁን ስለ ስፖርት፣የአካል ብቃት እና **የመዝናኛ እንቅስቃሴዎች (መዝናኛ)** ልጠይቅዎ እፈልጋለሁ።

327	ቢያንስ ለ 10 ደቂቃዎች ያለማቋረጥ እንደ ሩጫ ወይም እግር ኳስ ወይም ክብደት ማንሳት ያሉ አተነፋፈስ ወይም የልብ ምት በከፍተኛ የሚጨምሩ ጠንካራ የስፖርት ፣ የአካል ብቃት ወይም የመዝናኛ እንቅስቃሴዎችን ያደርጋሉ?	0. አዎን ____ 1. አይደለም ____	
328	በተለመደው ሳምንት ውስጥ ጠንካራ ስፖርት፣የአካልብቃት ወይም የመዝናኛ እንቅስቃሴዎችን ስንት ቀናት ያደርጋሉ?	____ ቀን	
329	በተለመደው ቀን ጠንካራ የስፖርት፣የአካልብቃት እንቅስቃሴ ወይም የመዝናኛ እንቅስቃሴዎችን በማድረግ ምን ያህል ጊዜ ያሳልፋሉ?	____:____	
330	ቢያንስ ለ 10 ደቂቃዎች ያለማቋረጥ እንደ ብስክሌት መንዳት ፣ መዋኘት ፣ የእጅ (የመረብ) ኳስ ያሉ አተነፋፈስ ወይም የልብ ምት በትንሹ የሚጨምሩ መጠነኛ የስፖርት ፣ የአካል ብቃት ወይም የመዝናኛ እንቅስቃሴዎችን ያደርጋሉ?	0. አዎን ____ 1. አይደለም ____	
331	በተለመደ ሳምንት፣መጠነኛ ስፖርቶችን፣የአካልብቃት እንቅስቃሴን ወይም የመዝናኛ እንቅስቃሴዎችን ስንት ቀናት ያደርጋሉ?	____ ቀን	
332	በተለመደ ቀን መጠነኛ-ስፖርቶችን፣የአካልብቃት እንቅስቃሴን ወይም የመዝናኛ እንቅስቃሴዎችን በማከናወን ምን ያህል ጊዜ ያሳልፋሉ?	____:____	
የሚከተለው ጥያቄ በስራ ላይ ሆነው፣በቤት ውስጥ፣ከጓደኞች ጋር፣ መኪና ውስጥ በመጓዝ፣ በአውቶቡስ፣ በባቡር፣ በማንበብ፣ ካርዶችን በመጨወት ወይም ቴሌቪዥን በመመለከት ተቀምጠው ስለሚያሳልፉ ጊዜ ነው። ነገር ግን የመተኛት ጊዜን አይጨምርም።			
333	በተለመደው ቀን ለመቀመጥ ወይም ለማረፍ ምን ያልጊዜ	____: ____ ሰዓት፡ ደቂቃ	

	ያሳልፋሉ?		
334	በ 24 ሰዓታት ውስጥ በአማካይ ምን ያህል ሰዓት ትክክለኛ እንቅልፍ ያገኛሉ?	____: ____ ሰዓት: ደቂቃ	
	ክፍል IV: ልኬቶች		
401	ክብደት _____ ኪ.ግ.		
402	ቁመት _____ ሴሜ		
403	የወገብ ስፋት _____ ሴሜ		
404	የዳሌ ዙሪያ _____ ሴሜ		
405	FBS 1 _____ FBS 2 _____ FBS 3 _____ FBS4 _____		
406	HA1C _____		
407	የደም ትራይግላይሰራይድ _____ mg / dl		
408	የደም ኮሌስትሮል _____ mg / dl		
409	የደም ኤችዲኤል _____ mg / dl		
410	የደም LDL _____ mg / dl		
411	ክሬቲኒይን		
412	የሽንት አልቡሚን መጠን	0. የለም 1. 1+ 2. 2+ 3. 3+	
ክፍል 6 አሁን እየተጠቀሙት ያለ መድሃኒት (ስም፣ መጠንና የወሰዱት አመት)			
601	የስኳር መድሃኒት		
602	የደም ግፊት መድሃኒት		
605	ሌሎች		

መረጃውን የሰበሰበ ሰው ስም _____ ፊርማ _____ ቀን _____