

## A STUDY ON AWARENESS ABOUT DIABETES AND ITS COMPLICATIONS IN TYPE 2 DIABETES PATIENTS

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### ABSTRACT

**Background:** Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder and a major global health concern due to its increasing prevalence and severe complications. In India, millions are affected, with many remaining undiagnosed. Awareness regarding diabetes and its complications is vital for prevention and management. This study assessed awareness levels among T2DM patients and examined their association with demographics and complication rates. **Materials and Methods:** A hospital-based prospective cross-sectional study was conducted in the Department of General Medicine at Dr. B.R. Ambedkar Medical College and Hospital, Bengaluru, from July 2024 to February 2025. A total of 300 confirmed T2DM patients aged 18 years and above were enrolled after obtaining informed consent. Data were collected using a structured questionnaire assessing demographic characteristics and awareness regarding diabetes and its complications. Statistical analysis was performed using SPSS software, with chi-square and independent t-tests applied to examine associations, and a p-value <0.05 considered statistically significant. **Result:** Among the 300 participants, the highest proportion of T2DM patients (31.67%) were aged 61–80 years, followed by 19–30 years (20%). Females (54.33%) slightly outnumbered males (45.67%). Awareness levels showed a significant relationship with complication occurrence: patients with low awareness reported more complications (20%) than those with high awareness (9.33%). The mean awareness score was significantly lower among patients with complications ( $4.42 \pm 3.06$ ) compared to those without ( $5.19 \pm 3.2$ ) ( $p = 0.03$ ), indicating that reduced awareness was associated with higher complication rates. **Conclusion:** The study highlights low diabetes awareness among T2DM patients, significantly associated with complications. Strengthening education and awareness programs can improve self-management, glycemic control, and reduce diabetes-related risks across all age groups.

## INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from inadequate insulin production, impaired insulin action, or both.<sup>[1]</sup> Despite advances in diagnosis and treatment, the burden of diabetes-related complications remains high. With its growing prevalence and potential for severe health consequences if untreated, DM has become a major global health concern. Millions of individuals worldwide are affected by both type 1 and type 2 diabetes, and while efforts continue to address the epidemic, it is evident that managing long-term

complications is just as critical as controlling the disease itself.<sup>[2]</sup> Effective diabetes care now extends beyond blood sugar regulation to include strategies that minimize the risk of complications, which can otherwise impair quality of life and significantly increase the likelihood of premature illness and death.<sup>[2]</sup>

The incidence of diabetes worldwide is increasing significantly, with developing nations like India experiencing a pronounced impact. The rise can be primarily linked to the increasing rates of obesity, sedentary lifestyles, and poor dietary habits. In 2019, it was estimated that approximately 77 million individuals in India were affected by diabetes, with

projections indicating that this number could surpass 134 million by 2045. It is concerning that over 50% of these individuals, approximately 57%, have not yet received a diagnosis.<sup>[3]</sup>

Diabetes mellitus (DM) is projected to remain a leading cause of global disease burden and mortality in the coming decades.<sup>[4]</sup> Despite advances in diagnosis and therapy, effective control remains challenging, and the prevalence of complications continues to rise. The primary goal of diabetes management is not only to reduce blood glucose levels but also to improve survival and quality of life by preventing long-term complications.<sup>[5]</sup> Evidence shows that achieving near-normal glycemic control, along with managing blood pressure and lipid levels, significantly lowers the risk of adverse outcomes.<sup>[6]</sup>

Type 2 diabetes accounts for the majority of cases and is associated with serious complications affecting multiple organ systems.<sup>[7]</sup> These include microvascular conditions such as retinopathy, nephropathy, and neuropathy, as well as macrovascular complications like cardiovascular and cerebrovascular disease.<sup>[8]</sup> Such outcomes contribute heavily to premature morbidity and mortality, reducing life expectancy and imposing substantial emotional, social, and financial burdens on individuals, families, and healthcare systems. Factors influencing the risk of diabetes include genetics, family history, ethnicity, aging, obesity, sedentary lifestyles, and unhealthy dietary habits.<sup>[9]</sup> Managing diabetes requires an integrated and ongoing approach, as fluctuations in blood glucose can occur even when patients adhere to recommended lifestyle and treatment regimens.<sup>[10]</sup> Complications such as dyslipidemia, neuropathy, and diabetic retinopathy highlight the progressive nature of the disease and the need for continuous monitoring and tailored interventions.<sup>[11]</sup> A comprehensive strategy that combines early diagnosis, patient education, lifestyle modifications, and access to effective therapies is essential. Such measures can substantially reduce the global burden of diabetes while improving long-term health outcomes for those living with the condition.

## MATERIALS AND METHODS

This study was carried out in a hospital setting, specifically within the Department of General Medicine at Dr. B.R. Ambedkar Medical College and Hospital in Bengaluru, following a prospective cross-sectional design. The duration of the study spanned eight months, commencing in July 2024 and concluding in February 2025. A total of 300

patients were included in the study, chosen based on established eligibility criteria. Informed consent was secured from every participant or their representative prior to enrolment. Approval for the study was obtained from the Institutional Ethics Committee.

### Study Participants:

The study included all eligible patients who had a confirmed diagnosis of Type 2 Diabetes Mellitus and were over the age of 18. Individuals diagnosed with Type 1 Diabetes Mellitus, as well as those who could not understand or respond to the questionnaire, were not included in the study. A structured questionnaire was utilized to gather data on demographic variables including age, gender, educational status, occupation, and place of residence, as well as awareness of diabetes and its complications. Every participant was subjected to a comprehensive clinical history and physical examination to align with the study objectives. The confidentiality of all patient information was rigorously upheld.

### Statistical Analysis:

The gathered data were systematically compiled and analyzed utilizing suitable statistical software, such as SPSS version XX or an equivalent program. Descriptive statistics, such as percentages, means, and standard deviations, were employed to summarize demographic variables and levels of awareness. Categorical variables were assessed through the chi-square test, whereas continuous variables were compared utilizing Student's t-test when appropriate. A p-value below 0.05 was deemed statistically significant.

## RESULTS

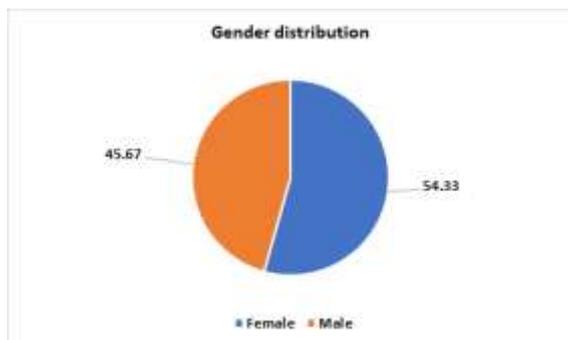
The age group distribution shows that type 2 diabetes is more prevalent among older individuals, with the highest proportion (31.67%) seen in the 61–80 age group, followed by younger adults aged 19–30 years (20%). Middle-aged groups (41–50 and 51–60) accounted for nearly similar proportions (18.33% and 17.33%, respectively), while the 31–40 group had the lowest frequency (12.67%). This pattern suggests that although type 2 diabetes is strongly associated with aging, younger populations are also significantly affected, indicating a shift toward earlier onset of the disease. These findings highlight the need for targeted awareness and prevention strategies across all age groups, with particular attention to both older adults who are at highest risk of complications and younger adults who may experience a longer disease burden over their lifetime.

**Table 1: Age group distribution of diabetes patients**

| Age Group | Frequency | Percentage |
|-----------|-----------|------------|
| 19-30     | 60        | 20.00      |
| 31-40     | 38        | 12.67      |
| 41-50     | 55        | 18.33      |
| 51-60     | 52        | 17.33      |
| 61-80     | 95        | 31.67      |

**Table 2: Gender distribution among study subjects.**

| Gender | Frequency | Percentage |
|--------|-----------|------------|
| Female | 163       | 54.33      |
| Male   | 137       | 45.67      |

**Figure 1: Gender distribution of the study subjects.**

The gender distribution shows that females (54.33%) slightly outnumber males (45.67%) among the study participants. This indicates a higher representation of women in the study population, which may reflect either greater prevalence of type 2 diabetes among females in the study area or higher health-seeking behavior among women compared to men. While both genders are substantially affected, the near-balanced distribution suggests that type 2 diabetes is a significant health concern for both sexes, underscoring the importance of gender-inclusive awareness and education strategies to address the disease and its complications.

**Table 3: Comparison of awareness level with complications**

| Awareness Level | Complications |            |     |            |
|-----------------|---------------|------------|-----|------------|
|                 | No            | Percentage | Yes | Percentage |
| Low             | 53            | 17.67      | 60  | 20.00      |
| Medium          | 57            | 19.00      | 62  | 20.67      |
| High            | 40            | 13.33      | 28  | 9.33       |

The comparison between awareness level and complications shows a clear trend where patients with lower awareness are more likely to experience complications. Among those with low awareness, 20% reported complications compared to only 17.67% without complications. Similarly, in the medium awareness group, complications (20.67%) slightly outweighed those without (19%). In contrast, patients with high awareness had the

lowest complication rate (9.33%) compared to 13.33% without complications. This pattern indicates that better awareness is associated with fewer complications, underscoring the importance of patient education in reducing diabetes-related morbidity. The findings suggest that strengthening awareness programs can play a crucial role in prevention and long-term disease management.

**Table 4: Correlation of awareness level with complications**

| Awareness score | Yes  | Standard Deviation | No   | Standard Deviation | Independent t-test (p-value) | Chi-square test (p-value) |
|-----------------|------|--------------------|------|--------------------|------------------------------|---------------------------|
| Mean            | 4.42 | 3.06               | 5.19 | 3.2                | 2.14 (0.03)                  | 2.76 (0.25)               |

The correlation analysis shows that the mean awareness score was lower in patients with complications ( $4.42 \pm 3.06$ ) compared to those without complications ( $5.19 \pm 3.2$ ). The independent t-test yielded a statistically significant difference ( $p = 0.03$ ), indicating that reduced awareness is associated with a higher likelihood of developing complications. However, the chi-square test result ( $p = 0.25$ ) was not statistically significant, suggesting that while awareness levels differ on a continuous scale between the two groups, categorical comparisons may not show strong associations. Overall, the findings highlight that higher awareness contributes to reduced risk of complications in type

2 diabetes, reinforcing the need for patient education interventions.

## DISCUSSION

One of the biggest lifestyle-related health issues in the world, diabetes is becoming more and more common, particularly in developing countries. This global epidemic is being driven by changes in socioeconomic conditions, industrial expansion, and urbanization.<sup>[12]</sup> China and India have seen the biggest increases in diabetes cases among these nations; India is exhibiting a concerning trend of the disease spreading from affluent to lower

socioeconomic groups, from urban to rural populations, and affecting younger people more and more.<sup>[13]</sup> Diabetes, a metabolic disease that worsens over time, frequently results in long-term problems that fall into two general categories: microvascular and macrovascular. Diabetic retinopathy, diabetic nephropathy, and diabetic neuropathy are examples of microvascular problems, whereas peripheral artery disease, cardiovascular disease, and cerebrovascular disease are examples of macrovascular complications.<sup>[14,15]</sup> Individuals, families, and society are heavily burdened by the long-term financial, social, and emotional effects of diabetes and its consequences. Universal access to healthcare, reasonably priced prescription drugs, early identification, and prompt action are necessary to lessen this burden. To reduce the negative health and financial effects of diabetes, a thorough, multifaceted approach is necessary.

Our study found that type 2 diabetes is most prevalent among older adults, with the highest proportion (31.67%) in the 61–80 age group, while younger adults aged 19–30 years also represented a notable 20%. Middle-aged groups (41–50 and 51–60) showed similar prevalence (18.33% and 17.33%), and the 31–40 group had the lowest frequency (12.67%). This trend indicates that although type 2 diabetes remains strongly age-related, its presence among younger individuals points to an emerging pattern of earlier onset. Comparable findings were reported by Bellary et al. (2021), who observed that nearly half of diabetic patients were older adults, emphasizing the predominance of type 2 diabetes in the elderly.<sup>[16]</sup> Similarly, Xu et al.<sup>[17]</sup> reported a higher percentage of older patients compared to younger ones, supporting the view that age remains a major determinant in type 2 diabetes prevalence despite growing evidence of its rise in younger populations.<sup>[18]</sup>

In our study, females accounted for a slightly higher proportion of type 2 diabetes cases (54.33%) compared to males (45.67%), suggesting either a greater prevalence of the disease among women in the study area or stronger health-seeking behavior among them. Similar to our findings, Mathew et al. (2012) also reported a higher prevalence of diabetes among female patients, reinforcing the pattern observed in our results.<sup>[19]</sup> However, in contrast, Nordstrom et al. (2016) found a greater prevalence of diabetes among males, indicating that gender distribution in type 2 diabetes may vary across populations due to differences in lifestyle, genetics, and healthcare access.<sup>[20]</sup>

Our study revealed a clear association between awareness levels and the occurrence of complications among type 2 diabetes patients, showing that individuals with lower awareness experienced more complications (20%) than those without complications (17.67%). Similarly, in the medium awareness group, complications were slightly more frequent (20.67%) than in those

without (19%), while patients with high awareness showed the lowest complication rate (9.33%) compared to 13.33% without complications. These findings suggest that higher awareness is linked to better health outcomes. Consistent with our results, Abdulrahman M. et al. (2020) reported that higher awareness levels were associated with improved diabetes control among participants.<sup>[21]</sup> In contrast, Tang et al. (2008) found a negative correlation between health awareness scores and diabetes control, indicating that the relationship between awareness and disease management may vary depending on patient education, healthcare access, and behavioral factors.<sup>[22]</sup>

Our study found that patients with complications had a lower mean awareness score ( $4.42 \pm 3.06$ ) compared to those without complications ( $5.19 \pm 3.2$ ), with the difference being statistically significant ( $p = 0.03$ ). This suggests that lower awareness is linked to a higher risk of developing complications among type 2 diabetes patients. Similar to our findings, Tang et al. (2008) reported a negative correlation between awareness scores and diabetes-related complications,<sup>[22]</sup> reinforcing the inverse relationship between patient awareness and disease severity. Likewise, Belsti et al. (2020) observed that individuals with low awareness levels had a higher prevalence of complications,<sup>[23]</sup> while Saglam et al. (2023) also highlighted that limited awareness contributes to an increased risk of diabetes-related complications, supporting the pattern identified in our study.<sup>[24]</sup>

## CONCLUSION

The study highlights low diabetes awareness among T2DM patients, significantly associated with complications. Strengthening education and awareness programs can improve self-management, glycemic control, and reduce diabetes-related risks across all age groups.

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