



Original Article

## Knowledge and Awareness of Diabetes Mellitus and its Complications in Diabetic Patients in Tertiary Care Hospital

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### ABSTRACT

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**Introduction:** Diabetes is one of the largest global health emergencies of this century, ranking among the 10 leading causes of mortality. Diabetes mellitus (DM) is a chronic metabolic disorder marked by hyperglycemia due to impairments in insulin production, insulin function, or both. Despite advances in the diagnosis and treatment of DM, the occurrence of related complications remains significantly high. **Aim:** This study aims to evaluate diabetic patients' awareness of complications and how it influences their compliance with treatment. **Materials and methods:** A cross-sectional study was conducted in Department of Biochemistry in association with Department of General Medicine, NRI Institute of Medical Sciences, Andhra Pradesh, India. This study involved 500 individuals aged over 15 years with type 1 or type 2 diabetes, of both genders, who consented to participate and were selected through convenience sampling. The study lasted 7 months. Using social media sites, a predefined questionnaire was distributed to the patients who came to General Medicine OP. The questionnaire covered all the necessary data. **Results:** In our study, majority of patients are in age group of  $\geq 50$  years, 249 (49%) 500 patients. Only 20 (4%) patients are in age group of 18-30 years. 31-50 years of age group were 235 (47%). In this study, majority were females, 310 (62%), indicating the incidence of DM is higher in female. Most of the patients are Illiterate 320 (64%) and 420 (84%) patients are from rural background. Concerned with duration of diabetes, 80 (16%) have DM from 1yr. 175 (35%) have DM from 1-5 yrs. 95 (19%) have DM from 5-10 yrs. 150 (30%) of patients have DM from  $\geq 10$  yrs. Majority of patients have DM from 1-5 yrs. Concerned with diabetic complications; 210 (42%) patients are aware of complications related to DM. In this study, 280 (56%) were advised to take anti-diabetic medications. Only 20 (4%) patients were advised insulin shots, 110 (22%) patients were advised both antidiabetic drugs and insulin. Out of 500 patients 280 (56%) exercised regularly. Only 140 (28%) DM patients own Glucometer and are conscious of regular monitoring of their blood glucose. In this study, 85 (17%) patients test their blood sugar every week. 45 (9%) patients test in every 2 weeks. 210 (42%) test every 3 weeks. In last month 160 (32%) DM patients have not tested their blood glucose. In this study, 255 (51%) patients demonstrated awareness of the symptoms of hypoglycemia, whereas 245 (49%) reported a lack of awareness. In this, 210 (42%) patients were aware that diabetes mellitus can affect vital organs such as the heart, nervous system, and kidneys. Regarding healthcare-seeking behavior for diabetes management, 415 (83%) patients reported visiting a general physician, 40 (8%) consulted an endocrinologist. When asked about the frequency of medical

consultations for diabetes, 170 (34%) patients reported visiting a doctor 5 or more times per year, 95 (19%) visited 3 to 4 times per year. Notably, 125 (25%) patients reported never visiting a doctor for their diabetes. In terms of specialized diabetes care, 85 (17%) patients had visited a diabetes educator. However, the majority 385 (77%) reported not consulting any such health professionals. With respect to self-examination of feet in the past month, 335 (67%) patients reported not examining their feet at all, 145 (29%) examined their feet 1 to 3 times. With regard to eye examinations, 180 (36%) patients had undergone an eye check-up within the past year. Notably, 230 (46%) patients reported never having had their eyes checked. When asked about sexual health, only 5 (1%) patients reported having been treated for or experienced erectile dysfunction/loss of libido. The majority 420 (84%) denied such issues. **Conclusion:** Our findings underscore substantial gaps in awareness, self-care, and utilization of specialist/support services among diabetic patients. These gaps likely translate into preventable morbidity. Interventions are urgently required at multiple levels: patient education, healthcare delivery, screening, and systemic support to improve quality of life and reducing healthcare burden.

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**Keywords:** Diabetes mellitus, Diabetic complication, Knowledge and awareness.

## INTRODUCTION

Diabetes is one of the largest global health emergencies of this century, ranking among the 10 leading causes of mortality.[1] The world prevalence of adult diabetes in 2010 is 285 million and predicted to reach 439 million in 2030 [2].

Diabetes mellitus (DM) is a chronic metabolic disorder marked by hyperglycemia due to impairments in insulin production, insulin function, or both. Despite advances in the diagnosis and treatment of DM, the occurrence of related complications remains significantly high [3]. It is increasingly evident that, for most individuals with both type 1 and type 2 diabetes, treating the major complications of the disease is just as essential as combating the current global diabetes epidemic itself [4]. Diabetes mellitus is projected to become a leading cause of morbidity and mortality in the future. The primary goal of DM treatment is to prevent mortality and complications by maintaining normal blood glucose levels. However, even with appropriate treatment, blood glucose levels may remain elevated, potentially leading to complications such as impaired fat metabolism, nerve damage, and eye disorders [5]. Common complications of diabetes affect the kidneys, retina, cardiovascular system, nerves, and liver, there are currently no effective treatments available to reverse the damage to these organs [6].

India is home to the world's second highest number of diabetic patients. India has 74.9 million diabetics in 2021 projected to increase to 124.9 million by 2045 [7]. According to IDF, one out of every seven diabetic adults worldwide resides in India, and one in every third household has diabetic patients. There are three worrying trends as far as the epidemiology of diabetes in India is concerned. Firstly, it is now affecting people at a younger age [8]. Secondly, earlier a disease of the affluent, diabetes has now started affecting the middle and even the lower socioeconomic strata [9]. Thirdly, the disease, which was mostly confined to urban areas earlier, is now affecting the rural population as well. This challenging burden of diabetes is a result of different reasons, mainly a rising obesity rate [10].

Complications related to diabetes mellitus can be life-threatening. However, these complications can be effectively managed if patients adhere to proper treatment and control measures [11, 12]. Knowledge and awareness through self-management training and diabetes education are crucial for effective diabetes care and management. It is important for individuals with DM to have a thorough understanding of the disease, its risk factors, potential complications, and available treatment options to help reduce the risk of complications [13, 14]. This study aims to evaluate diabetic patients' awareness of complications and how it influences their compliance with treatment.

## MATERIALS AND METHODS:

A cross-sectional study was conducted in Department of Biochemistry in association with Department of General Medicine, NRI Institute of Medical Sciences, Visakhapatnam, Andhra Pradesh, India. This study has been approved by the institutional ethics committee and informed consent was obtained from the study participants. This study involved 500 individuals aged over 15 years with type 1 or type 2 diabetes, of both genders, who consented to participate and were selected through convenience sampling. The study lasted 7 months. Using social media sites, a questionnaire was distributed to the patients who came to General Medicine OP. The questionnaire covered the following data: patients' socio-demographic characteristics like age, gender, education, occupation. The second section covered the parameters related to clinical characteristics of participants like the type of diabetes, duration of diabetes, in addition to, the

management of blood sugar level. The third one covered participants' awareness toward diabetic complications such as retinopathy, renal failure and neuropathy. There was no risk to the participants because it was a descriptive study that helped to determine the awareness of diabetic complications

#### RESULTS:

The present study was conducted to evaluate diabetic patients' awareness of complications and how it influences their compliance with treatment. In our study, majority of patients are in age group of  $\geq 50$  years, 249 (49%) 500 patients. Only 20 (4%) patients are in age group of 18-30 years. 31-50 years of age group were 235 (47%). In this study, majority were females, 310 (62%), indicating the incidence of DM is higher in female compared to males. In our study, most of the patients are Illiterate 320 (64%) and 420 (84%) patients are from rural background. Concerned with duration of diabetes, 80 (16%) have DM from 1yr. 175 (35%) have DM from 1-5 yrs. 95 (19%) have DM from 5-10 yrs. 150 (30%) of patients have DM from  $\geq 10$  yrs. In our study, majority of patients have DM from 1-5 yrs as shown in table 1.

**Table 1: Sociodemographic data of Diabetic patients in Tertiary care Hospital.**

Sociodemographic data	Number	Percentage
<b>Age in years</b>		
18-30	20	4
31-50	235	47
>50	245	49
<b>Gender</b>		
Male	190	38
Female	310	62
<b>Education level</b>		
Literate	180	36
Illiterate	320	64
<b>Residence</b>		
Rural	420	84
Urban	80	16
<b>Duration of Diabetes</b>		
$\leq 1$ yr	80	16
1-5yr	175	35
5-10yr	95	19
>10yrs	150	30

Concerned with diabetic complications, 210 (42%) patients are aware of complications related to DM. out of 210, urban area is 40 (8%) and rural area is 170 (34%), indicating rural patients are well aware of diabetic complications compared to urban patients. In this, majority of them were Illiterate 115 (23%) and literate were 95 (19%). Females were more 145 (29%) compared to men 65 (13%) as shown in Table 2.

**Table 2 Distribution of patients who are aware of Diabetic complications.**

Parameters	Number	Percentage
Total patients aware of complications	210	42
a. Urban	40	8
b. Rural	170	34
Literate	95	19
Illiterate	115	23
male	65	13
Female	145	29

In this study, 280 (56%) were advised to take anti-diabetic medications. Only 20 (4%) patients were advised insulin shots, May be due to their non responsiveness to anti-diabetic drugs. 110 (22%) patients were advised both antidiabetic drugs and insulin. 90 (18%) patients were not given any medication immediately on diagnosis. Maybe they must have been advised lifestyle changes or might be taking ayurvedic or Homeopathic drugs.

Out of 500 patients 280 (56%) exercised regularly. This shows that majority of patients are aware that exercise in any form like walking, Gym increases their glucose tolerance. Only 140 (28%) DM patients own Glucometer and are conscious of regular monitoring of their blood glucose. Rest 360 (72%) do not have glucometer. This implies that patients in study group are not tech savvy. In this study, 85 (17%) patients test their blood sugar every week. 45 (9%) patients test in every 2 weeks. 210 (42%) test every 3 weeks. In last month 160 (32%) DM patients have not tested their

blood glucose. This implies educational programmes should be conducted to create a sense of awareness among DM patients.

In this study, 255 (51%) patients demonstrated awareness of the symptoms of hypoglycemia, whereas 245 (49%) reported a lack of awareness. This indicates that nearly half of the patients are unable to recognize hypoglycemic symptoms, highlighting a potential gap in patient education and self-management. In this, 210 (42%) patients were aware that diabetes mellitus can affect vital organs such as the heart, nervous system, and kidneys, while 290 (58%) patients were unaware of these complications. 115 (23%) patients were checked for lipid profile and 385 (77%) were not.

Regarding healthcare-seeking behavior for diabetes management, 415 (83%) patients reported visiting a general physician, 40 (8%) consulted an endocrinologist, 30 (6%) sought care from a registered medical practitioner (RMP), and 15 (3%) preferred alternative systems of medicine. When asked about the frequency of medical consultations for diabetes, 170 (34%) patients reported visiting a doctor 5 or more times per year, 95 (19%) visited 3 to 4 times per year, and another 95 (19%) reported 1 to 2 visits per year. A smaller proportion consulted less frequently, with 5(1%) visiting once every 2–3 years and 10 (2%) once every 5 years. Notably, 125 (25%) patients reported never visiting a doctor for their diabetes.

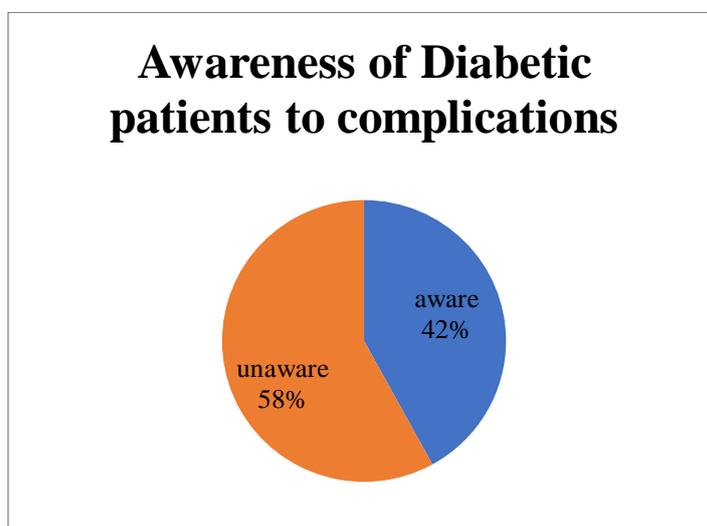
In terms of specialized diabetes care, 85 (17%) patients had visited a diabetes educator and 30 (6%) had consulted a dietician in the past 12 months. However, the majority 385 (77%) reported not consulting any such health professionals. With respect to self-examination of feet in the past month, 335 (67%) patients reported not examining their feet at all, 145 (29%) examined their feet 1 to 3 times, and only 20 (4%) examined their feet 4 or more times. With regard to eye examinations, 180 (36%) patients had undergone an eye check-up within the past year, 25 (5%) within 1–2 years, 30 (6%) within 2–5 years, 15 (3%) within 5–10 years, and 20 (4%) more than 10 years ago. Notably, 230 (46%) patients reported never having had their eyes checked. When asked about sexual health, only 5 (1%) patients reported having been treated for or experienced erectile dysfunction/loss of libido. The majority 420 (84%) denied such issues, while 75 (15%) were unsure or did not know as shown in table 3.

**Table 3: Overview of awareness of DM and remedial measures taken by our study subjects.**

Parameters	Number	Percentage
Q1. When your diabetes was diagnosed, what advice and /or treatment were you given?		
a. Oral antidiabetic drug	280	56
b. Insulin	20	4
c. Both (a+b)	110	22
d. None	90	18
Q2. Do you exercise regularly		
a. Yes	280	56
b. No	220	44
Q3. Do you own a Glucometer		
a. Yes	140	28
b. No	360	72
Q4. How often have you tested your sugar levels in the last month		
a. >1 every week	85	17
b. >1 in two weeks	45	9
c. >1 in 3 weeks	210	42
d. None	160	32
Q5. Do you know the symptoms of Hypoglycemia? (Diaphoresis, palpitation, tremor, headache, malaise)		
a. Yes	255	51
b. No	245	49
Q6. Are you aware that Diabetes can affect your heart, kidneys, and nervous system		
a. Yes	210	42
b. No	290	58
Q7. Have you ever checked your lipid profile?		
a. Yes	115	23
b. No	385	77
Q8. What type of doctor looks after your diabetes?		
a. General Physician	415	83
b. Endocrinologist	40	8
c. RMP	30	6
d. Alternative medicine	15	3

Q9. Approximately how often do you visit a doctor for your diabetes?		
a. 5 or more times a year	170	34
b. 3 to 4 times a year	95	19
c. 1 to 2 times a year	95	19
d. Once every 2 or 3 years	5	1
e. Once every 5 years	10	2
f. Never	125	25
Q10. Within the past 12 months have you visited any of these health professionals?		
a. Diabetes educator	85	17
b. Dietician	30	6
c. None	385	77
Q11. How often have you examined your feet in the last month		
a. None	335	67
b. 1 to 3 times	145	29
c. 4 or more times	20	4
Q12. How long has it been since you last had your eyes checked?		
a. Within 1-year	180	36
b. 1 to 2 Years	25	5
c. 2 to 5 Years	30	6
d. 5 to 10 Years	15	3
e. >10 years	20	4
f. None	230	46
Q13. Have you ever been treated for or suffered from erectile dysfunction/Loss of libido?		
a. Yes	5	1
b. No	420	84
c. Don't know	75	15

Figure 1 shows the percentage of Diabetic patients aware and unaware of complications in form of pie chart. Majority of patients 58% are unaware of complications. This stresses the need for educational programmes for not only patients but also first-hand health care professional.



**Figure 1: Awareness of Diabetic patients to complications.**

## DISCUSSION

DM can lead to various complications that affect multiple systems throughout the body. Among the most significant and chronic complications associated with DM are conditions such as coronary artery disease, nephropathy, diabetic neuropathy and retinopathy. Awareness of complications can lead to their prevention thereby reducing morbidity and mortality.

This study reveals several important gaps in knowledge, health-seeking behaviors, and self-care practices among people with diabetes. The following discussion integrates our findings with existing literature, to contextualize them and suggest ways for.

In our study majority of DM patients are above 50yrs of age. This suggests that Type II DM is more common in study. In a study done by Esmael et al., reported that age distribution reveals a predominantly older demographic, with 145 (37.7%) of participants over 40 years old (15).

Females have higher incidence of DM compared to males. This is consistent with a study done by Asiedu, C, et al., reported that majority were female, comprising 74.1% [16].

### **Awareness of hypoglycemia and diabetic complications**

In our study, approximately 51% of patients were aware of hypoglycemia symptoms, and 42% knew that diabetes can affect organs like the heart, nervous system, and kidneys. These rates suggest that nearly half of patients remain uninformed about critical aspects of their condition.

In a study by Alrasheedi AA et al., reported that about Regarding knowledge of hypoglycemia as a complication of DM, 326 (88.59%) participants were aware of it. The gap in knowledge about complications is echoed in many studies: for example, many patients know some complications (e.g. blindness, kidney failure) but are less aware of others [17].

Thus, while your awareness figures are concerning, they are somewhat lower than in some comparable Indian settings (for hypoglycemia at least), indicating room for improvement.

### **Healthcare-seeking behavior and provider access**

You found that 83% see general physicians, 8% see endocrinologists, 6% see RMPs, and 3% use alternative medicine. Moreover, over a quarter (25%) of respondents never visited a doctor for their diabetes.

- This aligns with studies showing that access to specialists is limited for many diabetic patients, especially in low-resource or rural settings.
- The large percentage not visiting clinicians is troubling, and supports findings from studies showing delays or omissions in seeking care, which increase risk of complications.

### **Utilization of specialist health professionals (educators, dieticians)**

Only 17% had visited a diabetes educator, 6% a dietician in the last 12 months, while 77% had seen neither.

- This is consistent with literature from India (and elsewhere) showing that structured diabetes education and nutritional counselling is underutilized. Studies show that such professional input (education, diet advice) leads to better glycemic control and complication prevention.

### **Self-care practices: Foot examination & Eye examinations**

- **Foot self-examination:** 67% of your patients examined their feet *not at all* in the past month; only 4% did so four or more times.
- **Eye exams:** In your study, 36% had an eye exam within 1 year, but a large proportion (46%) never had their eyes checked.
- This finding is concerning, given that diabetic retinopathy can be asymptomatic in early stages. Literature advocates for annual screening for retinopathy for people with diabetes.

### **Sexual health**

Only 1% reported erectile dysfunction or loss of libido; 15% were unsure.

- This low reporting might reflect under-reporting due to stigma, lack of awareness that sexual dysfunction is a complication of diabetes, or poor probing in healthcare encounters. Literature has shown that sexual dysfunction is relatively common in diabetics but often underrecognized.

### **Implications**

- The substantial proportion of patients unaware of hypoglycemia symptoms, diabetic complications, and the importance of foot/eye care suggests that current patient education is insufficient.
- The low use of specialists such as educators and dieticians points to gaps in multidisciplinary care. This is problematic because nutritional counselling and education are known to be essential in diabetes self-management.
- Poor self-care practices (foot checks, eye exams) raise risk for preventable complications—ulcers, amputations, vision loss.
- The healthcare system may need to focus on improving access, reducing barriers (cost, awareness, stigma), and integrating regular screening into routine diabetes follow-ups.

### **Strengths**

- Our study covers multiple domains: awareness, health-seeking, self-care, sexual health. That gives a comprehensive view of patient behaviors and knowledge.

- Use of quantitative data allows for drawing clear proportions, which can facilitate targeted intervention planning.

### Limitations

- Self-report bias: Patients may over- or under-report behaviors (e.g., visits, self-exams).
- Cross-sectional design: we cannot determine causality (e.g., whether knowledge leads to better self-care, or whether those who are engaged in care learn more).
- Possible selection bias: if your sample is from clinics or those willing to participate, maybe people already more engaged in care are over-represented (or conversely).
- Underreporting of sensitive issues: sexuality, erectile dysfunction may be under-reported due to social desirability or embarrassment.

**Ethical clearance** has been granted for this study.

**Conflict of interest:** There is no conflict of interest.

### Recommendations for Practice and Policy

1. **Enhanced patient education programs**
  - Integrate structured education on hypoglycemia, complications (especially heart, kidney, neurological) frequently, using culturally appropriate materials, and target both patients and families.
  - Use group sessions, peer support, and regular refreshers.
2. **Strengthen roles of diabetes educators, dietitians**
  - Make access to these professionals more routine in diabetes clinics.
  - Possibly subsidize or include such services in primary care settings.
3. **Regular screening protocols**
  - Implement systems to ensure annual examinations: feet (self and by clinician), eyes (retinopathy screening), possibly kidney/neurovascular screening.
  - Use reminders, checklists, or electronic health record alerts.
4. **Address barriers**
  - Identify cost, transport, literacy, stigma, or cultural concerns that prevent patients from seeking care or reporting issues (e.g., sexual dysfunction).
  - Consider mobile clinics or tele-medicine for rural/underserved populations.
5. **Future research**
  - Qualitative studies exploring why patients do not visit doctors, or why awareness is low (especially around complications).
  - Intervention studies: measuring the effect of education, reminders, access improvements, etc., on improving self-care and outcomes.
  - Larger, possibly longitudinal studies to assess causal links (e.g., does increased awareness lead to fewer complications?).

### CONCLUSION

Our findings underscore substantial gaps in awareness, self-care, and utilization of specialist/support services among diabetic patients. These gaps likely translate into preventable morbidity (foot ulcers, vision loss, cardiovascular complications). Interventions are urgently required at multiple levels: patient education, healthcare delivery, screening, and systemic support. With targeted efforts, many of the risks identified could be mitigated, improving quality of life and reducing healthcare burden.

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