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Levels and Predictors of Adherence to Self-care Behaviour among Adult Type 2 Diabetics at Arba Minch General Hospital, Southern Ethiopia

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Abstract

Background: Diabetes self-care behaviour adherence is considered to be the cornerstone in diabetes care. Hence, the success of long-term maintenance therapy for diabetes depends largely on the patients' adherence with self-care behaviour.

Objective: To assess Levels and Predictors of Adherence to self-Care Behaviour and Glycaemic Control among Adult Type 2 Diabetics at Arba Minch General Hospital, Southern Ethiopia.

Method: An institutional based cross sectional study was conducted from [15th-February to 15th-March, 2015] and data were collected by using interviewer administered questionnaires. The data were entered into EPI-DATA version 3.1, and analysed by Statistical Package for Social Science (SPSS) version 20.0. Descriptive statistics were used for most variables; a bivariate analysis was employed to determine the presence of association between adherence to self-care behaviour with other variables at P-value less than 0.05. Multi-variable logistic regression was performed to identify independent predictors of glycaemic control and self-care behaviour adherence.

Results: One hundred ninety four type 2 diabetics were participated in this study and 99 (51.0%) were Females. Mean age of participants was 50.3(±13.2) years, and 41.2% had good self-care behaviour adherence. Above one half (57.2%) had diabetes duration less than five years, with mean duration of diabetes 5.02 ± 3.8 years. Most of patients 169 (87.1%) were on oral anti diabetics Age 35-44 years [AOR=13.4, 95% CI=1.582, 113.56], Monthly income<750.00 birr [AOR=0.340, 95% CI=0.119, 0.976] and age at diabetes onset 15-24 years [AOR=11.3, 95% CI=2.621, 49.065] were independent predictors of self-care behaviour adherence.

Conclusion: In our study area adherence to self-care behaviour of the study subjects were low. So strategies that can improve these discrepancies like provision of diabetes self-care education and counselling especially on importance of self-monitoring of blood glucose, physical activity and problem solving should be considered by responsible bodies.

Keywords: Type 2 diabetes; Self-care behaviour adherence; Ethiopia

Acronyms: AADEs: American Association of Diabetes Educators; ACEIS: Angiotensin Converting Enzyme Inhibitors; ADA: American Diabetes Association; BMI: Body Mass Index; BP: Blood Pressure; DKT: Diabetes Knowledge Test; DM: Diabetes Mellitus; EAG: Estimated Average Glucose; FBS: Fasting Blood Glucose; HbA1C: Haemoglobin Glycated/Glycosylated; IDF: International Diabetes Federation; JUSH: Jimma University Specialized Hospital; MMAS: Morisky Medication Adherence Scale; Ncds: Non-Communicable Disease; Ohas: Oral Hypoglycaemic Agents; OPD: Outpatient Department; RBS: Random Blood Glucose; SDSCA: Summary of Diabetes Self-Care Activities; SMBG: Self-Monitoring of Blood Glucose; TB: Tuberculosis; USD: United States Dollar; WHO: World Health Organization

Introduction

Background

Type 2 diabetes is a chronic disorder, which is characterized by hyperglycaemia and glycosuria. It affects 90 to 95% of sufferers, with onset usually after the age of 40 years [1,2]. High concentration of blood glucose can cause structural damages including macrovascular events in the heart and blood vessels as well as microvascular complications [3].

IDF Atlas 6th edition 2013 showed that 382 million people worldwide are estimated to have diabetes and by 2035; 592 million people, or one adult in 10, will have diabetes [4-7]. Over the next 20 years, the developed world will see an increase of 20% in the number of adults living with diabetes and developing countries will see an increase of 69% [8,9].

Type 2 diabetes prevalence among 20–79-year-olds in African region is 4.9% with the majority of people with diabetes <60 years old [10]. Hence Sub-Saharan Africa faces a double burden of providing adequate care for both infectious diseases like malaria, tuberculosis and non-communicable diseases (NCDs) like diabetes and hypertension [11,12].

Ethiopia experiences a heavy burden of disease mainly attributed to communicable infectious diseases and nutritional deficiencies [13-15]. However currently, Ethiopia is also challenged by the growing magnitude of chronic non communicable diseases. The national estimate made based on neighbouring countries with similar socio-economic situations showed that 2%-3% of the population had diabetes [16,17].

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American Diabetes Association (ADA) and American Association of Diabetes Educators (AADEs) yearly states optimal glycaemic control is achieved; when glycosylated haemoglobin (HbA1c) is less than 7% [18,19]. Successful diabetes care requires a systematic approach to supporting patients' behaviour changes, including 1) healthy lifestyle changes (physical activity, healthy eating, tobacco cessation, weight management, and effective coping), 2) disease self-management (taking and managing medication and, when clinically appropriate, self-monitoring of glucose), and 3) prevention of diabetes complications (self-monitoring of foot health; active participation in screening for eye, foot, and renal complications; and immunizations) [20-22].

Lifestyle change strategies that combine diet, physical activity and behaviour modification are effective treatments for improving diabetic outcomes [23,24]; so that self-care behaviour adherence and patient education are the first steps in helping patients to better care and manage their disease [25,26].

Diabetes reduces both quality of life and life expectancy and imposes large economic burdens on individuals and on national health care systems directly or indirectly [27-29]. Diabetes in sub-Saharan Africa greatly increased the risk of serious, costly complications including emotional distress, heart attack, stroke, kidney damage, blindness, neural damage leading to amputation, and reduced life expectancy [30].

Regardless of the type of diabetes; 95% of diabetes treatment relies on self-care behaviours and 95% of the self-care is usually provided by the patients or their families [31], hence diabetic patients must adjust their behaviour like making lifestyle changes to diet and physical activity levels and follow prescribed treatments to prevent diabetic complications, which may be potentially fatal, particularly for older individuals [32,33]. Hence It is important to examine and understand factors affecting self-management behaviours of diabetic patients but, about a third of the people suffering from diabetes may not be aware of it early considering the insidious onset and development [34,35].

Study conducted on 256 Mexican American patients showed that good self-care associated with lower HbA1c levels [36-38], Study conducted in India showed that good practice associated with good glycaemic control [39] and similarly in Study conducted in Jimma university specialized hospital [40]. In study conducted in Tikur Anbessa Specialized Hospital revealed that 55.6% respondents were adhered to diabetes Self-Management practices [41,42]. Study conducted in Dilla university referral Hospital, showed that male diabetic patients are two times more likely to have diet adjustment than females, and diabetic patients with very high income were 2.5 times more likely to have diet adjustment than with less income [25].

Self-monitoring of blood glucose (SMBG) is a tool that guides gycaemic management. Generally testing blood glucose before and after each meal and at bedtime over the course of 2-3 days per week is recommended [43]. The systematic review on Metabolic and Endocrine Disorders showed that the overall effect of SMBG was a statistically significant decrease of 0.39% in HbA1c [44].

Regular exercise has been shown to improve blood glucose control, reduce cardiovascular risk factors, contribute to weight loss and improve wellbeing. ADA recommends at least 150 minutes per week of moderate intensity aerobic physical activity that achieves 50 -70% of maximal heart rate. Structured exercise interventions of at least 8 weeks duration have been shown to lower A1C by an average of 0.66% in people with type 2 diabetes even with no significant change in Body Mass Index [45].

According to the WHO, insufficient physical activity, defined as less than 150 minutes of moderate physical activity per week [or equivalent], was present in about a quarter of men and a third of women in African region [46,47]. A similar study done in Harari, Ethiopia, showed that only 31.1% had exercise for thirty minutes per day [48]. The WHO has reported that as many as 50% of the patients with chronic diseases do not take their medications as prescribed [49]. Hence Effective and successful glucose control requires appropriate and timely use of medication over the entire period of treatment, which is often lifelong [50].

The study conducted in Netherland showed apparent increase in the number of co-medications tends to decrease the adherence of patient with type-2 diabetes to their treatment regimens [51] and study conducted in south western Nigeria showed that Mean number of prescribed medications was 4.6 ± 1.4 [52]. Similar study conducted in North West Ethiopia showed that Self-reported adherence to medication measure by MMAS-8 scale was low for 25.4% [49]. Study conducted in Kenyata National Hospital on 171 type 2 diabetes patients; showed that Most patients, 127 (74.3% [53,54].

Positive family behaviors and parents encouraging and supporting youth in completing their own self-management may exert positive effects on diabetes [55,56]. Friends and families of individuals with diabetes play an important role in their well-being, successful self-management, and achievement of in-range glycaemic control [57-59].

In a study conducted in Thailand, knowledge about the illness were significantly related with the level of self-care behaviors [60,61]. In study conducted in Nigeria to evaluate the level of knowledge among type 2 diabetics showed that knowledge is below mean score 39% ± 16.7% [62]. In a South African primary care setting, showed lower levels of diabetes knowledge with an average of 52.2% compared to their Indian counterparts with an average of 75.9% [63,64].

Study conducted in Mekelle showed 132(44.0%) respondents had good knowledge [65] and study conducted in Felege Hiwot Hospital that Half (49.8%) had good knowledge and 144(36.8%) participants had good practice on diabetes. Age group between 18-32 yrs was 6 times more likely to have good practice. Higher educational status was also associated with good knowledge and practice. Participants in grade 1-8, grade 9-12 and higher education and above were 3.5, 4.3 and 5.4 times respectively to have good practice [66].

Inadequate diabetic self-management remains a significant problem facing health care providers and populations in all settings. Patients who have adequate self-management have better outcomes, live longer, enjoy a higher quality of life, and suffer fewer symptoms and minimal complications [67]. Despite scientific support for glucose control as a therapeutic strategy in diabetes, many diabetics do not care enough of their disease, and this causes the lack of or imperfect control of glucose [68,69]. Several studies which have assessed and managed diabetes in different countries, all indicate that diabetes management in different societies, even in developed countries is not desirable [70]. Similarly Studies conducted in Different Hospitals in Ethiopia have shown that glycaemic control is poor [48].

Local evidences on diabetes knowledge, attitude, levels and predictors of self-care behaviour adherence and glycaemic control are limited in Arba Minch General Hospital. Factors influencing glycaemic control and adherence to self-care behaviour based on seven self-care behaviour components have not been studied so far and Studies conducted elsewhere could not be used to infer about diabetic patients in the study area, as these differs in cultures and life style.

Therefore, to address these discrepancies, this research explored patient's diabetes knowledge, attitude, levels and predictors of adherence to self-care behaviour and glycaemic control, amongst adult type 2 diabetics and contribute to the scientific body of knowledge in general and it specifically provide necessary information for health care providers and diabetic patients in the Hospital for appropriate interventions to prevent or delay complications of DM. The study can be used as a basis for future similar studies at a diabetic follow-up unit at Arba Minch General Hospital.

Objectives and research questions

Research question: What are level and predictors of adherence to overall self-care behaviour in adult type 2 diabetics at Arba Minch General Hospital?

General objective: To asses Levels and Predictors of Adherence to Self-Care Behaviour among Adult Type 2 Diabetics at Arba Minch General Hospital, Southern Ethiopia.

Specific objectives:

- To determine level of adherence to self-care behaviour among adult type 2 diabetics at Arba Minch General Hospital.

- To identify Independent predictors of overall self-care behaviour adherence among adult type 2 diabetics at Arba Minch General Hospital.

Methods and Materials

Study area and period

This study was conducted from [15th-February to 15th-March, 2015] at Arba Minch Hospital, in Gamo Gofa zone; which is located about 505 km south from Addis Ababa, about 275 km from Hawassa, the capital of the SNNPR region. According to the 2007 census, Gamo Gofa Zone has a population of 1,595,570; of this 794,485 were male and 801,085 were female. There are three hospitals and 68 health centers offering health care services for the total population. Arba Minch Hospital is one of these hospitals and is located in Arba Minch Town. The hospital is rapidly expanding in terms of services it provides and infrastructures.

Study design

A facility-based cross sectional study was conducted amongst adult type 2 diabetic follow-up patients at Arba Minch General Hospital, Gamo Gofa Zone; Southern Ethiopia.

Source and study population

The source population were all type 2 diabetics who visit Arba Minch general hospital for diabetes follow-up care.

Study population

Study subjects included in this study were those aged 15 years and older, diagnosed with type 2 diabetes visited the hospital at the time of data collection period and fulfils eligibility criteria.

Inclusion and exclusion criteria

Inclusion criteria: Type 2 diabetic Patients who were 15 years and above having at least three month follow-up were included while Patients with a documented history of psychiatric illness; hearing impairement; serious health problems and pregnant women were excluded.

Variables of the study

Independent variables:

Socio-demographic variables: Sex, Age, Marital status, Religion, Ethnicity, Educational status, and Income.

- Age at diabetes onset

- Type of treatment

- Duration of diabetes

- Family history of diabetes

- Social drug use

- Presence of comorbidity

- History of hospitalization

- Patient physician relation

- Family support

- Knowledge of diabetes

- Attitude about diabetes

- **Outcome variable:** Adherence to self- care behaviour

Sample size determination and sampling technique

Sample size determination: The prevalence of glycaemic control and 17% prevalence was taken according to study conducted in Jimma University specialized Hospital [40] and Z value of 1.96 at 95% confidence interval was used and 10% was added for non-response rate.

The sample size was determined by using single population proportion and correction formulas. Formula for Correction for finite population was considered since the source population below 10,000.

$$no = \left(z^2 pq \right) / e^2 = 216.8 \approx 217$$

Corrected sample size ≈ 172

Sampling technique and procedures: Consecutive sampling technique was used to collect data and patient coming to the clinic for a follow-up service during data collection period were interviewed after screening them for eligibility criteria on arrival. The questionnaire was asked to the patients as they move from registration, triage, meeting the clinician to exit with minimal interference with the clinic activities.

Data collection tools and procedures

Data collection tools: The Questionnaire contains five parts, Part I and II were used to collect socio demographic data and clinical status data of the study subjects. Patient professional relationship was determined by using validated tool [71]. Part III was used to collect medication adherence data by Morisky Medication Adherence Scale (MMAS) [72]. Part IV diabetes knowledge/DKT [73] and Part V diabetes attitude were validated for assessment of Diabetes attitude and knowledge respectively. Part VI is the modified SDSCA, which was used to measure seven areas or domains of diabetes self-care practices. Summary of diabetes self-care activities (SDSCA) is used to measure seven diabetes self-care activities [74].

Data collection procedures

Informed written consent was obtained from each patient at the time of their visit to the hospital. Anthropometric measurements were used to assess the body mass index (BMI) of the patients. Weights

of patients were measured using weighing scale up to the nearest 100 g. Heights were measured using a standard height board with the participant wearing no shoes. Measurements for height were then taken to the nearest 1 cm. The socio demographic data, disease related factors data, health system related data and data on diabetes knowledge, attitude, and self-care behaviours, and Patient professional relationship were collected by direct patient interview using structured and standardized questionnaires. The data were collected by trained (B.Sc.) nurses who have experience of data collection previously.

Data quality control

Questionnaires were prepared in English and translated into Amharic and translated back into English to check its consistency. The Amharic versions were used for data collection after pretesting on 5% (9) of the actual sample size in Chencha Hospital diabetes clinic. Five (B.Sc.) nurses for data collection and one medical doctor (MD.) working in the hospital for supervision were given orientation before data collection. Continuous follow up and supervision was made by the principal investigator throughout the data collection period.

Data analysis

The collected data was checked for completeness and consistency by principal investigator on daily basis at the spot during the data collection time. Then data was transcribed back to English and entry was made using Epi-data 3.1 software and analysis was made using SPSS version 20.0. A summary descriptive statistics was computed for most variables; bivariate analysis was done to determine the presence of association between adherence to self-care behaviour with other variables [75-82]. To avoid many variables and unstable estimates in the subsequent model, only variables that reached a p-value less than 0.05 at bivariate analysis was kept in the subsequent model analysis. Multiple logistic regression analysis was applied to describe the functional independent predictors of adherence to self-care behaviour. A point estimates of Odds ratio (OR) with 95% confidence interval (CI) were determined to assess the strength of association between independent and dependent variables. For all statistical significant tests p-value<0.05 was used as a cut-off point.

Ethical considerations

Ethical clearance was obtained from institutional Review Board of Jimma University College of Public Health and Medical Sciences. Permission letters to conduct the study was obtained from, Gamo Gofa Zone, health department and Arba Minch General Hospital administration. Interview was carried out only with full consent of the patient being interviewed. Each respondent was assured that the information provided by him/ her was confidential and used only for the purpose of research. Respondents were allowed to refuse or discontinue participation at any time they want.

Operational definitions and definition of terms

- **Age at disease onset:** age when the patient is told by physician about the diagnosis for the first time or documentation of the age of the diagnosis at the first time.

- **Being active:** respondents were labelled to have optimal physical activity if he/she scores greater than or equal to 75%, moderate if 50-75% and poor if less than 50% of the questionnaire.

- **Dietary adherence:** respondents were labeled to have "optimal dietary adherence" if they score ≥ 75% the mean score,

"moderate" if they score 50-75% and "poor" if <50% of the mean score of the total, on the closed ended questions related to dietary adherence.

- **Family history of diabetes:** having a history of diabetes of their parents and first- and second-levels of relatives as self-reported.

- **Fasting blood glucose** (FBS): blood is tested for glucose at least eight hours after meal.

Glycaemic control: The level of glycaemic control was indicated as 'adequate glycaemic control' when FBS results were between 70–130 mg/dL (3.9–7.2 mmol/L) (i.e. an average of three measures at different visits), or when RBS results were less than 180 mg/dL (10.0 mmol/L); 'inadequate glycaemic control' takes place when FBS greater than 130 mg/dL and RBS greater than 180 mg/dL [24].

- **Good knowledge:** Respondents were labelled to have good knowledge of diabetes if they scored greater than or equal to mean score of the total on the knowledge questions and otherwise poor knowledge.

- **Good patient relation:** Respondents were labelled to have good relationship if he/she scored greater than 80% of the questions related to patient professional relationship, moderate if 70-80% and poor if less than 70% were scored.

- **Good self-care behaviour:** Respondents were labeled to have "good self-care" if they score the mean score of the total or above, on the closed ended questions related to self-care behaviour and poor otherwise.

- **Health coping:** Respondents were labeled to have "optimal health coping" if they score ≥ 75% the mean score, "moderate" if they score 50-75% and "poor" if <50% of the mean score of the total, on the closed ended questions related to health coping.

- **Hypoglycaemia:** An abnormally diminished concentration of glucose in the blood<70 mg/dl.

Medication adherence: The degree of adherence was determined by using MMAS-8 and participants scoring (1-2) were recorded as good adherence and those (≥3 points) were recorded as poor adherence [75].

Monthly income: Defined as all household's total monthly income that participants self-reported and categorized as low if less than 750.00 birr and high otherwise.

Positive attitude: Respondents were labelled to have positive attitude if they scored 50% or above to questions related to attitude; otherwise, negative attitude.

Problem solving: respondents were labeled to have "optimal problem solving" if they score ≥ 75% the mean score, "moderate" if they score 50-75% and "poor" if <50% of the mean score of the total, on the closed ended questions related to problem solving.

Risk reduction: respondents were labeled to have "optimal risk reduction" if they score ≥ 75% the mean score, moderate if they score 50-75% and poor if <50% of the mean score of the total, on the closed ended questions related to risk reduction.

Self-care behaviours mean score: (Number of days patient practiced specific behaviour)/(Total number of days under questions designed for that behaviour).

Self-care: It is the practice of activities that individual diabetics will

initiate and perform on their own behalf in controlling their disease, maintaining life, health and wellbeing.

Self-monitoring of blood glucose: Respondents were labeled to have "optimal self-monitoring" if they score ≥ 75% the mean score, "moderate" if they score 50-75% and "poor" if <50% of the mean score of the total, on the closed ended questions related to self-monitoring of blood glucose.

Results

Socio-demographic characteristics of the respondents: One hundred ninety four type 2 diabetics were included in this study. With regard to Sex distribution 99 (51.0%) were Females. The majority of study participants 115(59.3%) were in the age group of 35-54 years and mean age (±standard deviation (SD)) of participants was 50.3(±13.2) years, ranging from 17-83 years. One hundred one (52.1%) were orthodox by religion and majority of the respondents 102 (52.6%) were Gamo by ethnicity. One third (29.4%) of respondents had monthly income below 750.00 birr per month) with mean monthly income of 1872.55 ± 1351.16 birr ranging from 300-8,000 birr. With regard to educational status of respondents 57 (29.4%) were attended college and above followed by 1-8 grade 54 (27.8%) (Table 1).

Diabetes related clinical characteristics: Majority of respondents 114(58.7%) reported that there diabetes was diagnosed at age of 35-54 years with mean age of diagnosis (±SD) 45.29 (±12.8) years ranging from 15-77 years. More than half of respondents 111 (57.2%) had diabetes duration less than five years, with mean duration of diabetes 5.02 ± 3.8 years, ranging from 1-20 years. Most of patients 169(87.1%) were on oral anti diabetics for their diabetes management and the mean number of drugs per patient for treatment was 2.09 ± 0.5. Most of respondents 129(66.5%) had no family history of diabetes and majority of patients 165(85.1%) had family support for their diabetes care. Eighty seven (44.8%) had good glycaemic control and mean, fasting blood glucose of 148.8 mg/dl ± 48.7 mg/dl, ranging from 87.5-449 mg/dl and Majority of respondents 168(86.6%) had no history of hospitalization due to hyperglycaemia (Table 2).

Most of patients 169(87.1%) were on oral anti diabetics for their diabetes management followed by insulin 14(7.21%) (Figure 1). With regard to presence of comorbidity along with diabetes; only 36(18.6%) of respondents had comorbidity, among which hypertension was the most common 24(69.4%) followed by heart failure and kidney disease (Figure 2).

Diabetes and health facility related factors: Majority 169(87.1%) of respondents had good relationship with professionals caring for their diabetes and only 13(6.7%) respondents had poor relationship with health professionals caring for their diabetes (Figure 3).

Diabetes knowledge: One hundred eighty six (95.8%), subjects had good knowledge and only 4.2% had poor knowledge about diabetes and its care principles. Participants were asked about causes, types and management principles of diabetes, accordingly, 194(100%), responded that Cuts and abrasions on diabetics heal more slowly; 190(97.9%), said that A fasting blood sugar level of 210 is too high; 165(85.05%), reported that Eating too much sugar and other sweet foods is a cause of diabetes, In untreated diabetes, the amount of sugar in the blood usually increases, If I am diabetic, my children have a higher chance of being diabetic and diabetes is not curable (Table 3).

Diabetes attitude: One hundred sixteen (59.8%) of respondents had positive attitude towards diabetes. As per reported by respondents 94 (48.5%) were afraid of their condition and said it was difficult to

believe they were suffering from diabetes, 78(40.2%) felt unhappy and depressed because of the diabetes, 105(54.1%) felt satisfied with their life and 165(85.1%) felt they could do anything that they set out to do concerning their diabetes and 32(42.7%) found it hard to carry out all the practices related to the disease. However, 194(100%) stated that, all things considered, they were very well right now (Table 4).

Adherence to self-care behaviour: This study revealed both individual and overall adherence to self-care behaviour. Majority 169(87.1%) of respondents practiced health coping behaviour (i.e. managing stress related to diabetes), 163(84.0%) adhered to medication taking behaviour and 116(59.8%) practiced recommended dietary behaviour. On the other hand, only 19(9.8%) and 11(5.7%) practiced problem solving and self-monitoring of blood glucose respectively.

Socio-demographic characteristics	Number (%)
Sex	
Female	99(51.0)
Male	95(49.0)
Age	
15-24	8(4.1)
25-34	4(2.1)
35-44	55(28.4)
45-54	60(30.9)
55-64	38(19.6)
Above 64	29(14.9)
Religion	
Orthodox	101(52.1)
Protestant	66(34.0)
Muslim	22(11.3)
Catholic	5(2.6)
Ethnicity	
Gamo	100(51.5)
Amhara	41(21.1)
Gofa	27(13.9)
Wolayta	19(9.8)
Others*	7(3.6)
Marital status	
Married	157(80.9)
Divorced	17(8.8)
Widowed	12(6.2)
Single	8(4.1)
Monthly income	
≥750.00 birr	137(70.6)
<750.00 birr	57(29.4)
Educational status of respondent	
College and above	57(29.4)
1-8 grade	54(27.8)
9-12 grade	51(26.3)
Illiterate	32(16.5)
Occupational status	
Merchant	57(29.4)
Gov't/private employee	48(24.7)
Farmer	45(23.2)
House wife	22(11.3)
Retired	13(6.7)
Daily laborer	9(4.6)

*Gurage, Tigre, Hadiya, Kambata, Konso, Zayise

Table 1: Socio-demographic characteristics of respondents among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).

Clinical and social factors	Number (%)
Age at disease on set	
15-24	8(4.1)
25-34	28(14.4)
35-44	59(30.4)
45-54	55(28.4)
55-64	27(13.9)
Above 64	17(8.8)
Duration of diabetes in years (n=194)	
≤5	122(62.9)
6-10	54(27.8)
11-15	15(7.7)
Above 15	3(1.5)
Number of medications	
Two	144(74.2)
Three and above	34(17.5)
One	16(8.2)
Frequency of administration per day	
Two	160(82.5)
Three	29(14.9)
One	5(2.6)
Family history of diabetes	
No relative	129(66.5)
1st degree relative	51(26.3)
2nd degree relative	14(7.2)
Family support for diabetes care	
Always supporting	166(85.6)
Sometimes supporting	28(14.4)
Alcohol use status	
Ex-drinker	146(75.3)
Non-drinker	36(18.6)
Drinker	12(6.2)
Chat use	
Non-chewer	174(89.7)
Ex-chewer	15(7.7)
Chewer	5(2.6)
Smoking status	
Non-smoker	189(97.4)
Ex-smoker	5(2.6)
Average fasting blood sugar	
>130 mg/dl	107(55.2)
70-130 mg/dl	87(44.8)
Body mass index	
17.9-24.9 kg/m²	116(59.8)
25-30 kg/m²	67(34.5)
Above 30 kg/m²	11(5.7)
History of hospitalization related to diabetes	
Not hospitalized	168(86.6)
Hospitalized	26(13.4)
Experience of hypoglycaemia in past one year	
Not experienced	165(85.1)
Experienced	28(14.4)
I don't know	1(0.5)
Presence of comorbidities	
No	158(81.4)
Yes	36(18.6)

Table 2: Clinical characteristics respondents among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).

With regard to physical activity 98(50.5%) of respondents reported to have optimal to moderate physical activity (participated in at least 30 minutes of physical activity for total of ≥ 3 days per week) and 96(49.5%) of participants were least active. On the other hand majority of patients reported having their serum glucose measured at least once or twice a month usually on day of their clinic appointments and only 16(8.2%) of respondents had self-monitoring of their blood glucose at home.

This study also revealed that only 76(39.1%) respondents reported to have optimal risk reduction behaviour practice (checking their foot, inspecting inside of shoes and visiting eye and dental clinic).

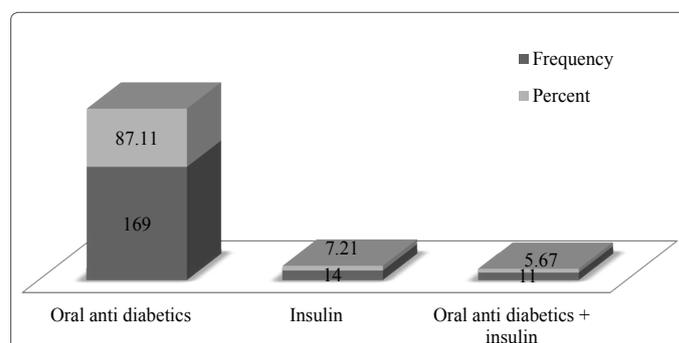Overall self-care behaviour adherence above half 114(58.8%) had

Figure 1: Diabetes management type among adult type 2 diabetic patients at Diabetes follow-up clinic among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).
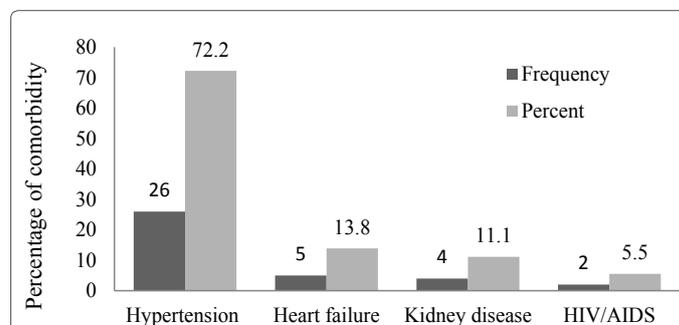

Figure 2: Type of comorbidities among adult type 2 diabetic patients at Diabetes follow-up clinic among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=36).
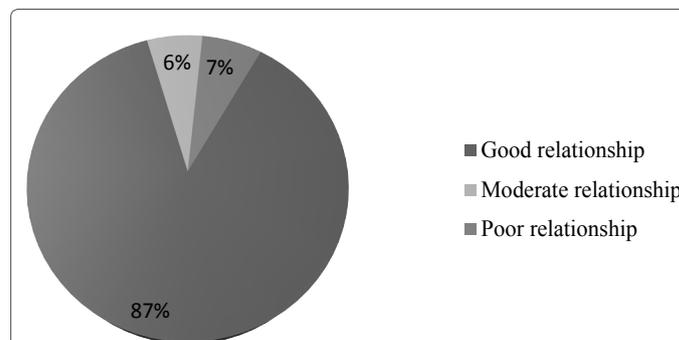

Figure 3: Patient professional relationship at Diabetes follow-up clinic among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).

Diabetes knowledge response	Response			
	Correct	%	Incorrect	%
Cuts and abrasions on diabetics heal more slowly.	194	100	0	0
Diabetics should take extra care when cutting their toe nails.	194	100	0	0
A fasting blood sugar level of 210 is too high.	190	97.93	4	2.06
Tight elastic hose or socks are not bad for diabetics.	186	95.87	8	4.12
Diabetes can damage my kidneys.	180	92.78	14	7.21
The way I prepare my food is as important as the foods I eat.	175	90.20	19	9.79
Eating too much sugar and other sweet foods is a cause of diabetes.	165	85.05	29	14.94
In untreated diabetes, the amount of sugar in the blood usually increases.	165	85.05	29	14.94
If I am diabetic, my children have a higher chance of being diabetic.	165	85.05	29	14.94
Diabetes can be cured.	165	85.05	29	14.94
There are two main types of diabetes: Type 1 and Type 2.	165	85.05	29	14.94
A person with diabetes should cleanse a cut with iodine and alcohol.	145	74.74	49	25.25
Diabetes can cause loss of feeling in my hands, fingers, and feet.	145	74.74	49	25.25
A diabetic diet consists mostly of special foods.	145	74.74	49	25.25
Diabetes often causes poor circulation.	123	63.40	71	36.59
The usual cause of diabetes is lack of effective insulin in the body.	112	57.73	82	42.26
Frequent urination and thirst are signs of low blood sugar.	112	57.73	82	42.26
Shaking and sweating are signs of high blood sugar.	104	53.60	90	46.39
Medication is more important than diet and exercise to control my diabetes.	102	52.57	92	47.42
The best way to check my diabetes is by testing my urine.	100	51.54	94	48.45
Kidneys produce insulin	98	50.51	96	49.48
Regular exercise will increase the need for insulin or other diabetic medication.	98	50.51	96	49.48
An insulin reaction is caused by too much food.	54	27.83	140	72.16
Diabetes is caused by failure of the kidneys to keep sugar out of the urine.	40	20.61	154	79.38

Table 3: Frequency distribution of diabetic patients' knowledge response among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).

poor self-care behaviour adherence and only 80(41.2%) practiced the recommended self-care practices.

Medication adherence based on MMAS-8: Most of respondents 163(84.0%) had good medication adherence and only 31(15.9%) of respondents had poor adherence. The major reason for not adhering to medication was forgetting to take medications 14(45.2%) followed by failure to understand instructions 8(25.8%) (Figure 4).

Predictors of adherence to self-care behaviour: Multivariable logistic regression analysis was done to identify independent predictors of adherence to self-care behaviour among the study participants. Respondents aged 35-44 were 13.4 times more likely to practice self-care activities as compared to those above the age of 64 years, [AOR=13.403, 95% CI=1.582, 113.564], Respondents earning <750.00 birr per month were less likely [AOR=0.340, 95% CI=0.119, 0.976] to have good adherence to self-care behaviour than those earning greater than ≥ 750.00 birr and individuals with diabetes onset age between 15-24 years were 11.3 times [AOR=11.3, 95% CI=2.621, 49.065] and

between 25-34 years were 7.5 times [AOR=7.5, 95% CI=2.0081, 28.23] more likely to have adherence to self-care behaviour than those above 64 years (Tables 5 and 6).

Discussion

Predictors of adherence to self-care behaviour

Diabetes self-care is an essential component of diabetes care. Diabetes self-management strategies increase lifestyle adjustments to maintain best possible diabetes management to achieve optimal glycaemic control in type 2 diabetics [83-91]. In this study the current situation of adherence to self-care behaviour of type 2 diabetics in Arba Minch General Hospital and factors that contribute to efficient adherence to self-care behaviour of diabetics was investigated.

In this study only 80(41.2%) practiced the recommended self-care behaviour activities. The finding of this study was similar to study done in Harari 39.3% of the study participants had good self-care practices [48]. However findings from study done in JUSH; 45% of the participants had Good self-care practice [40] and Nekemte Referral Hospital showed that; 45% of study participants had good self-care practices [9]. This variation could be due to difference in glycaemic target range used, instruments used to access self-care behaviour adherence since previous studies have used old AADEs criteria while we used new AADEs criteria.

Diabetes Attitude questions	Response			
	Positive	%	Negative	%
I'm afraid of my diabetes	100	51.54	94	48.45
I find it hard to believe that I really have diabetes	100	51.54	94	48.45
I feel unhappy and depressed because of my diabetes	116	59.79	78	40.20
I feel I'm not as good as others because of my diabetes	120	61.85	74	38.14
I find it hard to do all the things I have to do for my diabetes	150	77.31	44	22.68
I feel satisfied with my life	105	54.12	89	45.87
I can do just about anything I set out to do	165	85.05	29	14.94
Diabetes doesn't affect my life at all	60	30.92	34	69.07
I am pretty well off, all things considered	130	67.01	64	32.98
Things are going very well for me right now	194	100	0	0

Note: The answer to the question was recorded as positive for the first 5 questions if the respondents answered them No since they are questions of negative nature and for the next 5 questions, recorded as positive if they answered them Yes since they are questions of positive nature.

Table 4: Frequency distribution of patients' diabetes Attitude response among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).
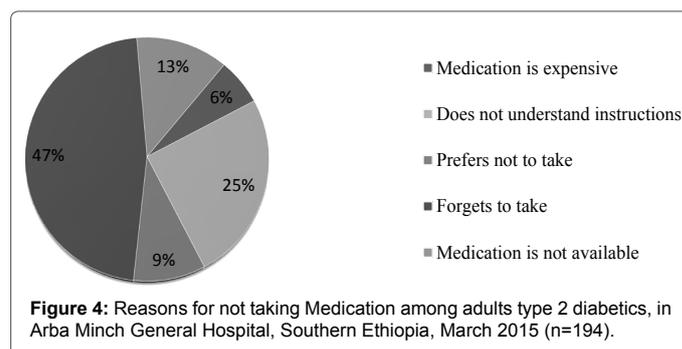

Figure 4: Reasons for not taking Medication among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).

Self-care behaviour components		Number (%)	Mean ± SD
Dietary adherence	Optimal dietary adherence	116(59.7)	0.903 ± 0.06679
	Moderate dietary adherence	44(22.6)	0.6473 ± 0.0763
	Poor dietary adherence	34(17.6)	0.3824 ± 0.04943
Physical activity	Optimal physical activity	78(40.2)	0.9355 ± 0.06679
	Moderate physical activity	20(10.3)	0.6256 ± 0.0693
	Poor physical activity	96(49.5)	0.3653 ± 0.0566
Self-blood glucose monitoring	Optimal self-monitoring	5(2.5)	0.7149 ± 0.02208
	Moderate self-monitoring	11(5.6)	0.5844 ± 0.0771
	Poor self-monitoring	178(91.7)	0.2512 ± 0.09337
Medication taking	Optimal medication taking	188(96.9)	0.9686 ± 0.04903
	Poor medication taking	6(3.1)	0.6429 ± 0.04994
Risk reduction	Optimal risk reduction	59(30.4)	0.9531 ± 0.04526
	Moderate risk reduction	17(8.7)	0.6587 ± 0.051
	Poor risk reduction	118(60.8)	0.38 ± 0.036
Health coping	Optimal health coping	169(87.1)	0.9007 ± 0.0506
	Moderate health coping	12(6.2)	0.5893 ± 0.06186
	Poor health coping	13(6.7)	0.3736 ± 0.05943
Problem solving	Optimal problem solving	47(24.2)	0.9688 ± 0.06156
	Moderate problem solving	19(9.8)	0.6190 ± 0.0693
	Poor problem solving	128(66)	0.167 ± 0.06960

All self-care practices were divided into three categories based on the following (below 0.5= poor, 0.5-0.75=moderate, and 0.75-1= optimal) except for medication taking practice 0-0.75= poor and 0.75-1= optimal.

$$\text{Self care behaviors mean score} = \frac{\text{Number of days patient practiced specific behavior}}{\text{Total number of days under questions designed for that behavior}}$$

Table 5: Diabetes patients' self-care behaviour components among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015 (n=194).

Adherence to self-care behaviour [a]			Self-care behaviour		COR	95% CI COR		AOR	95% CI for AOR		P value
			Optimal	Poor		Lower bound	Upper bound		Lower bound	Upper bound	
			N (%)	N (%)							
Optimal adherence to self-care behaviour	Age of the patient	15-24	0	8(100)	0.462	0.013	16.088	0.493	0.033	7.306	0.607
		25-34	1(33.3)	3(66.7)	0.955	0.085	10.710	1.652	0.076	35.802	0.749
		35-44	52(94.5)	3(5.5)	5.727	0.004	0.078	13.403	1.582	113.564	0.017*
		45-54	18(30)	42(70)	0.742	0.269	2.047	1.839	0.374	9.040	0.453
		55-64	2(5.2)	36(94.8)	0.018	1.091	30.078	0.033	0.005	0.223	0.000*
		Above 64 (Ref)	7(24.1)	22(85.9)	1			1			
	Monthly income	<750.00	13(22.8)	44(77.2)	3.240	1.603	6.547	0.340	0.119	0.976	0.045*
		≥750.00 (Ref)	67(48.9)	70(51.1)	1			1			
	Age at onset of diabetes	15-24	0	8(100)	0.041	0.001	2.227	11.339	2.621	49.065	0.001*
		25-34	22(78.5)	6(21.5)	0.084	0.020	0.354	7.530	2.008	28.233	0.003*
		35-44	45(76.3)	14(23.7)	2.462	0.476	12.716	.320	.076	1.355	0.122
		45-54	6(10.9)	49(89.1)	2.513	0.616	10.243	.369	.070	1.954	0.241
		55-64	3(11.1)	24(88.9)	0.096	0.027	0.341	.	.	.	.
		Above 64 (Ref)	4(23.5)	13((76.5)	1			1			

a. The reference category is: Poor adherence to self-care behaviour.
*Statistically significant at p<0.05

Table 6: Multivariable logistic regression of Predictors of adherence to self-care behaviour predicting the likelihood of self-care behaviour adherence among adults type 2 diabetics, in Arba Minch General Hospital, Southern Ethiopia, March 2015, (n=194).

There is no statistically significant association between educational level and good adherence self-care behaviour. This is incomparable with systematic review, showed that there is a positive correlation between education and regular diabetic self-care [91]. High educational attainment was associated with good and regular Type 2 DM self-care and it was also discovered that higher educational attainment were associated with less dependence on medications, high level of physical activity, and SMBG regularly and were associated with positive support behaviour or attitude [90].

This study showed that respondents aged 35-44 years were 13.4 times [AOR=13.4, 95% CI=1.582, 113.564] more likely to have good adherence to self-care behaviour than those above the age of 64 years. This study is similar to study done in Nekemte Referral hospital, respondents in age group 35-44 were more likely perform self-care as

compared to those above the age of sixty five [9,48] and study done in JUSH, age is associated with self-care practices [40], study conducted in Thailand, age was an independent predictor of self-care practices [60] being young aged in Type 2 DM was associated with ability to shifting of view or mentality and motivation to engage in healthy lifestyles [91]. This could be attributed to lack of motivation and lack of social support in elderly individuals compared to young adults.

Respondents earning<750.00 birr per month were less likely [AOR=0.340, 95%CI=0.119, 0.976] to have good adherence to self-care behaviour than those earning greater than ≥ 750.00 birr. This is similar with study done in Nekemte Referral Hospital; Subjects earning relatively high average monthly income (750-1050) Birr were 5.6 times more likely to practice self-care than those earning less than 350 Birr [9] and study done in Harari; patients relatively in high income category can get healthy foods that are recommended for diabetic patients [48], high income was correlated with high self-care ability or low income was associated with low self-care ability than those middle and high income patients [91].

About one half of the study population 96(49.5%) reported typical activities of daily living as regular exercise and only small proportion 76(40%) did additional activities purely for exercise. This is lower than the current recommendation made by ADA which states that adults with diabetes should be advised to perform at least 150 min/week of moderate-intensity aerobic physical activity (50–70% of maximum heart rate), spread over at least 3 days/week with no more than 2 consecutive days without exercise [24]. This might be due to lack knowledge on difference between physical activity and daily living activities and lack of access to recreational centers in the area.

In this study there was no statistically significant association between Diabetes Attitude and good adherence to self-care behaviour. This is in contrast to study conducted in Dilla University referral hospital showed that; individuals who had positive perception towards diabetes were 2.7 times more likely to perform recommended self-care than negative perception [25]. Similarly a study conducted in JUSH; Patients with high perceived severity of the disease was more likely to adhere to self-care practice [40]. This variation could be explained by difference in socio-economic characteristics, hospital setting and instruments used.

Limitations of the Study

The results of this study should be interpreted in light of its limitations. The adherence to self-care behaviours of the study participants were based on self-reports and possibility of desirability bias. Mean fasting blood sugar of the last three months nearest to study period rather than glycosylated haemoglobin to determine the level of glycaemic control was used, being single-centered study inferences should be made with caution and the use of cross-sectional data that can only demonstrate an association and not causality.

Conclusion and Recommendations

Conclusion

This study revealed that; adherence to self-care behaviour particularly physical activity, self-monitoring of blood glucose; problem solving and glycaemic control of adult type 2 diabetics were low. In this study respondents had high level of knowledge on diabetes and its care principles but inappropriate self-care practices. The respondents' age, age at onset of diabetes, monthly income and age at diagnosis of diabetes as independent predictors for adherence to self-care behaviour.

Recommendation

The following recommendations were made as per results of this study to improve the situation of diabetic patients:

1. Regional Health Bureau and Zonal Health Department in coordination with Arba Minch Hospital Diabetic Association Coordinators should have to develop health information dissemination programmes and strategies to improve the awareness of diabetic patients about the importance of glycaemic control and self-care practices especially physical activity, self-monitoring, and risk reduction.

2. All professionals working in diabetes clinic should give diabetes education and counselling during every visit on importance of self-care practices and should not rely on medical intervention only.

3. Arba Minch Hospital Administers and Arba Minch Hospital Diabetic Association Coordinators should design strategies to avail facilities to monitor HbA1c level of patients; hence it is more reliable method of determination of glycaemic level.

4. To researchers who are interested in the area it is important to conduct, further follow-up study to look into the sustainability of the self-care behaviour and its effect on diabetic related morbidity since observing behaviour is better than studying it as reported.

Competing Interests

There is no financial or personal relationship(s) which may have inappropriately influenced us in writing this article.

Authors' Contributions

Mende Mensa conceived the study and Tesfahun Chanie was first consultant during writing this paper. Lamessa Dube worked on the statistical analysis and polished the language. All of us participated in drafting the article, final reviews and approved the final manuscript.

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