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Research Article

Cardiovascular Risk Awareness and Its Influence on Disease Outcomes in Ethiopian Type 2 Diabetic Patients

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ABSTRACT

Background: Cardiovascular disease is the most common cause of death in people with diabetes. High blood pressure, high cholesterol, high blood glucose and other risk factors contribute to increasing the risk of cardiovascular complications. Strategies to reduce the risk of CVD are counseling about lifestyle modification. Hence, counseling by physicians about lifestyle modification is less than optimal.

Objective: To determine the perception of health related cardiovascular risk factors among type two diabetes mellitus patients on follow up, in selected specialized Hospitals, Ethiopia.

Method: Institution based cross-sectional study was conducted among T2DM patients. Sample size was determined using single population proportion formula. Semi structured Questionnaire was used to assess the socio-demographic information and medical record review. Perception of the study participants were assessed by using the six-point Likert scale format. Anthropometric and blood pressure measurements were conducted. SPSS version 17 was used for statistical analysis.

Result: About 289 (69.6%) patients and 4 (33.3%) physicians reported that there were no discussions on cardiovascular disease between them. Furthermore, 180 (43.4%) of patients and 3(25.0%) of physicians reported that there were no discussions on behavior change at all. Participants' perceived someday developing cardiovascular disease was negatively correlated with discussion of cardiovascular disease with physician [r=-.272, n=415, p< .001]; behavior change with physician [r=-.272, n=415, p< .001]; monitoring blood glucose with physician [r=-.853, n=415, p< .001]; saturated fat with physician [r=-.575, n=415, p< .001], cholesterol intake with physician [r=-.741, n=415, p< .001]; and discussion of exercise with physician [r=-.510, n=415, p< .001].

Conclusion: Most of T2DM patient were had less frequency of discussion with their physician on health related factors of cardiovascular disease such as heart disease, life style or behavior change, saturated fat, cholesterol intake, physical exercise and recommendations of exercise type, frequency and duration.

Keywords: Cardiovascular risk factors; Type 2 diabetic patients; Specialized hospitals; Ethiopia

ABBREVIATIONS

ADA: American Diabetic Association; BMI: Body Mass Index; CAD: Coronary Arterial Disease; CVDs: Cardiovascular Diseases; FPG: Fasting Plasma Glucose; HbA1c: Hemoglobin A1C; HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; NHMS: National Health and Morbidity Survey; T2DM: Type 2 Diabetes Mellitus; TC: Total Cholesterol; TG: Triglyceride; WHO: World Health Organization; WHR: Waist-to-Hip Ratio

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INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder of multiple etiologies characterized by a high blood sugar level over a prolonged period of time with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both [1]. The effects of diabetes mellitus include long–term damage, dysfunction and failure of various organs. Symptoms often include frequent urination, increased thirst, and increased appetite. If left untreated, diabetes can cause many complications [2]. Acute complications can include diabetic ketoacidosis, hyperosmolar hyperglycemic state, or death [3]. Serious long-term complications include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes and cognitive impairment [2].

Individuals with diabetes and with chronically poor metabolic control can experience micro vascular and macro vascular complications. In general, patients with diabetes aggregate other comorbidities such as obesity, hypertension, and dyslipidemia which also contribute to increase the risk for CVD [4].

Type two diabetes mellitus acts as an independent risk factor for several forms of CVD (micro- and macro vascular diseases), and people with T2DM are more likely to develop CVD due to a variety of risk factors [5]. Preclinical manifestations of macro vascular diseases are developed much earlier in newly diagnosed, never-treated T2DM patients [6], and such macro vascular changes are also observed even in normoglycemic and normotensive offspring of parents with T2DM [7], Furthermore, early manifestations of preclinical vasculopathy and development of macro vascular disease were potentially found to be at increased risk with impaired glucose tolerance (IGT) [8].

The global burden of diabetes mellitus is rising dramatically. There are more than 230 million diabetic patients worldwide; two thirds of whom are in developing countries. By the year 2030, more than 80% of the 366 million diabetic patients will be in developing countries [9].

Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. In 2016, an estimated 1.6 million deaths were directly caused by diabetes. Another 2.2 million deaths were attributable to high blood glucose in 2012. Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. World health organization (WHO) estimates that diabetes was the seventh leading cause of death in 2016. Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes (T2DM) [10,11].

Cardiovascular disease causes fatal complications such as coronary artery disease (leading to heart attack) and stroke. Cardiovascular disease is the most common cause of death in people with diabetes. High blood pressure, high cholesterol, high blood glucose and other risk factors contribute to increasing the risk of cardiovascular complications [12].

The mechanisms of the pathogenesis of CVD in diabetes are related to epigenetic, genetic, and cell-signaling defects in inter-related metabolic and inflammatory pathways. These metabolic defects (especially in the endothelium, liver, skeletal muscle, and β cells) can be triggered by various factors such as high caloric intake, smoking, glycation end-products, glucose toxicity, and some medications [13].

Although there are several recognized CVD risk factors, strategies to reduce the risk of CVD focus on controlling hypertension, high cholesterol, obesity, smoking, and sedentary lifestyle, because they are amenable to lifestyle modification. Because more than 70% of adults with DM receive routine care in primary care settings, primary care physicians are particularly well suited to provide counseling about lifestyle modification [14]. Hence, counseling by physicians about lifestyle modification is less than optimal [14-17]. Therefore, this study was designed to assess the Ethiopian Type 2 diabetics and their physicians' perception and discussion on health related CVD risk factors and its effect on disease outcome.

MATERIALS AND METHODS

Study design, area, population and period

This is an institution based cross sectional study. Six diabetic Clinics in Major hospitals in Ethiopia were randomly selected. T2DM patients that were enrolled in Adama specialized medical hospital, Felege Hiwot specialized hospital, Hawassa University hospital, Maychew specialized hospital, Tikur Anbessa specialized hospital and Yekatit 12 specialized hospital were recruited into the study. Data were collected from October 2018 to March 30, 2019.

Inclusion and exclusion criteria

All adult patients with a diagnosis of Type 2 diabetes and no previous history of CVD were included in the study. However, Type 2 diabetic adult patients who have had prior history of cardiovascular disease were excluded.

Sample size determination

The sample size was calculated using single population proportion formula as indicated by Daniel WW, 1999 by assuming the knowledge level of 50 %; 95 % CI and 5 % margin of error [18]. Based on this we got 389 sample size. An additional 10 % was added to the sample size as a contingency to increase power. Hence, the total sample became 422.

Instrument and method of data collection

Perceptions of CVD risk assessment questionnaire: CVD risks were assessed through the use of conditioned and unconditioned questions. To increase variability among patient responses, questions for this assessment were modified from the original six-point Likert scale version to a logarithmic scale/response format (e.g., 0-100). Participants were asked to estimate their chance of experiencing a specific health related condition [19].

Conversation on health related factors of cardiovascular disease assessment questionnaire: Participants were asked to indicate if their physician discussed their risk of developing CVD, risk-reducing behavioral change, and exercise recommendations during the time of clinical visit [20].

Attitudes to physical exercise assessment questionnaire: Adapted from Godin and Shepard (1985), individual attitudes regarding exercise was measured using four 7-point bipolar adjective scales. Attitude scales was reverse scored, such that higher scores indicated higher levels of positive attitudes regarding exercising regularly [21].

Medical Record Review Form: This form was used to assess information about patient diabetic condition. Medical record data was collected from their secondary data during the patient interview date. Information gathered included: type of diabetes, date of diabetes onset, prescribed medications and complications.

Equipment and procedure of measurements

Blood Pressure Measurement: Resting blood pressure was measured using mercury sphygmomanometers. Following WHO recommendation, blood pressure was measured with the subject in a seating position after waiting in a quiet room for at least five minutes with legs uncrossed. Depending on the size of the subject's right upper arm, one of two mercury sphygmomanometers with different size cuffs were used to take three readings for blood pressure, measured to the nearest 2mmHg, at intervals of one minute each. An average of three readings was later used for the analysis [22].

Anthropometry measurement

Body weight and height measurement: Height was measured using a wall-mounted stadiometer to the nearest 0.1 cm. Body weight was measured using a digital calibrated scale to the nearest 0.1 kg. Body weight and height were used to calculate body mass index (BMI). The equation BMI = weight (kg)/height (m^2) was used [22].

Waist and hip circumferences measurement: Waist and hip circumferences were measured two times using a flexible, non-elastic tape to the nearest 0.1 cm. A waist-to-hip ratio (WHR) greater than 1.0 in men or greater than 0.85 in women was used to measure Central Obesity [22].

Lipid profile evaluation: Blood lipid profile measured using a Cholestech LDX analyzer. The Cholestech system uses a finger stick to collect a blood sample of 35uL of whole blood. The blood sample is then added to a cassette and then analyzed by the Cholestech giving results for High Density Lipoprotein Cholesterol (HDLC), Low Density Lipoprotein Cholesterol (HDL-C), Total Cholesterol (TC), Triglycerides Cholesterol (TG-C), Low-Density Lipoprotein Cholesterol (LDL-C), and Glucose (mg/dL) [23].

Data processing and analysis

Data was checked for consistency, cleaned and coded and entered in to Epi-Data version 3.1 and were exported to SPSS version 20. Continuous variables were expressed as mean and standard deviation while, categorical variables were expressed as frequencies and percentage. Pearsons product moment correlation was used to analyze the relationship between perceived cardiac risk and health related factors of cardiovascular disease between patient and physician. An r-value of 0.01 was considered significant correlation.

Ethical issues

Ethical clearance for the study was obtained from the Institutional Review Board of College of Health and Medical Sciences, Jimma University under reference no: FPU15-05635 and FPU16-0 4141. Written permissions were obtained from the directors of each hospital. Informed written consents were obtained from the participants and their physicians and data collection were done confidentially.

RESULTS

Socio-Demographic of T2DM patients

A total of 422 T2DM patients were included into this study. Only 415 (98.3%) of T2DM patients responded to the questioner among whom 232 (55.9%) were men while 183 (44.1%) were women. The age of the respondents ranged from 25 to 86 years with mean age and standard deviation of 48.88+11.29 year. With regard to educational status; 118 (28.4%) of respondents did not attend any formal education; 195 (47.0%) attended primary level; 85 (20.5%) attended secondary level and the remaining 17 (4.1%) were tertiary level and above.

Regarding to BMI of study subjects; 175 one hundred seventy five (42.2%) of the study participants were obese; 169 (40.7%) were overweight; 47 (11.3%) had normal weight and the remaining 24 (5.8%) participants were underweight. Current cigarette smokers were 298 (71.8%) of whom majority of the smokers were males.

Most of the participants 136 (32.8%) reported that their physician recommended physical exercise before one year ago and 31(7.5%) of participants reported that physical exercise recommended by their physician before 6 months. Regarding to distribution of diabetes treatment, 175 (42.2%) of participants had been taking combination treatment (Pills and insulin), 95 (22.9%) of participants had been taking oral agent (Pills) treatment, 110 (26.5%) of participants had been taking insulin treatment, and 35 (8.4%) of participants had been taking diet alone (Table 1).

Chance of developing CVD of T2DM patients

It can be seen from the data in Table 2 that, T2DM patients estimated that the overall perception of CVD risk was (M=31.41, SD= 0.044) and their physician were (M=88.75, SD=0.025). More specifically, T2DM patients' reported that someday developing CVD was 35.81 (SD=23.624) whereas physicians reported that T2DM patients someday developing CVD was 82.17 (SD=6.991). In addition, T2DM patients' reported that the chance they developing CVD over the next 10 years was 27.01 (SD=17.369) while on the contrary physicians' estimated that the chance of T2DM patients developing CVD over the next 10 years was 95.33 (SD=3.393). Considering the current physical exercise, if the T2DM patients do not change the current exercise behavior the chance to develop CVD in next 10 years is 3.49 (SD=1.524).

Physicians reported that their patients' developing CVD in next 10 years was 6.67(SD=.492) if not change their current exercise behavior (Table 2).

Cardiac risk factors related to lipid profile among T2DM patients

The result, as shown in Table 3, indicate that patients' total cholesterol mean was 217.53 (SD=21.772) mg/dl, triglycerides level was 162.49 (SD=15.334) mg/dl, HDL was 35.52 (SD=11.337) mg/dl and LDL was 106.54 (SD=13.841) mg/dl. The mean systolic blood pressure was 129.71 (SD= 15.025) mmHg and the diastolic blood pressure was 89.69 (SD=3.648) mmHg. Mean duration of diabetes mellitus of the patients was 4.67 (SD=1.373) years and their number of diabetes complications noted in the medical record were 2.39 (SD= .866). The HbA1c value of T2DM patients was 6.6 (SD=1.236) %. BMI was 29.36(SD=5.56) kg/m^2 (Table 3).

Discussion between physicians and T2DM patients on health related factors of cardiovascular disease

About 69.6% of patients and 33.3% of physicians (n=289 and n=4, respectively) reported that there were no discussions on cardiovascular disease between themselves while 30.4% of the patients and 66.7% of physicians (n=126 and n=8, respectively) reported that there were discussions on cardiovascular disease between them. In addition, 180 (43.4%) of patients and 3 (25.0%) of physicians reported that there were no discussions on behaviour change at all. Yet, 255 (61.4%) of patients and 11 (91.7%) of physicians reported that there were frequent discussions on glycaemic control throughout the follow-ups. Nevertheless, only

Table 1 - Socio- demographic characteristics of adult patients with T2DM attending in some selected Hospitals of Ethiopia, from October 2018 to March 30, 2019.

Category		Frequency (n=415)	Percent (%)
Age in yrs	(*M*= 48.88, *SD*=11.29)		
Gender	Male	232	55.9
	Female	183	44.1
Education Status	Illiterate	118	28.4
	Primary level	195	47.0
	Secondary level	85	20.5
	Tertiary level & above	17	4.1
Marital Status	Married	209	50.4
	Living with Partner	33	8.0
	Single	71	17.1
	Divorced	59	14.2
	Separated	27	6.5
	Widowed	16	3.9
Family Income	Less than 9515 birr/year	257	61.9
	9515-33,660 birr/ year	91	21.9
	Greater than 33,660 birr/year	67	16.1
Current employment status	Employed full time (≥30 hours/week)	38	9.2
	Employed part-time (<30 hours/week)	79	19.0
	Unemployed	215	51.8
	Disabled &Retired	83	20.0
Has had HbA1c Test	Yes	346	83.4
	No	69	16.6
Current Smoking Status	Current Smoker	298	71.8
	Non-Smoker	117	28.2
Smoking History	Has Smoked/Smokes	337	81.2
	Never Smoked	78	18.8
Frequency of discussion b/n patient and their physician on exercise	At Every Visit	23	5.5
	Occasionally	47	11.3
	Sometimes	71	17.1
	Rarely	113	27.2
	Never	161	38.8
Time recommended exercise to patient	Within the last 3 months	38	9.2
	Within the last 6 months	31	7.5
	Within the last year	55	13.3
	Longer than One Year Ago	136	32.8
	Never has recommended exercise	54	13.0
	First day visit to this particular doctor	101	24.3
Body Mass Index Category	Underweight	24	5.8
	Normal Weight	47	11.3
	Overweight	169	40.7
	Obese	175	42.2
Treatment Regimen	Diet only	35	8.4
	Pills	95	22.9
	Insulin injections	110	26.5
	Pills and insulin inject	175	42.2
Reason for visit hospitals	DM-related	184	44.3
	Cold/flu	55	13.3
	Other	86	20.7
	General check up	90	21.7
No. Cigarette Smoked per day (n=298)	*M*=8.75, *SD*=3.368		

Table 2: Chance of developing a Cardiovascular Disease among patients with T2DM attending in some selected Hospitals of Ethiopia, from October 2018 to March 30, 2019.

	T2DM Patients (n=415)		Physicians (n=12)	
	M	SD	M	SD
Chance develop CVD	35.81	23.624	82.17	6.991
Chance develop CVD in next 10 yrs	27.01	17.369	95.33	3.393
Perceived CVD risk	31.41	0.044	88.75	0.025
If No change the Exercise behavior, the chance develop CVD in next 10 years	3.49	1.524	6.67	0.492

Table 3: Cardiac risk factors related to lipid profile, blood pressure status, HbA1c and life style behaviors among adult patients with T2DM attending in some selected Hospitals of Ethiopia, from October 2018 to March 30, 2019.

	M	SD
Total Cholesterol (mg/dl)	217.53	21.772
Triglycerides (mg/dl)	162.49	15.334
HDL (mg/dl)	35.52	11.337
LDL (mg/dl)	106.54	13.841
Systolic Blood Pressure (mmHg)	129.71	15.025
Diastolic Blood Pressure (mmHg)	89.69	3.648
HbA1c in % (n=346)	6.6	1.236
Number of Complications	2.39	0.866
Diabetes Duration (year)	4.67	1.373
BMI (kg/m2)	29.36	5.56
Waist Circumference (cm)	106	10.7
Waist to Hip Ratio	0.95	0.1

Note: HDL= High Density Lipoprotein; LDL= Low Density Lipoprotein; HbA1c= Hemoglobin A1C; BMI= Body Mass Index

119 (28.7%) of patients and 2 (16.7%) of physicians reported that there were discussions on saturated fat and 75.9% of patients and 66.7% of physicians (n=315 and n=8, respectively) informed that they didn't discuss on cholesterol intake behavior at last visit of hospitals. Beside this, about one-third of the patients (30.4%; n=126) and two-third of the physicians (66.7%; n=8) reported that discussions on physical exercise (Table 4).

Correlations between cardiovascular risk and health related factors

Pearson product moment correlation was used to identify significant correlations at the $p \leq .05$ level and differences between perceived cardiovascular diseases risks were used 2-tailed. As indicate in Table 5, variables of the perceived cardiac risk were examined in relation to one another. Health related cardiovascular disease factors were also included for comparisons with perceived cardiovascular disease risk.

Participants' perceived that someday developing cardiovascular disease was positively correlated with their perceived developing cardiovascular disease in the next ten years [r=.889, n=415, p<.001]; perceived developing cardiovascular disease in the next ten years regard to their current exercise [r=.099, n=415, p< .05]; and physical exercise level [r=.333, n=415, p< .05]. This indicates a greater patients' perceived someday developing cardiovascular disease, they also believed that they were at risk of developing cardiovascular disease in the next ten years with considering current exercise.

However, Participants' perceived someday developing cardiovascular disease was negatively correlated with discussion of cardiovascular disease with physician [r=-.272, n=415, p< .001]; behaviour change with physician [r=-.272, n=415, p< .001]; monitoring blood glucose with physician [r=-.853, n=415, p< .001]; saturated fat with physician [r=-.575, n=415, p< .001], cholesterol intake with physician [r=-.741, n=415, p< .001]; and discussion of exercise with physician [r=-.510, n=415, p< .001]. This demonstrate that participants perceived high risk of someday developing cardiovascular disease significantly associated with low perceived of discussion with their physician on behaviour change, blood glucose status monitoring, saturated fat, cholesterol intake, and exercise.

Participants' perceived risk of developing cardiovascular disease in the next ten years was positively correlated with risk of developing cardiovascular disease in the next ten years when considering their current exercise level [r=.438, n=415, p<.001]. This show that higher perceived risk of developing cardiovascular disease in the next ten years is associated with higher levels of perceived developing cardiovascular disease in the next ten years when considering their current exercise level. By contrast, participants' perceived risk of developing cardiovascular disease in the next ten years was negatively correlated with discussion of saturated fat with physician [r=-.304, n=415, p< .001], and cholesterol intake with physician [r=-.174, n=415, p< .001]. This indicates that participants' perceived high risk of developing cardiovascular disease in the next ten years significantly associated with lower perceived of discussion with physician on cardiovascular disease.

Furthermore, participants' perceived risk of developing cardiovascular disease in the next ten years was negatively correlated with discussion of cardiovascular disease with physician [r=-.644, n=415, p< .001]; discussion of behaviour change with physician [r=-.212, n=415, p< .001]; discussion of monitoring blood glucose with

Table 4: Discussion on health related risk factors of cardiovascular disease between physicians and T2DM patients attending in some selected Hospitals of Ethiopia, from October 2018 to March 30, 2019.

		T2DM Patients		Physicians	
		(n=415)	(%)	(n=12)	(%)
Discuss Heart Disease	Yes	126	30.40%	8	66.70%
	No	289	69.60%	4	33.30%
Discuss Behavior Change	Yes	235	56.60%	9	75.00%
	No	180	43.40%	3	25.00%
Discuss Monitoring Blood Glucose Status	Yes	255	61.40%	11	91.70%
	No	160	38.60%	1	8.30%
Discuss Saturated Fat	Yes	119	28.70%	2	16.70%
	No	296	71.30%	10	83.30%
Discuss Cholesterol Intake	Yes	100	24.10%	4	33.30%
	No	315	75.90%	8	66.70%
Discuss Exercise	Yes	126	30.40%	8	66.70%
	No	289	69.60%	4	33.30%
When Exercise Discussed, Type of Exercise (n=289) and physician (n=8)	Walking	110	38.10%	4	50.00%
	Jogging	46	15.90%	-	-
	Other Exercise	81	28.00%	2	25.00%
	Discussed exercise, but not type	52	18.00%	2	25.00%
When Exercise Discussed, Frequency of Exercise (n=289) and physician (n=8)	At least one day	66	22.80%	-	-
	At least two days	86	29.80%	4	50.00%
	At least three days	98	33.90%	2	25.00%
	At least four days	39	13.50%	2	25.00%
When Exercise Discussed, Duration of Exercise (n=289) and physician (n=8)	<20 minutes	36	12.50%	-	-
	20-30 minutes	45	15.60%	3	37.50%
	31-40 minutes	42	14.50%	4	50.00%
	41-50 minutes	40	13.80%	1	12.50%
	51-60 minutes	39	13.50%	-	-
	Non-specific	87	30.10%	-	-
Exercise Not Discussed, Contraindications Reported (n=126) and physician (n=4)	Yes	54	42.90%	3	75.00%
	No	72	57.10%	1	25.00%
Reason of Contraindications Reported (n=54) and physician (n=3)	Discussed Before/Prior	16	29.60%	-	-
	Discussed Acute Issues	22	40.70%	2	66.70%
	Already Exercising	8	14.80%	-	-
	No Time	8	14.80%	1	33.30%

Table 5: Correlations b/n perceived cardiac risk and health related CVD Variables among patients with T2DM attending in some selected Hospitals of Ethiopia, from October 2018 to March 30, 2019.

	Chance someday develop CHD	Chance develop CHD in next 10 yrs	Don't change exercises, how likely develop CHD in 10 yrs?	Discussed Heart Disease	Discussed Behavior Change	Discussed BGSM	Discussed Saturated Fat	Discussed Cholesterol Intake	Discussed Exercise	Individual Attitudes to Exercise
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
[1]	1	.889**	.099*	-.272**	-.330**	-.853**	.575**	-.741**	-.510**	0.035
[2]		1	.438**	-.644**	-.212**	-.363**	-.304**	-.174**	-.349**	-.242**
[3]			1	.346**	-0.082	0.072	-.137**	0.022	.192**	.310**
[4]				1	.578**	.523**	-.419**	-.372**	.436**	.530**
[5]					1	.905**	-.724**	-0.004	.754**	.481**
[6]						1	-.800**	-.711**	.834**	-.331**

[7]							1	-.293**	-.960**	-.224**
[8]								1	-.293**	-0.088
[9]									1	.270**
[10]										1
* Correlation is significant at p < .05 (2-tailed). ** Correlation is significant at p <.0001 (2-tailed).										

physician [r=-.363, n=415, p< .001]; and discussion of exercise with physician [r=-.349, n=415, p< .001]. This indicate that participants' perceived high risk of developing cardiovascular disease in the next ten years significantly associated with lower perceived of discussion with physician on cardiovascular disease, behavior change, blood glucose status monitoring and exercise (Table 5).

DISCUSSION

The current study was used hospital based cross-sectional study design to evaluate the discussion on health related cardiovascular risk factors and their effect on disease outcomes between T2DM patients and their physician. T2DM participants (n=415) were predominately middle-aged, obese men. At least half of all T2DM participants reported that they did not attend any formal education and reported total annual incomes of less 9,515 birr. More than half of the T2DM participants reported that they are unemployed, ever having smoked cigarettes in their lifetime. Half of T2DM participants reported that they never discussed about physical exercise with their physician at every hospitals visit. Majority of T2DM participants' visits their hospitals were related to the treatment of other' reasons.

According to the World Health Organization (WHO) recommendation, T2DM patients in the current study are classified as overweight (29.36 kg/m^2). Moreover, waist circumference (106cm) and waist to hip ratio (0.95) are correlated with an increase in cardiovascular complications. A WHR >0.9 and a waist circumference >102 cm are not only a strong indicator of cardiovascular risk but are a better predictor in addition to BMI (24). T2DM patients are at risk for increased cardiovascular complications as a result of borderline or higher than the normal anthropometric measurements. Most of T2DM patients were diagnosed with high cholesterol. In conjunction, mean reported cholesterol on averaged was 217.53±21.772 mg/dl. Numerically, >200 mg/dl indicates a diagnosis of high cholesterol, so an increase in blood cholesterol result in high risk for CVD. In addition, high triglyceride diagnosis (>150 ml/dl) was found in most of T2DM patients with the mean value of 162.49±15.334 mg/dl. This shown that most of the participants were having no any awareness about their triglyceride number.

Cardiovascular disease is significantly associated with increased concentrations of low density lipoprotein cholesterol (LDL), decreased concentrations of high density lipoprotein cholesterol (HDL), and increased triglyceride concentration [25]. Therefore, the current study indicated that the overall education about CVD numbers such as blood pressure, cholesterol, and triglycerides may increase CVD awareness among T2DM patients, and lower risk for future complications.

Regarding the relationship between of perceptions of CVD risk and exercise behavior participants did not view themselves at risk for CVD.

One of the fundamental notions suggests that higher levels of perceived risk are associated with increased health behaviors. However, participants reported that their chances of developing CVD someday and within the next 10 years were 35.81% and 27.01% respectively. Consequently, participants who did not see themselves at risk for CVD may not have demonstrated significant changes in exercise behavior. The possible reason for why T2DM participants did not see their risk for CVD as elevated may have been because they did not view CVD as a severe disease. Sheeran and Abraham (1996) argued that specific levels of perceived severity of disease may function as a threshold variable before perceived risk has an impact on behavior. Thus if participants did not perceive CVD as severe, they would be less likely to perceive their risk of CVD as elevated and consequently, less likely to engage in exercise. Other study also supports the notion that perceived risk be retained as a distal antecedent of exercise [26]. Irrespective of whether T2DM participants did not understand themselves at risk for CVD or that they did not view CVD as a serious disease participants were unaware they could reduce their risk of CVD through increased exercise.

Around 70% of participants (n=289) reported did not discussing CVD with their doctor and 39% of participants (n=161) reported that they did not receive exercise recommendations every time. This indicates that participants suggest their physicians may not be observing to clinical practice recommendations for reducing CVD risk factors. Regarding to exercise, it is remarkable that physicians were not strengthening lifestyle interventions such as exercise at every visit [27]. This point is especially important that physicians have considerable opportunity to provide information about CVD risk and behavioural changes on exercise to reduce that greater risk.

With regard to the discussion about health related cardiovascular risk factors between patients and their physician. Around 66.7% of the physicians' reported "no reason" for why they did not recommend exercise to their patients. So, the current study indicated that there may be barriers to discussing exercise recommendations. For example, physicians may report not having adequate time to provide appropriate exercise counselling, having limited training in exercise counselling techniques, and they may be doubtful about the effectiveness of their counselling efforts [28]. It has been argued that exercise interventions may not be feasible forms of therapy that generalize to all T2DM patients [24,29]. Within older cohorts of T2DM patients, for example, orthopaedic problems (e.g. lower limb complications, foot ulcers, and peripheral neuropathy) may preclude adherence with physical activity programs [24].

A similar concern has also been stressed among obese T2DM patients who engage in exercise treatment. Among these patients, exercise may be truncated by joint disturbances brought on by engaging in physical activity [29,30]. However, lifestyle interventions which focus on low-intensity exercise, such as daily walking, can be performed safely and are easily integrated into the lifestyles of obese T2DM patients while continuing to have beneficial effects on health outcomes and cardiac risk [29]. Physicians less frequently recommend exercise to older patients in general may not be surprising. Advancing age is associated with numerous changes in body composition that may lead to difficulties in adhering to exercise recommendations and the ability to continue increased physical activity over the long-term [31].

CONCLUSION

Most of diabetic Type 2 patients had found with high risk of CVD compared with World Health Organization guideline recommendation. Furthermore, subjects had high proportion of total cholesterol, triglycerides, LDL, HbA1c, BMI, waist circumference but had low level of HDL. Large numbers of T2DM participants are reported that they had low belief on the chance of someday developing CVD and over the next 10 years. Most of T2DM patient were had less frequency of discussion with their physician on health related factors of cardiovascular disease such as heart disease, life style or behavior change, saturated fat, cholesterol intake, physical exercise and recommendations of exercise type, frequency and duration.

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COMPETING INTERESTS

The authors have declared that no competing interest exists.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Institutional Review Board of Jimma University. The study respected freedom to participate and adhered to research principles pertaining to privacy and confidentiality and written consent was sought from all the study participants.

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AUTHOR'S CONTRIBUTION

TG designed and conducted the main research. TG and TA involved in data interpretation, analysis, manuscript revision and write up. ZN and BZ involved in data analysis and interpretation, and write up. ZN involved in preparing the study designed data analysis and manuscript drafting. All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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