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Quality of Life and Self-care Activities Among Type 2 Diabetes Mellitus Patients on Insulin

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Abstract

Context: Self-care activities play a crucial role in the management of diabetes. It can also improve quality of life in patients. **Aims**: The present study was carried out to understand the QoL and self-care activities among T2DM patients on insulin and find out the association between quality of life and self-care activities. **Settings and Design**: This study was conducted on 105 subjects (55 females and 45 males) between the ages of 40 and 60 years with more than 1 year of T2DM attending OPD in the endocrinology department of private hospitals in North-east and East Delhi. **Materials and Methods:** A general questionnaire along with validated self-care (SDSCA) and quality of life (QOLID) questionnaires were used to collect data. **Statistical Analysis:** Data analysis was done using SPSS version 21.0. For the categorical variable, frequencies and percentages were calculated and for the continuous variables mean and standard deviations were calculated. **Results**: Mean age of subjects being 51.3 ± 6.2 years and 55% of them were females. It was observed that diet ($P = 0.016$), exercise ($P = 0.001$), blood sugar testing ($P = 0.017$), and foot care ($P = 0.018$) were strong predictors of self-care that were affecting the QoL. Mean scores of various domains between males and females revealed better QoL in males than females in domains of physical health (3.65 ± 0.94), physical endurance (4.11 ± 0.67), general health (3.19 ± 0.71), treatment satisfaction (3.55 ± 0.44), and overall QoL (3.50 ± 0.39). **Conclusions**: The present study showed that self-care activities and QoL among T2DM patients were poor. Results showed that improving nutritional status of patients can be effective on their QoL improvement.

Keywords: Quality of life instrument for Indian diabetic patients, Quality of life, SDSCA questionnaire, Self-care, Self-monitoring of blood glucose, Type 2 diabetes mellitus

Key Messages: Results showed that improving the nutritional status of patients can be effective on their quality of life's improvement. This paper caters to the benefits of the nutritional interventions for clinical condition and health promotion.

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Introduction

T2DM is one of the crucial world health problems of present-day society. According to the Diabetes Atlas published by the International Diabetes Federation (IDF), approximately 463 million people suffer from T2DM in 2019.[1] Around 88 million adults suffer from diabetes in the South-east Asia region.[1] India has a prevalence of 7.8%[2] with the largest number of diabetes cases and it is the second-most populous country in the world with 1.3 billion residents.[3] In the ICMR-INDIAB study in Chandigarh, a city in North India, the highest prevalence of diabetes was found (13.6%).[4] People with T2DM are at five-fold increased risk of complications such as cardiocerebrovascular disease, stroke, heart failure, and atherogenesis.[5]

Diabetes management includes good self-care such as diabetic diet, regular physical activity and SMBG can lead to improved glycemic control, positive outcomes, and cutback in complications.[6] Glycemic control through insulin therapy interplays when self-care interventions are not managed successfully. Studies have reported that insulin therapy when administered on diabetic patients has the potential to affect quality of life in both ways, positive or negative.[7] The QoL can be impeded by concerns with regard to hassles of frequent injections, needles/discomfort, and fears of hypoglycemia, weight gain, and other potential unfavorable events[8] and[9] due to which they have increased interest in arriving at alternatives.[10] Studies have shown that the T2DM patients who do not have suitable self-care conditions and who are not able to participate in self-care activities suffer major treatment costs.[11]

Quality of life (QoL) is a holistic concept which addresses many aspects of health. The WHO defines it as "a perception of an individual of his/her position in life in the relation to culture and value system in which they thrive and relation to their goals, expectations, standards, and concerns.[12] Management of T2DM has a great impact not only on mortality and morbidity of the disease but also on QoL of diabetic patients.[13]

The relationship between QoL and diabetes is bidirectional; aspects of diabetes may negatively impact QoL and impaired QoL may also negatively influence diabetes self-management and thus health outcomes and treatment satisfaction.[14] Many people who suffer from T2DM and who have poor QoL often have less attention to their self-care and disease management.[15] Better exercise self-care behaviors are associated with better HbA1c, lower BMI, fewer complications, and higher QoL.[16] Self-care nutrition, SMBG control, and self-medication behavior were identified as factors significantly associated with QoL.[17]

During the past decades, the major aim of controlling diabetes has been shifted to improve the complete patient's quality of life[18] else it can lead to frustration, reduced socioeconomic activities and

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health care.[19] Determining the factors and changeable predictors of QoL in T2DM patients, we can develop effective interventions for better care of diabetes, in addition to correcting the QoL in T2DM patients. Considering the importance of the QoL and Self-care among patients with diabetes, this study is aimed to assess the QoL and self-care and its association activities among T2DM patients.

Subjects and Methods

Methodology

Locale of the study

An observational and cross-sectional study was carried out among 105 T2DM patients which were identified and recruited (those who met the inclusion criteria from the endocrinology department of hospital in North-east Delhi and East Delhi, India. They were referred by the doctor after examination. Proper permissions from the concerned authorities of the hospitals were obtained to carry out the research work and collection of the data. Ethical approval from the Ethical Committee of Institute of Home Economics was obtained on September 24, 2018. The data for the study were gathered from November 2018 to January 2019.

Selection of the Sample

In this study, 105 T2DM patients were selected using purposive sampling techniques which included patients aged between 40 and 60 years (both adult males and females) diagnosed with T2DM since one year or more along with administering insulin therapy. Pregnant and lactating women were excluded and not screened for the study.

A detailed information sheet was formulated providing information regarding the purpose and procedure to be followed during the study. Further, consent of the T2DM patients was taken using a consent form before enrolling them for the study. Both these documents were approved by the ethics committee. A detailed information sheet (approved by the Ethics Committee) was formulated and given to the subjects providing information regarding the purpose and procedure to be followed during the study. The subjects were asked to confirm their participation and provide consent by filling up the consent form (approved by the ethics committee).

Data Collection

Data were collected using a validated revised version of summary of diabetes self-care activities questionnaire (SDSCA)[20] and Quality of Life Instrument for Indian Diabetic patients (QOLID)[21] questionnaires through a face-to-face interview. A general questionnaire consisting questions related to name, age, gender, education, occupation, income, marital status, medical history, biochemical parameters, dietary practices, physical activity pattern, and lifestyle was formulated. The questionnaire was prepared by two investigators based on the reviewed relevant literature and research papers. All the questionnaires were pretested among five insulin dependent T2DM patients visiting the hospital and were not included in the study. After analyzing the responses during pre-testing, the questionnaires were suitably modified and administered on 105 subjects enrolled for the study to collect the information. Participants were also asked to speak up their mind. Data collection tools also included anthropometric assessment tools for height and weight. The revised version of SDSCA consists of a core set of 11 items along with the expanded list of 14 additional questions which evaluates the status of patients' self-care during the past 7 days. The questionnaire included the following dimensions: Following a healthy diet (five items), exercise (two items), blood–glucose testing (two items), and foot care (five items), and taking medication (three items). The last item focused on smoking habits. Under every segment, the patients were asked to respond in the previous seven days how frequently they were able to practice the self-care activities. Scoring was done on an ordinal scale of 0–7 with higher scores suggesting better self-management. For the present study based on earlier literature, 0–4 has been considered unsatisfactory and 5–7 considered satisfactory. The method is uniform for all segments, excluding blood sugar testing for which the timeframe is taken for the past 3 months. QOLID consists of eight domains with 34 items, a reliable and valid tool for assessing the QoL of patients. The domains include general health (GH-4 questions on overall health and fatigue levels), physical health (PH-6 questions on how PH was limiting activities) and physical endurance (PE-6 questions on how disease interfered daily activities) reflect the health-related QoL (HRQOL), whereas the domains like treatment satisfaction (TS-4 questions to measure level of satisfaction with current treatment), mental health (MH-5 questions to measure their satisfaction from family/others support), financial worries (FW-6 questions on cost and expenses toward treatment regimen), diet satisfaction (DS-3 questions on food restriction behavior), and symptom irritability (SB-3 questions to find out symptoms such as thirst, hunger, and frequent urination) reflect the Diabetes Specific Quality of Life (DSQOL).[22] Questions under each of these domains had a 5-point Likert scale to be answered in. All items were rated on Likert scale from 1 to 5 where "1" indicated poorest quality of life for choices and "5" denoted the best quality of life standing for "never" or "very satisfied" in case of above two questions.[21]

Data Analysis

Data were entered into the excel sheet. Data analysis was done using SPSS version 21.0. For the categorical variable, frequencies and percentages were calculated and for the continuous variables mean and standard deviations were calculated. Association of self-care behaviors and quality of life among insulin dependent T2DM patients was assessed using Pearson's correlation. Level of significance was considered as ($P < 0.05$).

Results

In total, 100 T2DM patients participated out of which majority were females (55%). Over 40% of the subjects reported themselves to be unemployed which included mostly females who were homemakers. Physical activity was reported by most of them (70%) but it was light intensity like yoga or walking [Table 1].

Self-care Activities Measure

The mean scores of self-care behaviors including the self-care nutrition, self-management of physical activity, foot care, and self-medication among the sample were not statistically different

Table 1: Distribution of subjects on the basis of their sociodemographic profile

Parameter	*No. of subjects*
Gender	*n*=100
Male	45 (45.0)
Female	55 (55.0)
Age	*n*=100
40–44 years	18 (18.0)
45–49 years	19 (19.0)
50–54 years	24 (24.0)
55–60 years	39 (39.0)
Mean	51.32±6.20
Religion	*n*=100
Hindu	92 (92.0)
Muslim	5 (5)
Sikh	3 (3)
MArital status	*n*=100
Married	85 (85.0)
Widowed	15 (15.0)
Educational status	*n*=100
Primary (10th)	11 (11.0)
Secondary (12th)	16 (16.0)
Graduation	32 (32.0)
Postgraduation/Higher	18 (18.0)
Certificate/diploma	6 (06.0)
Uneducated	17 (17.0)
Current occupation	*n*=100
Government employee	21 (21.0)
Manual laborer	2 (02.0)
Private job	30 (30.0)
Any other	46 (46.0)
Total family income per month	
Up to 20,000	17 (17)
20,000–40,000	34 (34)
40,000–60,000	26 (26)
60,000–80,000	19 (19)
>80,000	4 (4.0)
Distribution of subjects according to duration of diabetes	
Category (in years)	Total
	n=100
>1–5	24 (24.0)
>5–10	40 (40.0)
>10–15	17 (17.0)
>15–20	8 (8.0)
>20	11 (11.0)
Distribution of subjects whether they smoke or not n=100	
Yes	17 (17)
No	83 (83)
Distribution of subjects whether they consume alcohol or not *n*=100	
Yes	27 (27)
No	73 (73)
Type of exercise	No. of subjects *n*=100
Light activity	70 (70)
Moderate activity	20 (20)
Heavy activity	4 (4.0)
Do not exercise	6 (6.0)
Frequency of exercise *n*=100	
Daily	72 (72)
5–6 days	23 (23)
3–4 days	4 (4.0)
1–2 days	1 (1.0)

*Values are presented as numbers (%)

between male and female patients ($P > 0.05$) [Table 2]. However, only SMBG control, a statistical difference was found where males were found to be more frequently checking their blood glucose than females ($P < 0.05$). Men focus on the technical aspects of SMBG but females center around their fears and anxieties. Our results support a similar finding that stated that men worth the technical

Table 2: Comparison of the self-care behaviors in male and female patients with Type 2 diabetes mellitus patients administering Insulin

Variable	*Male (n=45)*	*Female (n=55)*	*P value*
General diet	3.66±1.86	3.97±1.92	0.425
Specific diet	4.51±1.50	4.10±1.28	0.153
Exercise	5.56±2.07	5.52±2.09	0.925
Blood glucose testing	1.90±1.05	1.17±1.41	0.005
Foot care	5.21±1.24	5.46±1.16	0.315
Medications	6.97±0.14	6.93±0.25	0.339

*Values are presented as mean±standard deviation. *P* value based on independent t-test

understanding of blood glucose control.[23] Walking was most reported by all and certain targeted exercises were mostly done by males as in females household chores restricted exercises in women more than men and a study by Shrestha *et al*. 2013 reported social chores prevented them from exercising.[24] With respect to specific diet intake of 3–5 servings of fruits and vegetables, low fat milk and nuts/roasted snacks instead of tea biscuit were low as seasonal availability and cost may have contributed to low constancy to specific diet and this has also been stated in a study by Mogre *et al*. 2017.[25]

Domains in quality-of-life assessment

Quality of life is a comprehensive term affected in a complex way by the person's physical and psychological health, level of independence, social and environmental relationships, and personal beliefs[26] People with T2DM have a poorer quality of life in all aspects than those without diabetes.[27] In terms of gender, significant differences were observed in most aspects of life's quality of the patients. Among quality of life's dimensions, there was a statistical difference in physical health, physical endurance, and general health dimension which showed males had better health than females ($P < 0.001$) [Table 3]. The patients' treatment satisfaction level was statistically different showing greater satisfaction with treatment in males than females ($P < 0.001$) [Table 3]. The overall quality of life was found to be better in males than females, a statistical difference was found ($P < 0.001$) [Table 3].

Correlation between quality of life and various self-care factors

In the present study, correlation between quality of life and self-care was done using Pearson's correlation. It was observed that diet, exercise, blood sugar testing, and foot care were the main predictors of self-care that were affecting the quality of life. There was a positive correlation ($r = 0.241$, $P = 0.016$) between diet and quality of life. The results showed that the self-care behavior of nutrition was a strong predictor of quality of life. Medication was not a strong predictor of quality of life but it still was seen affecting quality of life as it was reported that insulin injections were problematic for certain patients. SMBG was the least followed self-care ($r = 0.238$, $P = 0.017$) and a similar result was found in a study by Mogre *et al*., 2017 where just one patient did SMBG daily. There was strong positive correlation ($r = 0.321$, $P = 0.001$) between exercise and quality of life and the most of the subjects were engaged in exercise but it was mostly low level with less regularity. A negative correlation ($r = -0.236$, $P = 0.018$) was found between foot care and quality of life. This showed that participants bothered to take care of their feet when they had

poor quality of life and when few suffered from symptoms related to foot disorders.

Discussion

The majority of the subjects were in the age group 50–60 years. Overall, the subjects' education level was good, the majority of subjects were either graduates or postgraduates and belonged to middle socioeconomic strata. Over 50% of the subjects reported that although they had been visiting the hospital, they did not receive any diabetes education from physician/nurse/dietician in the past due to lack of time, they did not give it priority and other circumstances such as laboratory tests and collecting medicines. A study by Abazari *et al*. 2012 also reported that patients' education failure was due to time constraints.[28]

About 85% of subjects reported that they did not have any family history of diabetes. The biochemical data record of those patients revealed that the majority (91.0%) of participants had unsatisfactory fasting blood glucose levels ranging from 103 to 590 due to lack of consistency in following the management and treatment plan and similar results a study reported where patients failed to achieve desired outcome due to lack of participation in treatment.[29] Over 95% participants reported high post prandial plasma blood glucose levels also ranging from 145 to 602 due to insufficient diabetes self-management education. A study by Yuan *et al*. concluded that education has positive outcomes on T2DM patients.[30] Approximately 76% of the subjects had poor HbA1c due to lack of information, self-care, and few of them despite knowing did not practice self-care. A study reported similar results that people knew what had to be done but did not execute it.[31]

For most of the participants (70%) following a diabetic diet meant avoiding sweets and sugar only, thus there was a lacuna found in their education and adherence toward dietary preferences. Furthermore, their adaptability toward adherence to diabetic diet was poor due to lack of knowledge, as compared to other self-care measures such as physical activity, foot care, and medication. A study by Kavya and Bant 2019 stated that patients had lack of knowledge regarding diabetic diet and low motivation which acted as barriers for following a healthy diet.[32] The majority of patients reported avoiding fruits totally as they believed that it would raise their blood glucose levels drastically. Consumption of regular salad was also poor among participants and a high intake of carbohydrates was reported in the form of bread and biscuits instead of nuts or roasted chana. A study by Mohammed-ali and Hamza 2016 also reported that high intake of bread (Blood sugar monitoring practices were poorly followed by the patients during the past 7 days among the participants (2.0%).[33] The general reasons reported were glucometer device maintenance, price of lancet and strips, anxiety and fear of pain, low technical knowledge, lack of health-care personnel support, and reliance on traditional/alternate therapies. The study by Mogre *et al*., 2017, findings where women showed fear and anxiety of needle pain more as compared to men.[25]

Adherence to specific foot care was poor and similar results were observed by Rajasekharan *et al*. (2015),[34] where also specific foot care was lacking. Adherence to medication was high, all participants were taking pills or insulin shots regularly as recommended to them since for most of them following a specific diet, engaging in apt physical activity and following foot care regimen seemed complicated on a routinely basis [Table 4]. A study by Shrivastava, Shrivastava, and Ramasamy (2015)[34] also reported high adherence to medication (Shrivastava, Shrivastava and Ramasamy 2013).[35]

Quality of life was studied on physical health, physical endurance, general health, treatment satisfaction, symptom botherness, financial worries, mental health, and diet contentment.

Over 50% of the subjects said diabetes prevented them from attending to their work and reported their cost of treatment as expensive. Nearly 80% of the subjects said diabetes affects efficiency at work. As much as 30% of the patients reported that the dietary regulation and medication for diabetes affected their work as they had issues with meal preparation. The most of the patients also mentioned to have experienced frequent urination very frequently during the past 3 months because of the disease which hampered their social activities. A study by Sricharen *et al*. 2020 also reported that patients avoided travelling on business tours, holidays, and general outings to a great extent due to diabetes.[36] Over 50% of the subjects reported that they were dissatisfied with themselves along with the personal relationships and emotional support that they received from their friends and family. The majority of the subjects (76%) felt a restriction in choosing the foods while they were eating outdoors.

Correlation

It was observed that diet, exercise, blood sugar testing, and foot care were the strong predictors of self-care that were affecting the quality of life of these TDM patients. There was a positive correlation (r = 0.241, P = 0.0.016) between diet and quality of life. Towhid 2017 also reported a direct relationship between nutritional performance and quality of life.[17] This shows that improving the nutritional status of patients can be effective on their quality of life's improvement. A negative correlation (r = –0.236, P = 0.018) was found between foot care and quality of life.[37] Participants

Table 3: Comparison of the quality of life in male and female patients with T2DM patients on administering Insulin

Variable	*Male (n=45)*	*Female (n=55)*	*P value*
Physical health	3.65±0.94	3.22±0.75	0.014
Physical endurance	4.11±0.67	3.20±0.83	0.000
General health	3.19±0.71	2.70±0.65	0.001
Treatment satisfaction	3.55±0.44	3.08±0.74	0.000
Symptom bother-ness	3.21±0.67	3.05±0.73	0.264
Financial worries	3.07±0.85	2.95±0.76	0.434
Mental health	3.36±0.57	3.53±0.71	0.200
Diet satisfaction	3.30±0.72	3.64±0.55	0.009
Overall quality of life	3.50±0.39	3.19±0.43	0.000

*Values are presented as mean±standard deviation. *P* value based on independent t-test

Table 4: Correlation between quality of life and various self-care factors

Variable (self-care) and BMI	*Correlation coefficient (r)*	*Significance (P)*
BMI	–0.003	0.98
General diet	0.241*	0.016
Specific diet	0.047	0.642
Exercise	0.321**	0.001
Blood sugar testing (SMBG)	0.238*	0.017
Foot care	–0.236*	0.018
Medication	0.157	0.119

**P* is significant at P<0.05

bothered to take care of their feet when they had poor quality of life and when they suffered from any symptoms related to foot disorder.

In spite of regular medication adherence, the most of the patients reported that they needed assistance while injecting insulin be it a family member, medical personnel, or attendant and because of their timely medication and frequent urination problems they reported that they highly avoided travelling or visiting friends/relatives.

There was positive correlation ($r = 0.321$, $P = 0.001$) between exercise and quality of life. Findings of this study also are in line with results of a similar study performed by Lukacs *et al*., 2016 on T2DM patients that found an association between increased physical activity and better quality of life.[38] Therefore, it can be recommended that more emphasis should be laid on promoting physical activity among T2DM patients as it could help them improve their quality of life.

In our study, significant association between gender and the quality of life where women had low scores [Table 3] than men which might be because they are likely to have limited income, greater responsibilities toward household chores, and more hurdles regarding health-care cover.[39] Therefore, these results highlight the need to develop different interventions for different genders to improve their quality of life.

Limitation of the study was that there was time constraint so it could have been done on a large subject size and more statistical tests could have been applied.

Strengths of this study include the use of standard tools for measuring the quality of life and self-care variables in T2DM patients. Patients were interested and eager to converse about their conditions and also to know about certain facts which they did not know could be related to diabetes and this facilitated in generating elaborative data.

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Statement of Authors' Contributions to Manuscript

Project conception, development of overall research plan, and study oversight were developed by Dr. Sonal Gupta Jain and Ms.Tanya Srivastava; hands-on conduct of the experiments and data collection was conducted by Ms.Tanya Srivastava; Dr. Vandana Sabharwal; and Ms. Tanya Srivastava performed statistical analysis; and paper writing was done by Ms.Tanya Srivastava and also had primary responsibility for final content. All authors read and approved the final manuscript.

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