



SURVEY ON QUALITY OF LIFE AND FUNCTIONAL MOBILITY IN TYPE 2 DIABETES: A CROSS-SECTIONAL STUDY

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Abstract: This study has been undertaken to investigate the determinants of Quality of life and Functional mobility in Type 2 Diabetes patient using SF-36 and TUG test. **BACKGROUND:** Type 2 diabetes mellitus (T2DM) is a chronic metabolic disease with major impact on the quality of life (QoL) in terms of various domains such as social, physical, and mental well-being. **Objective:** The objective of our study is to evaluate the quality of life and to determine the functional mobility among type 2 diabetic patients. **Methodology:** A cross sectional study conducted among 40 type 2 diabetic patients. Quality of life was assessed using Short Form – 36 questionnaire and functional mobility was assessed using Time Up and Go Test. **Result:** Out of 40 participants 28 were male and 12 were female participants. Result of the study suggested that quality of life score was found to be 72.1% in type 2 diabetic patients and time up and go score was found to be 25% participants under < 10s was completely independent, 60% participants under < 20s was independent for main transfer, and 15% under > 30s was required assistance. **Conclusion:** It was concluded from the results that quality of life and functional mobility has impact on type 2 diabetic patients.

Key words - Quality of life, SF – 36, Functional Mobility, TUG

I. INTRODUCTION

Diabetes is a heterogeneous metabolic disorder characterized by the presence of hyperglycemic due to impairment of insulin secretion, defective insulin action or both. [1] According to census 2017 international diabetes federation, 72.9 million adults in India were living with diabetes. India ranks the second highest total population in the worlds for diabetic patient. [2] As per the result of large-scale survey conducted across India, over 36% of the respondents who had diabetes in 2020 were above 60 years old age. notably, almost 4% of respondents in the 20- to 29-year-old age bracket also reported to have diabetes that year.[3] The analysis is based National Family Health Survey (NFHS-4) shows results that the overall prevalence of diabetes is higher among men (2.63) than women (2.35).[4]

India is titled as the diabetes capital of the world. Every 5th diabetic in the world is an Indian and the rising trends are due to aging, obesity, physical inactivity, genetic predisposition, rural to urban migration, and family history. Every diabetic patient's life is unique and they feel psychologically overwhelmed by the numerous rules that the disease constrains them to follow. Therefore, assessing the quality of life (QoL) of patients is important due to the fact that each individual has their own individualized perception on their physical, emotional, and social well-being, which includes a cognitive element satisfaction as well as emotional component happiness.[5]

Diabetes is classified by underlying cause. the categories are: type 1 diabetes – an autoimmune disease; type 2 diabetes – in which a resistance the effect of insulin secretion may be seen.[6] In type 2 diabetes mellitus, your body either doesn't make enough insulin or your body's cells don't respond normally to the insulin. This is the most common type of diabetes. Up to 95% of people with diabetes have Type 2. Other common names for Type 2 include adult-onset diabetes and insulin-resistant diabetes. Your parents or grandparents may have called it "having a touch of sugar." Risk factors for prediabetes and Type 2 diabetes include: Family history (parent or sibling) of prediabetes or Type 2 diabetes [7]. Depending upon etiology of diabetes mellitus, hyperglycemia may result from the following (1) Reduced insulin secretion; (2) Decreased glucose use by the body; and (3) Increased glucose production. Pathogenesis of two main types of diabetes mellitus and its complications is distinct.[7] Pathogenesis of type 2 diabetes mellitus the basic metabolic defect in type 2 diabetes mellitus is either a delayed insulin secretion relative to glucose load (impaired insulin secretion), or the peripheral tissues are unable to respond to insulin (insulin resistance). Type 2 diabetes mellitus is a heterogeneous disorder with a more complex etiology and is far more common than type 1, but much less is known about its pathogenesis.

A number of factors have been implicated though, but HLA association and autoimmune phenomena 3 are not implicated. These are: (1) Genetic factors; (2) Constitutional factors; (3) Insulin resistance; (4) Impaired insulin secretion; and (5) Increased hepatic glucose synthesis.[7] In essence, hyperglycemia in type 2 diabetes mellitus is not due to destruction of B-cells but is instead a failure of B-cells to meet the requirement of insulin in the body. Its pathogenesis can be summed up by interlinking the above factors as under: (1) Type 2 diabetes mellitus is a more complex multifactorial disease, (2) There is greater role of genetic defect and heredity. (3) Two main mechanisms for hyperglycemia in type 2 diabetes mellitus -insulin resistance and Impaired insulin secretion, are

interlinked; (4) While obesity plays a role in pathogenesis of insulin resistance, impaired insulin secretion may be from many constitutional factors; and (5) Increased hepatic synthesis of glucose in initial period of disease contributes to hyperglycemia. [7]

Type 2 Diabetes exposes people to both physical (cardiovascular diseases, neuropathy, diabetic foot, stroke, etc.) and psychological complications (e.g., depression and emotional distress); it also has a direct impact on several social aspects. And, more generally, on daily life (due to, e.g., glycemic control and changes in dietary habits and in lifestyle). Indeed, psychosocial factors seem to be, for diabetic patients, better predictors of relevant clinical outcomes (i.e., mortality). Type 2 Diabetes exposes people to both physical (cardiovascular diseases, neuropathy, diabetic foot, stroke, etc.) and psychological complications (e.g., depression and emotional distress); it also has a direct impact on several social aspects and, more generally, on daily life (due to, e.g., glycemic control and changes in dietary habits and in lifestyle). Indeed, psychosocial factors seem to be, for diabetic patients, better predictors of relevant clinical outcomes (i.e., mortality and hospitalization). [8] If your blood glucose level remains high over a long period of time, your body's tissues and organs can be seriously damaged.

Some complications can be life-threatening over time. Complications include: cardiovascular issues including coronary artery disease, chest pain, heart attack, stroke, high blood pressure, high cholesterol, atherosclerosis (narrowing of the arteries), Nerve damage (neuropathy) that causes numbing and tingling that starts at toes or fingers then spreads, Kidney damage (nephropathy) that can lead to kidney failure or the need for dialysis or transplant, Eye damage (retinopathy) that can lead to blindness; cataracts, glaucoma, Foot damage including nerve damage, poor blood flow and poor healing of cuts and sores, Skin infections, Erectile dysfunction, Hearing loss, Depression, Dementia, Dental problems. [7] As a consequence of hyperglycemia of diabetes, every tissue and organ of the body undergoes biochemical and structural alterations which account for the major complications in diabetics which may be acute metabolic or chronic systemic. Both types of diabetes mellitus may develop complications which are broadly divided into 2 major groups: 1. Acute metabolic complications These include diabetic ketoacidosis, hyperosmolar nonketotic coma, and hypoglycemia; 2. Late systemic complications These are atherosclerosis, diabetic microangiopathy, diabetic nephropathy, diabetic neuropathy, diabetic retinopathy and infections. [9]

Type 2 Diabetes is diagnosed and managed by checking your glucose level in a blood test. There are three tests that can measure your blood glucose level: fasting glucose test, random glucose test and A1c test. Fasting plasma glucose test: This test is best done in the morning after an eight hour fast (nothing to eat or drink except sips of water). Random plasma glucose test: This test can be done any time without the need to fast. A1c test: This test, also called HbA1C or glycated hemoglobin test, provides your average blood glucose level over the past two to three months. This test measures the amount of glucose attached to hemoglobin, the protein in your red blood cells that carries oxygen. You don't need to fast before this test. Oral glucose tolerance test: In this test, blood glucose level is first measured after an overnight fast. Then you drink a sugary drink. Your blood glucose level is then checked at hours one, two and three. [7]

The impact of the disease and of treatment on all chronic Patients' quality of life (QoL) and lifestyle is a key concern for both the patients themselves and their physicians. This is particularly relevant in the case of diabetic patients: the Physical, psychological, and social burden of diabetes affects Patient's self-care behaviors, disease management, therapeutic adherence, and, consequently, QoL [8]. There are various factors associated with both short-term and long-term diabetes management that enumerate to the QoL negatively or positively. The microvascular and macrovascular complications and longer duration of illness associated with the disease are the foremost important factors that affect the patient's QoL. [5] A declining QoL and depression can also strongly influence a patient's commitment toward controlling his disease. Most of the existing QoL questionnaires for type 2 diabetics have been developed in the Western population which are socially, culturally, and economically different from Indian participants. By considering all such aspects, we aimed to determine the QoL of Indian type 2 diabetics using QoL questionnaire for Indian type 2 diabetes patients. [5] A cross-sectional quantitative study investigating the effects of age-related motor performances under increased attention demands by adding a motor task to the time up and go test. [5]

The purpose of the study is to confine the quality of life and functional mobility in type 2 diabetic patients using short form-36 and TUG respectively

METHODOLOGY

Population and Sample

Type 2 Diabetic patients reside in Vadodara district. The convenient sampling. The sample size was calculated using the G-power. The main outcome variable for the study was "SF-36". The calculated size of sample is 40.

Data and Sources of Data

The data selected from Vadodara district and duration 6 months from November 2021 to 2022. Study design: A cross-sectional study Selection criteria.

Theoretical framework

Inclusion criteria:

- Known type 2 diabetic patient 18 or >18 age who can give an age
- More than 6 months with or without comorbidity
- Male or female both are included

Exclusion criteria:

- No willingness
- Cognitive impairment
- Disability
- Women with gestational diabetes

Outcome measures:**• Short form 36**

Short form 36 is a health-related quality of life questionnaire to assess the quality of life, SF 36 consist of two main domains i.e., physical and mental components and 8 sub domains. Physical functional domain consist of question number “3 , 4 , 5 , 6 , 7 , 8 , 9 , 10 , 11 , 12” ,role limitation due to physical health domain consist of question number “13 , 14, 15, 16” , role limitation due to emotional problem domain consist of question number “23 , 27 , 29 , 31”, emotional wellbeing domain consist of question number “24, 25 , 26 , 28 ,30” , social functioning domain consist of question number “20 , 32” , pain domain consist of “21 , 22” and general health domain consist of question number “1 , 33 , 34 , 35 ,36. All the questions are scored in percentage on the basis of response obtain from the subject . each point has different weightage in percentage. first of all, all the questions scored independently and then according to domains they are aggregated on average score for each and every domain is obtained.

• TUG

The time up and go test is a simple evaluative test used to measure functional mobility. The TUG test requires only a few pieces of equipment, most of which people will already have at home: a chair with a solid seat and flat back, stopwatch, measuring tap, chalk, regular walking shoes or any assistive device you routinely used to walk, such as walker or quad can. To set up the test, the therapist will place a chair in an open space and measure 3 meters (10 feet) from the seat. A small piece of tape or chalk is used to marked the distance on the floor. To start the TUG, patient 18 will sit in a chair patient will sit in a chair with arms resting comfortably at the sides. Patient should be seated properly with hips positioned all the way to the back of seat. The test begins when the therapist says “GO” and starts the stopwatch. Therapist the patient that “you would then be timed as you rise from the chair, walk 3 meters, turn around, return to the chair and sit down”. The recorded time on the stopwatch is patients TUG score. While an assistive device is permitted, no other form of physical assistance should be used. If patient balance is impaired, someone should be at patient side to prevent from falling, but they should not hold patient up.

Material to be used:

- Pen, Pencil
- Consent form & Assessment form
- Patient information sheet
- One chair with a solid sit and flat back
- Stop watch
- Measuring Tap or ruler (to mark 3 meters)
- piece of tap or chalk
- Regular walking shoes
- Assistive device such as walker

Ethical clearance was obtained from the Institutional Ethical Committee of KPGU, Vadodara prior to the study. The whole procedure of the study was explained to all the subjects and patient information sheet was given to participants. A written informed consent of all the subjects were taken prior to the study. Total 40 type 2 diabetes subjects of the Vadodara district who were fulfilling the inclusion criteria, willing to participate and had signed the inform consent were included in the study. All the type 2 diabetic patients were assessed regarding demographic details, quality of life & functional mobility. Quality of life was assessed by filling “Short form – 36” and functional mobility was assessed by filling “Time Up and Go”. Both questionnaire and Test for all subjects were filled up by the investigator.

STATISTICAL ANALYSIS

Data was collected using standardized questionnaire. i.e., SF-36 and TUG.

- Data was entered in Microsoft office excel sheet 2022 and access was limited to research only.
- Data was cross-checked for any data entry error.
- Descriptive statistics are presented as Qualitative data as percentage, quantitative data as mean and standard deviation (SD).

RESULTS

Gender Distribution

Gender	Number of Participants
Male	28
Female	12
Total	40

Table 1: Gender distribution among type 2 diabetic patients

Table 1: shows the gender distribution of participants. Out of 40 participants 28 were male and 12 were female participants.

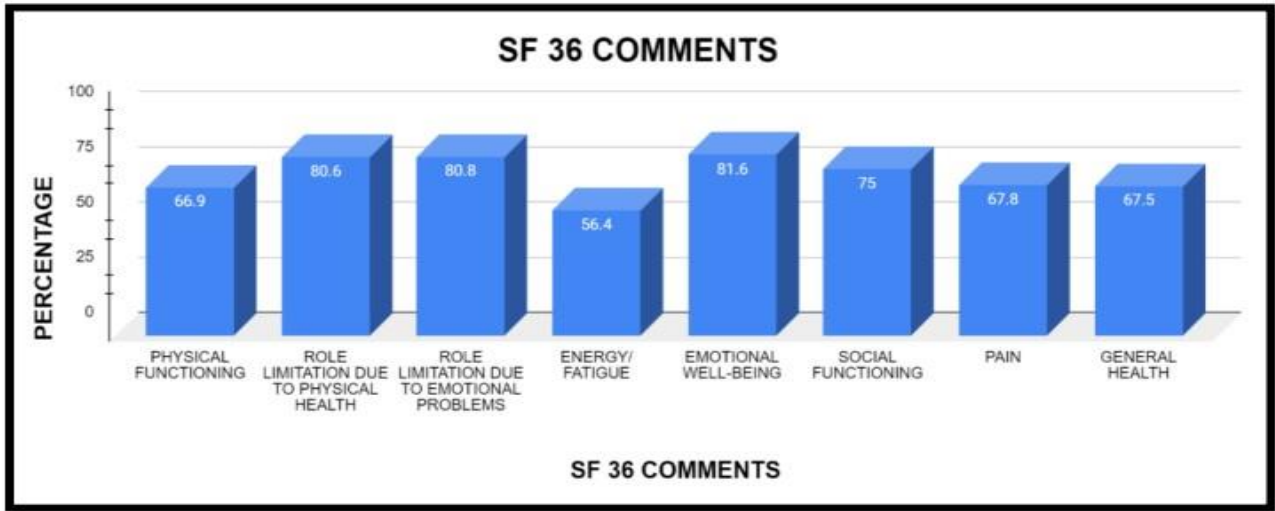
Age Distribution

Total No. of participants	Mean Age	SD
40	57.15	12.37

Table 2: Age distribution among type 2 diabetic patients

Table 2 Display the statistics of age distribution of the 40 participants. Among the 40 participants, the mean age was 57.15 with a standard deviation (SD) of 12.37. 22

QUALITY OF LIFE IN TYPE 2 DIABETIC PATIENT.



Finger 1: Affection of quality of life in eight domains of SF-36 type 2 diabetic patients.

Figure 1 shows affection of quality of life in eight domains of SF-36 type 2 diabetic patients. Emotional well-being (81.6%) domain was greatly affected following role limitation due to emotional problems (80.8%), role limitation due to physical health (80.6%), social functioning (75%), pain (67.7%), general health (67.5%), physical functioning (66.9%), energy/fatigue (56.4%).

FUNCTIONAL MOBILITY IN TYPE 2 DIABETIC PATIENTS

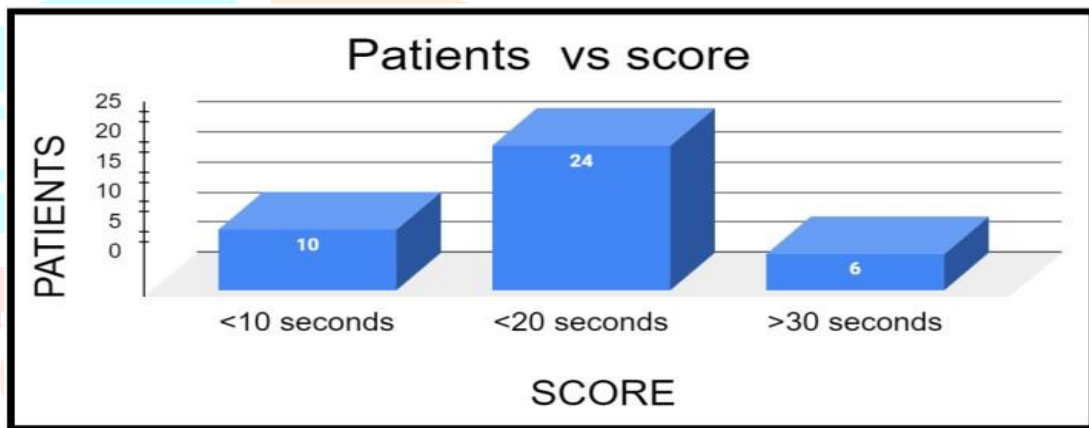


Figure 2: Affection of functional mobility in TUG type 2 diabetic patients.

Figure 2 shows the affection of functional mobility in TUG type 2 diabetic patients. 24 patients having under < 20s score (Independent for main transfer) was greatly affected 10 patients having under < 10s score (Completely independent) and 6 patients having under > 30s score (Required assistance).

TUG (Time Up and Go)	
Score	Number of patients
< 10s (Completely independent)	10
< 20s (Independent for main transfers)	24
> 30s (Required assistance)	6

Table 3: Patients distribution according to score

Table 3 shows the patients distribution according to score. Out of 40 patients 10 were under < 10s was completely independent, 24 were under < 20s was independent for main transfers and 6 were under > 30s was required assistance.

Discussion:

The study describes “survey on quality of life and functional mobility in patients with type 2 diabetes: a cross sectional study” with sample of 40 type 2 diabetic patients out of which 28 (70%) were male and 12 (30%) were female. With the mean age of 57.15 years and standard deviations of 12.37

Quality of life in type 2 diabetic patients using short form 36:

Quality of life type 2 diabetic was assessed using a short form-36 questionnaire. It has eight domains which are: Which is physical functioning, role limitation due to physical health, role limitation due emotional problems, energy / fatigue, emotional well-being, social functioning, pain and general health.

Item Number	Change original response	To recorded value
1,2,20,22,34,36	1	100
	2	75
	3	50
	4	25
	5	0
3,4,5,6,7,8,9,10,11,12	1	0
	2	50
	3	100
13,14,15,16,17,18,19	1	0
	2	100
21,23,26,27,30	1	100
	2	80
	3	60
	4	40
	5	20
	6	0
24,25,28,29,31	1	0
	2	20
	3	40
	4	60
	5	80
	6	100
32,33,35	1	0
	2	25
	3	50
	4	75
	5	100

Table 4: Recording Items

Scoring of the SF-36 health survey is a two-step process. First, precoded numeric values are recorded per the scoring key given in table 3. Note that all items are scored so that a high score defines a more favorable health state. In addition, each item is scored on a 0 to 100 range so that the lowest and highest possible score are 0 and 100, respectively. Scores present the percentage of total possible score achieved.

In the study result, physical functioning was 66.9% type 2 diabetes. The physical functioning domain consists of 10 questions about vigorous physical activity, moderate activities, lifting, stair climbing, bending, kneeling, stooping, walking, bathing, and dressing. Role limitations due to physical health domain consist of 4 questions about the limitations in work or other activities and difficulty in carrying activities or work. It was found to be 80.6% in type 2 diabetes. [25]

Role limitation due to emotional problem domain consists of three questions asking details about change in work or activity duration and change in way of doing activities. It was found to be 80.8% in type 2 diabetes. Emotional well-being domain consists of five questions asking about feeling of nervousness, calmness and peacefulness, downheartedness and tiredness. It was found to be 81.6% in type 2 diabetes. [26] Energy/fatigue domain consists of four questions asking about the level of energy and fatigue experience. It was found to be 56.4% in type 2 diabetes. [27]

Social functioning domain consists of 2 questions asking about interference of physical or emotional health in social activities with friends and family. It was found to be 75% in diabetes. [28]

Pain domain consists of 2 questions asking about bodily pain experience during work different activities during last 4 weeks. Pain was found to be 67.7% in diabetes. General health domain consists of 5 questions asking about general health conditions and its perception. It was found to be 67.5% in diabetes. The SF-36 questionnaire evaluates the physical domain to be significantly affected with the common symptoms like arthralgia, sleep disturbance, fatigue and depression. As well as the duration of recovery also had an accountable impact on the quality-of-life score and lesser the duration of recovery higher the quality-of-life score. [28] Hence both are inversely proportional to each other. Clinical recovery can be faster but cannot be correlated with the normal quality of life as persistence of symptoms hampers quality of life till longer duration. [29]

Functional mobility using TUG in type 2 diabetic patients' Functional mobility was assessed using time up and go test. Material we used to check TUG are one chair with arm rest, stop watch, tap (to mark 3 meters), chalk, regular walking shoes and assistive device such as walker. Method, we used to check TUG is first of all patient have to wear their regular footwear and can use a walking aid, if needed. Then patient have to start in a seated position. After that patient stand up upon therapist's command: walks 3 meters, turn around, walk back to the chair and sit down. Time stops when the patient is seated. Document the assistive device used. We observed the gait, balance, assistive device of all the type 2 diabetic patients we checked. We experienced the benefits like..

quick to conduct, minimal equipment required, highly reliable and valid. In the study result, based on the scoring out of 40 type 2 diabetic patients score was found to be 25% participants under 30s was required assistance.

Conclusion:

The study result was found that, the quality of life and functional mobility was affected in type 2 diabetic patients. It was concluded that, role limitation in physical health, emotional problems, emotional well-being and social functioning was majorly affected, in contrast to other components of SF-36 (Physical functioning, energy/fatigue, pain and general health). And that for functional mobility, 60% of them were independent for main transfers and less than 15% require assistance. A proper intervention of physical activity, diet and medications should be designed to improve reduced quality of life and functional mobility.

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