**ORIGINAL ARTICLE**

# Health-Related Quality of Life and Its Determinants among Elderly Patients with Diabetes Mellitus in West Bengal, India

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### ABSTRACT

*Background:* India is experiencing an upward spiral in the diabetic population. With the impact of diabetes on physical, social, and psychological components of an individual's life, a holistic view in terms of Quality of Life (QoL) is being increasingly recognized as an essential component of diabetes care and management. *Objective:* This study aims to assess the Health-Related Quality of Life (HRQoL) and its determinants among the elderly population in a rural area of West Bengal, India. *Methods:* This cross-sectional study was conducted among 200 elderly patients with diabetes mellitus recruited by simple random sampling from the list available in 26 functional Health and Wellness Centers (HWCs) in Haringhata Block of Nadia district in West Bengal state, India. The QoL of patients were assessed by the WHO-QoL BREF questionnaire. The four domains of the WHO-QOL-BREF26 physical health, psychological, social relationships, and environment were rated on a 5-point Likert-type scale. Bivariate and multivariate analyses were performed to assess the determinants of quality of life. *Results:* Overall, 58% of the participants were found to have a good quality of life. 51% of the patients were unaware about diabetic complications. However, 85% of the patients reported adherence to diabetic medications. 58%, 55%, 55% and 61% reported good quality of life in physical, psychological, social, and environmental domains respectively. Sociodemographic factors like socioeconomic status, education, adherence to medicine, number of medicine intake per day, and depression appeared to be significant predictors of the outcome. *Conclusion:* Quality of life is an important outcome assessment tool for diabetes. Policymakers and concerned authorities may use the findings to revise their strategies if needed, and interventions for the betterment of the community.

**Keywords:** Elderly people, diabetes mellitus, non-communicable disease, quality of life, India

## INTRODUCTION

Diabetes is a global health issue affecting populations in all regions, including rural areas of low- and middle-income countries. The number of people with diabetes has been steadily increasing, with an estimated 422 million adults worldwide affected in 2014. The prevalence of diabetes has risen from 4.7% in 1980 to 8.5% in 2014, with the greatest increase observed in low- and

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middle-income countries compared to high-income countries.[1] In addition to adult diabetes, it is estimated that 1.1 million children and adolescents aged 14- 19 years have type 1 diabetes worldwide.[1] Without effective interventions, the number of people living with diabetes is projected to reach at least 629 million by 2045.[2] High blood glucose levels associated with diabetes contribute to nearly 4 million deaths annually.[1] The economic impact of diabetes is significant, with the International Diabetes Federation estimating that global healthcare spending on diabetes among adults amounted to $850 billion in 2017.[2] India is no exception; it has been noted that India is now the home of the highest number of diabetic patients in this millennium. In India, an estimated 77 million people above the age of 18 years are suffering from diabetes (type 2) and nearly 25 million are prediabetics (at higher risk of developing diabetes in the near future). More than 50% of people are unaware of their diabetic status which leads to health complications if not detected and treated early.[3]

The number of elderly people with diabetes is increasing globally, and it poses significant challenges to their health-related quality of life (HRQoL). Quality of life (QOL) is a broad multidimensional concept that usually includes subjective evaluations of both positive and negative aspects of life. The Centers for Disease Control and Prevention (CDC), USA, explains 'health-related quality of life' (HRQoL) as "an individual's or a group's perceived physical and mental health over time".[4] Biomedical/clinician-assessed measures of health status such as co-morbidity are often unable to capture individuals' perspectives and often correlate poorly with patient-reported outcomes such as HRQoL and/or subjective function.[5] HRQoL, hence provides a measure that is sensitive to the patients' perspective and subjective experience of health and illness that expands upon clinical measures.[6]

Adults with diabetes have a two- to three-fold increased risk of heart attacks and strokes. In India, the latest statistical data (NFHS-5) shows that diabetes and pre-diabetes are prevalent among Indian people with the percentages being about 19.8% and 6.1%.[7] Prevalence of diabetics among males and females (age more than 15 years and above) are respectively 21.3% and 17.5% in West Bengal (NFHS-5); while the same is 21.2% and 20.0% respectively in Nadia district of the state.[7]

Diabetes is a chronic disease that has a profound impact on the physical, emotional, and social well-being of individuals. The elderly population is particularly vulnerable to the complications associated with diabetes, which can lead to a decline in their HRQoL; also, significant challenges faced by the elderly diabetic population in rural areas are another issue to be dealt with.[8] Understanding the determinants that influence the HRQoL of elderly diabetic patients in a block can contribute to the development of comprehensive interventions and policies that will address the specific health needs of this population. The study's findings can also contribute to the existing literature on diabetes and HRQoL. With this background, the current study aims to assess health-related quality of life and determine its determinants among elderly diabetic patients in a block of Nadia district in West Bengal state of India.

## METHODS

A community-based cross-sectional study was conducted between February and July of 2023 in Haringhata Block under Kalyani subdivision of Nadia district in West Bengal state, India. All the elderly diagnosed type 2 diabetes mellitus aged 60 years and above permanently (at least more than one year) residing in the block were included in the study; while mentally disabled or seriously ill persons along with those who did not give consent were excluded from the study. The sample size was calculated using Cochran's formula, where p had been taken as the prevalence of good HRQoL which was found 48% in a previous study conducted in Nadia district in West Bengal.[8] Assuming a confidence interval of 95% and absolute precision of 7.5% (d), the sample size is calculated to be 171. Considering a nonresponse rate of 10% final sample size is 190. In Haringhata block, Nadia district there were a total of 42 Sub-centers of which only 26 had been upgraded to HWCs. Following the census method all the HWCs were included in this study since for samples to be drawn a pre-existing list of already diagnosed diabetic patients was the prerequisite. Next from these line lists available in the HWCs the eligible elderly persons were selected by simple random sampling.

A semi- structured, pretested and previously validated questionnaire was used. The first part of the questionnaire contained questions regarding sociodemographic characteristics, the second

was to measure mental health status by a standardized questionnaire i.e., PHQ9,[9] and the third part was to measure HRQoL by another standardized questionnaire WHOQOL BREF26.[10] The four domains of the WHO-QOL-BREF26 physical health, psychological, social relationships, and environment were rated on a 5-point Likert-type scale. As per the WHO user manual, raw scores for the domains of WHO QOL-BREF were calculated by adding values of single items and were transformed on a scale ranging from 0 to 100, where 100 is the highest and 0 is the lowest QOL. The mean score of each domain and the total score were calculated. Individuals with a total mean score of 50% and above were classified as having good QOL and less than 50% as having poor QOL.[10]

After data collection, data was entered in MS Excel and analyzed using SPSS 20.0 version for windows. Descriptive statistics were used to analyze the demographic and clinical characteristics of the participants. The HRQoL of the participants was analyzed using descriptive statistics, and the determinants of the same were analyzed using multivariate analyses. Bivariate and followed by multivariate analyses were done to find out the determinants of health-related quality of life. The factors that were found to have statistically significant associations with health-related quality of life were entered into multivariate analyses by enter method. All the tests were two-tailed; a p-value<0.05 was considered statistically significant.

## RESULTS

The majority of the patients belonged to the 60-70 years age group (90%) with a mean age of 63.90±5.77 years. Most of them were females (55%), Hindu (65%), from OBC caste (38.5%), from middle socio-economic class (32.5%), nuclear family (81%), illiterate (47%), and married (71%). Regarding financial dependence, half of the study participants were financially independent. (Table 1). Regarding clinical profile, the majority of the patients had DM for more than 3 years (53%), a recent RBS level above the threshold of 140 mg/dl (83.5%), obesity (33.5%), undergone physical exercise like brisk walking for more than 150 minute/week (68.5%), comorbidity (72%) of which hypertension being the commonest (93.75%) and depression of minimal level (33%). (Table 2). Slightly more than half of the surveyed individuals knew the complica-

tions of DM. Respondent had more knowledge of both Kidney and eye-related complications than any other. The majority of patients had adherence to medication as prescribed (85%) and consulted government health facilities (87.5%) regarding diabetes, had not undergone consultation in the last three months (75%), and had not been prescribed insulin therapy (96%). Most of them were taking more than 4 pills per day.to control the disease (29%) (Table 3). Regarding quality of life, overall, more than half of the study participants had a good quality of life (58%); while regarding different domains, the majority had a good quality of life in physical, psychological, social, and environmental domains (58%, 55%, 55% and 61% respectively) (Figure 1). The variables having an association with overall quality of life in bivariate analyses had been entered into a multivariate logistic regression model and religion, education, adherence to medicine, number of medicine intake per day, and depression appeared to be significant predictors of the outcome. Regarding determinants of the physical domain of quality of life, religion, education, number of medicine intake per day, and depression appeared to be significant predictors of the outcome in multivariate analyses; while regarding the psychological domain as well as social domain, only depression appeared to be a significant predictor of the outcome. Regarding the environmental domain of quality of life, education, Socioeconomic status (SES), and depression appeared to be significant predictors of the outcome in multivariate analyses. (Table 4).

**Table 1:** Sociodemographic characteristics of the participants (n=200)

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Age group<br><br>Mean±SD: 63.90±5.77 | 60-70 years | 180 | 90.0 |
| | 71-80 years | 17 | 8.5 |
| | 81-93 years | 3 | 1.5 |
| Sex | Male | 90 | 45.0 |
| | Female | 110 | 55.0 |
| Religion | Hindu | 130 | 65.0 |
| | Muslim | 70 | 35.0 |

| Variables | Categories | Frequency | Percent-age |
|---|---|---|---|
| Caste | General | 55 | 27.5 |
| | SC | 65 | 32.5 |
| | ST | 3 | 1.5 |
| | OBC | 77 | 38.5 |
| SES* | Upper | 19 | 9.5 |
| | Upper middle | 36 | 18.0 |
| | Middle | 65 | 32.5 |
| | Lower middle | 63 | 31.5 |
| | Lower | 17 | 8.5 |
| Family type | Nuclear | 162 | 81.0 |
| | Joint | 38 | 19.0 |
| Education | Illiterate | 94 | 47.0 |
| | Primary | 66 | 33.0 |
| | Secondary | 22 | 11.0 |
| | Higher Secondary | 7 | 3.5 |
| | Graduation and above | 11 | 5.5 |
| Marital status | Married | 142 | 71.0 |
| | Unmarried | 12 | 6.0 |
| | Widow | 42 | 21.0 |
| | Separated | 4 | 2.0 |
| Financial independence | Independent | 100 | 50.0 |
| | Dependent | 100 | 50.0 |

*According to the modified BG Prasad Scale[11]

**Table 2:** Clinical profile of the study participants (n=200)

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Duration of DM | <3 years | 94 | 47.0 |
| | >3 years | 106 | 53.0 |
| Recent RBS | <140 mg/dl | 33 | 16.5 |
| | >140 mg/dl | 167 | 83.5 |
| Body mass index (BMI) | Underweight | 16 | 8.0 |
| | Normal BMI | 66 | 33.0 |
| | Overweight | 50 | 25.0 |
| | Obesity | 67 | 33.5 |
| Physical exercise | >150min/week | 137 | 68.5 |
| | <150min/week | 63 | 31.5 |
| Comorbidity | Yes | 144 | 72.0 |
| | No | 56 | 28.0 |

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Types of co-morbidities (n=144) | Chronic Kidney Disease (CKD) | 3 | 2.07 |
| | Hypertension (HTN) | 135 | 93.75 |
| | HTN + foot ulcer | 1 | 0.69 |
| | Foot ulcer | 3 | 2.07 |
| | HTN+CKD | 2 | 1.39 |
| Depression | Minimal depression | 66 | 33.0 |
| | Mild depression | 44 | 22 |
| | Moderate depression | 39 | 19.5 |
| | Moderately severeDepression | 31 | 15.5 |
| | Severe depression | 20 | 10 |

**Table 3:** Knowledge of complications and treatment-related characteristics regarding diabetes among study participants (n=200)

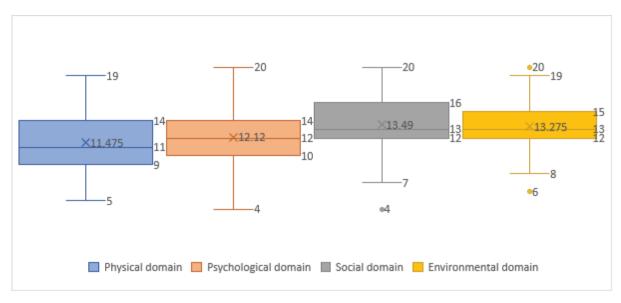| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Knowledge about complications of DM | Yes | 102 | 51.0 |
| | No | 98 | 49.0 |
| Types of complications known | Kidney and eye problem | 45 | 44.1 |
| | Kidney disease | 17 | 16.66 |
| | Eye problem, foot disease | 16 | 15.68 |
| | Liver and kidney disease | 20 | 19.6 |
| | Foot disease | 4 | 3.92 |
| Adherence to medicine | Yes | 170 | 85.0 |
| | No | 30 | 15.0 |
| Consultation type | Government | 175 | 87.5 |
| | Private | 25 | 12.5 |
| Consultation in the last three months | Yes | 50 | 25.0 |
| | No | 150 | 75.0 |
| Insulin therapy | Yes | 8 | 4.0 |
| | No | 192 | 96.0 |
| Number of medicines taken per day | 1 | 17 | 8.50 |
| | 2 | 40 | 20 |
| | 3 | 47 | 23 |
| | 4 | 39 | 19.50 |
| | >4 | 57 | 29 |

**Figure 1:** Box plots of raw scores for different domains of Quality of Life [x = mean; values on the right of the box denote quartile values (from 1st to 3rd)]

**Table 4.** Determinants of Quality of Life

| Variables | Categories | Overall Quality of life | | Test of signifi-cance | Crude Odds Ratio (95% CI) | Adjusted Odds Ratio (95% CI) |
|---|---|---|---|---|---|---|
| | | Good Frequency (Percentage) | Poor Frequency (Percentage) | $\chi^2$ degree of freedom (df) p-value | | |
| Age | <61 years | 53 (57.0) | 40 (43.0) | $\chi2= 0.163$ df= 1 p= 0.686 | 0.890 (.507-1.564) | |
| | ≥61 years | 64 (59.8) | 43 (40.2) | | | |
| Sex | Male | 54 (60.0) | 36 (40.0) | $\chi2= 0.152$ df=1 p=0.697 | 1.119 (.635-1.971) | |
| | Female | 63 (57.3) | 47 (42.7) | | | |
| Family type | Nuclear | 96 (59.3) | 66 (40.7) | $\chi2= 0.202$ df=1 p=0.653 | 1.177 (.578-2.400) | |
| | Joint | 21 (53.3) | 17 (46.7) | | | |
| Religion | Hindu | 83 (63.8) | 47 (36.2) | $\chi2= 4.373$ df=1 p=0.037 | 1.870 (1.037-3.372) | 2.519 (1.074-5.907) |
| | Muslim | 34 (48.6) | 36 (51.4) | | | |
| Caste | General | 40 (72.7) | 15 (27.3) | $\chi2= 6.325$ df=1 p=0.012 | 2.355 (1.196-4.635) | 1.282 (0.512-3.212) |
| | Others | 77 (53.1) | 68 (46.9) | | | |
| Marital status | Married | 89 (62.7) | 53 (37.3) | $\chi2= 3.517$ df=1 p=0.061 | 1.799 (.971-3.335) | |
| | Others | 28 (48.3) | 30 (51.7) | | | |
| Education | Primary and above | 79 (74.5) | 27 (25.5) | $\chi2= 23.866$ df=1 p<0.001 | 4.312 (2.365-7.861) | 4.722 (1.999-11.152) |
| | Illiterate | 38 (40.4) | 56 (59.6) | | | |

| Variables | Categories | Overall Quality of life | | Test of significance | Crude Odds Ratio (95% CI) | Adjusted Odds Ratio (95% CI) |
|---|---|---|---|---|---|---|
| | | Good Frequency (Percentage) | Poor Frequency (Percentage) | χ2 degree of freedom (df) p-value | | |
| Socioeconomic status (based on BG Prasad Scale)[11] | I & II | 44 (80.0) | 11 (20.0) | χ2= 14.444 df=1 p<0.001 | 3.945 (1.889-8.240) | 1.236 (0.468-3.265) |
| | III, IV, V | 73 (50.3) | 72 (49.7) | | | |
| Financial independence | Independent | 68 (68.0) | 32 (32.0) | χ2 =7.032 df=1 p=.008 | 2.168 (1.219-3.857) | 1.041 (0.462-2.364) |
| | Dependent | 49 (49.5) | 50 (50.5) | | | |
| Physical exercise | ≥150min/week | 92 (67.2) | 45 (32.8) | χ2 =14.263 df=1 p<0.001 | 3.289 (1.750-6.180) | 1.632 (0.702-3.793) |
| | <150min/week | 23 (38.3) | 37 (61.7) | | | |
| Adherence to medicine | Yes | 105 (61.8) | 65 (38.2) | χ2 = 4.976 df=1 p=.026 | 2.423 (1.096-5.356) | 4.906 (1.587-15.167) |
| | No | 12 (40.0) | 18 (60.0) | | | |
| Duration of diabetes | <3years | 60 (63.8) | 49 (46.2) | χ2 =0.967 df=1 p=.150 | 1.517 (.860-2.678) | |
| | ≥3years | 57 (53.8) | 83 (41.5) | | | |
| Knowledge about complications | Yes | 51 (52.0) | 47 (48.0) | χ2 =3.302 df=1 p=.069 | .592 (.336-1.044) | |
| | No | 66 (64.7) | 36 (35.3) | | | |
| Type of consultation | Government | 102 (58.3) | 73 (41.7) | χ2 =0.026 df=1 p=.871 | .932 (.396-2.190) | |
| | Private | 15 (60.0) | 10 (40.0) | | | |
| Consultation with doctor in last three months | Yes | 34 (68.0) | 16 (32.0) | χ2 =2.478 df=1 p=.115 | 1.715 (.873-3.372) | |
| | No | 83 (55.3) | 67 (44.7) | | | |
| Insulin therapy | Yes | 5 (62.5) | 3 (37.5) | χ2 =0.055 df=1 p=.815 | 1.190 (.277-5.125) | |
| | No | 112 (58.3) | 80 (41.7) | | | |
| Number of medicine per day | 0-2 | 42 (73.7) | 15 (26.3) | χ2 =7.571 d=1 p=.006 | 2.539 (1.293-4.985) | 4.056 (1.514-10.863) |
| | ≥2 | 75 (52.4) | 68 (47.6) | | | |
| Co-mobidity | No | 40 (71.4) | 16 (28.6) | χ2 =5.355 d=1 p=.006 | 2.175 (1.118-4.233 | 2.037 (0.813-5.103) |
| | Yes | 77 (53.5) | 67 (46.5) | | | |
| BMI | Normal | 34 (51.5) | 32 (48.5) | χ2 =1.980 df=1 p=.159 | .653 (.360-1.184) | |
| | Abnormal | 83 (61.9) | 51 (38.1) | | | |

| Variables | Categories | Overall Quality of life | | Test of significance | Crude Odds Ratio (95% CI) | Adjusted Odds Ratio (95% CI) |
|---|---|---|---|---|---|---|
| | | Good Frequency (Percentage) | Poor Frequency (Percentage) | $\square2$ degree of freedom (df) p-value | | |
| Recent RBS | <140 mg/dl | 20 (62.5) | 12 (37.5) | $\chi2$ =.251 df=1 p=.616 | 1.220 (.560-2.657) | |
| | ≥140 mg/dl | 97 (57.7) | 71 (42.3) | | | |
| Depression | Minimal depression | 62 (93.9) | 4 (6.1) | $\chi2$ =50.961 d=1 p<0.001 | 22.264 (7.651-64.782) | 14.106 (4.128-48.207) |
| | Mild depression and above | 55 (41.0) | 79 (59.0) | | | |
| Nagelkerke R Square=.525 Hosmer and Lemeshow Test: x2 5.874 at df 8 (p-value 0.661) | | | | | | |

## DISCUSSION

Our study included 200 participants with a mean age of 63.90 years and a standard deviation of 5.77 years. The socio-economic status varied, with 9.5% in the upper class, 18.0% in the upper middle class, 32.5% in the middle class, 31.5% in the lower middle class, and 8.5% in the lower class while 50.7% belonged to the upper middle class and 23.1% to the upper class as reported in a previous study conducted in Nadia. [8] Education-wise, the majority were illiterate (47.0%), consistent with a previous study finding held in Nadia as 41% of participants were to be illiterate there, too.[8]

The study found that 25% were overweight and 33.5% obese among the participants, which could be associated with increased health risks such as chronic conditions, including diabetes, cardiovascular diseases, and metabolic disorders. Basu et al. found the prevalence of overweight and obesity to be 42% as per body mass index.[8] This study found about 72% had co-morbidities, and among them, hypertension was the most prevalent one (93.75%) which corroborated with previousstudy findings conducted in the Nadia district, in West Bengal state, India.[8] The current study found 33% of participants had minimal depression, 22% mild depression, 9.5% moderate depression, 5.5% moderately severe depression, and 10% severe depression. This suggests that a majority of diabetic patients were suffering from some sort of depression which might have an impact on their quality of life as also found in this study. A previous study in Nadia district reported every 3rd diabetic patient out of 4 to have depression.[8] Patra et al. found the prevalence of patients scoring positive on PHQ 9 in the study was 50.3%.[12] A study conductedin north India reported 41% prevalence of depression, while another study from South India found 37.5%.[13,14]

Only 51% of the participants reported knowing the complications of diabetes and chronic kidney disease was the most mentioned among diabetic complications. A similar study from Ghana reported that 62% of diabetic patients have inadequate knowledge regarding its complications.[15] Another facility-based study done in West Bengal state, India, reported that about 22.3% of patients attending the out-patient department (OPD) were unaware of diabetic complications.[16] Another study from northern Ghana found that about 54.1% of diabetic patients had inadequate knowledge about diabetic complications.[17] The high percentage of respondents (85%) reporting adherence to medicine was encouraging, since medication adherence is crucial for effective treatment outcomes. A study conducted in a rural area of West Bengal reported that 39.4% of DM patients were non-adherent to medication.[18] Another study from Eastern India found 60.7% non-adherence rate.[19]

Our study found that 58 % of participants had a good physical quality of life. A previous study conducted in West Bengal reported it to be 43.8%.[8] In multivariate logistic regression analyses religion, education, no of medicine intake/day, and depression were found to be significant predictors of quality of physical life. The study found 55 % of participants have a good psychological quality of life which was reported

to be 45.7% in a previous study.[8] In multivariate logistic regression analysis, only depression was found to be a significant predictor of psychological quality of life which was also found in the social domain as a determinant. The study found that 55 % of participants had a good social quality of life, which is very similar to a previous study finding.[8] The study found that 61% of participants had a good physical quality of life, whereas previous literature showed it to be 48.4%. [8] In multivariate logistic regression analysis education, SES, and depression were found to be significant predictors of quality of life (environmental domain). In this study, the average score was found to be highest in the social domain, followed by the environmental domain and psychological domain, and least in the physical domain. Another study from Nadia district in West Bengal state of India reported that the highest average score obtained was in the environmental domain (25.38), followed by the physical domain (22.27), while the least was observed in the social domain, followed by the psychological domain.[8] The study found that 58% of participants had having overall good quality of life. A previous study conducted in Nadia showed that 48% of participants had an overall good life.[8] In multivariate logistic regression analysis religion, education, adherence to medicine, number of medicine intake/day, and depression were found to be significant predictors of quality of life. A study conducted previously in Nadia showed QOL was significantly better among literate patients compared to illiterate patients.[8] Mishra et al. found education, income, residing close to hospital, and duration of diabetes were important determinants of quality of life.[20]

The study was conducted in a block with a specific sociodemographic context; hence, the findings might not be generalizable to other populationsor regions with different sociocultural characteristics. Many of the variables, such as knowledge of diabetes complications, adherence to medication, and physical exercise, were based on self-reported data. Self-reportingcan be subjected to recall bias and social desirability bias, leading to inaccurate findings.

## CONCLUSION

To summerize, more than half of the study participants had good QOL. Factors such as religion, education, medication adherence, number of medications taken per day, and depression were associated with better QOL. Participants with higher education, lower pill intake per day, and minimal depression tended to have better physical QOL. Depression was found to be a determinant of both psychological and social domains. Education, socioeconomic status (SES), and depression were associated with better environmental QOL. Understanding factors associated with QOL of diabetic patients will help to identify loopholes and plan more precise strategies. The issue of mental health should be addressed by a holistic approach with the help of self-help groups in the community. An innovative evidence-based approach for glycemic control can handle the predictors like the number of pills per day as well as treatment adherence thereby achieving better glycemic control, minimal complication, and financial catastrophe; ultimately leading to a better quality of life.

**Ethical Approval:** Ethical clearance was obtained from the Institutional Ethics Committee of the Institute of Health and Family Welfare, West Bengal, India.

**Authors' Contribution:** All the authors were equally involved in concept and design, patient selection, data collection, compilation and analysis, manuscript preparation, editing and final submission.

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