# **Original Research Article**

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# Knowledge of diabetes, its complications and treatment adherence among diabetic patients

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#### **ABSTRACT**

**Background:** Diabetes Mellitus not only debilitates, but also kills. It may lead to microvascular and macrovascular complications. This study was undertaken a) to assess the knowledge of diabetes and its complications among patients with type 2 diabetes mellitus, b) to assess treatment adherence of the above patients, c) to determine association of knowledge and treatment adherence.

**Methods:** Across sectional study was conducted on a total of 120 patients coming to Vydehi Institute of Medical Sciences and Research Centre, Bangalore over a period of 2 months. A semi-structured questionnaire consisting of questions on patients' knowledge of diabetes, its complications and adherence to treatment was administered and each patient was interviewed face-to-face. The data was analyzed using SPSS Version 21.0. Statistical analysis was done based on percentages and proportions.

**Results:** Out of 120 diabetics, 67 (55.8%) had more than 80% knowledge regarding diabetes mellitus and its complications, 45 (37.5%) patients had 60-79% knowledge and only 8 (6.7%) patients had less than 60% knowledge. The study revealed that 77 patients (64.2%) scored greater than 80% in the treatment adherence, 27 patients (22.5%) scored between 60-79% and 16 (13.3%) scored below 60%. Patients having more knowledge better adhered to the treatment. Therefore 55.8% of the people who had greater than 80% knowledge, better adhered to their treatment.

**Conclusions:** Patients having more knowledge better adhered to the treatment. This highlights the importance of empowering patients with knowledge regarding the disease to obtain maximum benefit from their treatment.

Keywords: Diabetes mellitus, Knowledge, Treatment adherence

## INTRODUCTION

Diabetes is a chronic disease that occurs due to inability of the pancreas to produce enough insulin or when the body is unable to utilize the insulin it produces effectively. Insulin is a hormone that regulates blood sugar levels in the body. Uncontrolled diabetes leads to hyperglycemia which seriously damages many of the body's systems.<sup>1</sup>

According to WHO Global Report on Diabetes 2016, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence of diabetes has become nearly twice of what it was in 1980, rising from 4.7% to 8.5% in the adult population. According to WHO, diabetes will be the 7th leading cause of death by 2030.

According to International Diabetes Federation 1 in 11 adults had diabetes in 2015 which will become 1 in 10 adults by 2040 if the disease is not prevented and controlled. It was found that every 6 seconds 1 person dies from diabetes. Expenditure on diabetes was 12% of global health expenditure.<sup>4</sup>

India is one of the 6 countries of the International Diabetes Federation South East Asia (IDF SEA) region. According to this, there were 69.1 million cases of diabetes in India in 2015. Prevalence of diabetes in adults 20-79 years was 8.7%. The Indian health system provides services for diabetic care and prevention though there is limited availability of self-management education.<sup>5</sup> India's economic boom has been accompanied by an increase in the number of people with diabetes and those at risk for the disease with prevalence rates up to 20% in some cities.<sup>6</sup>

According to Wild et al, in the year 2000, India topped the world with the highest number of diabetics (31.7 million), China in second place (20.8 million) and the United States in third place (17.7 million). However, according to the International Diabetes Federation, India (69.1 million diabetic cases) was ranked second in the world in diabetes prevalence, just behind China which had 109 million cases of diabetes in 2015.

Diabetes not only debilitates but also kills. If diabetes is poorly controlled, it can cause complications like heart attacks, strokes, kidney failure, blindness, and foot ulcers that can lead to amputations. The complications of diabetes can be grouped into macrovascular and microvascular diseases. The main macrovascular complications are ischemic heart disease, stroke and peripheral vascular disease. Microvascular complications include diabetic retinopathy, neuropathy and nephropathy.<sup>8</sup>

Management of diabetes includes lifestyle changes like regular physical activity, developing healthy eating habits, maintaining normal body weight, adherence to treatment, cessation of smoking and moderation in alcohol consumption.

Patient centered factors such as age, gender, patient education and therapy-related factors such as route of administration, duration and complexity of treatment and the side effects of the medicines are responsible for non-adherence.<sup>9</sup>

Studies have shown that there is improvement in compliance to treatment and decrease in the complications associated with the disease with increase in patients' knowledge about the disease and its complications. <sup>10</sup> As few studies have been done on assessment of the knowledge of diabetes, its complications and treatment adherence among diabetics in Karnataka the present study has been taken up in a rural community with the objectives of a) assessing the

knowledge of diabetes and its complications among patients with type 2 diabetes mellitus, b) assessing treatment adherence of the above patients and c) to determine any association of their knowledge with treatment adherence.

#### **METHODS**

This was a cross sectional study over a two months' period from October to November 2016. After obtaining approval from the Vydehi Institutional Ethics Committee (VIEC) 120 diabetic patients attending Endocrinology, Ophthalmology, Medicine and Surgery outpatient departments as well as those admitted in the wards who were willing to participate in the study were included in the study. Exclusion criteria consisted of those with gestational diabetes, Type 1 diabetes and patients with very severe diabetes. Informed consent was taken from each patient.

A semi-structured questionnaire consisting of questions on socio demography as well as patients' knowledge of diabetes, its complications and adherence to treatment was administered to them.

Each patient was interviewed face-to-face in their own language and each questionnaire was scored. A maximum of 35 points was allotted to the questions on knowledge and complications of diabetes and 7 points for treatment adherence. The total scores for each patient were calculated by cumulating the scores for the correct answers.

The data obtained was entered into Microsoft Excel and statistical analyses were performed based on percentages and proportions using SPSS Version 21.0.

#### **RESULTS**

Table 1 shows the knowledge of diabetes and its complications among the 120 patients.

Table 2 reveals the adherence of the diabetic patients to the treatment regimen prescribed by the consultants.

Out of 120 patients, 67 (55.8%) had more than 80% knowledge regarding diabetes mellitus and its complications, 45 (37.5%) patients had 60-79% knowledge and only 8 (6.7%) patients had less than 60% knowledge as shown in Table 3.

As depicted in Table 4, 77 patients (64.2%) scored more than 80% regarding treatment adherence to the medicines prescribed by their consultants. 27 patients (22.5%) scored between 60-79%. However, 16 patients (13.3%) scored below 60%.

Table 5 reveals that there was a significant association between knowledge on diabetes and its complications with treatment adherence.

Table 1: Knowledge about diabetes and its complications.

Knowledge on Diabetes	Knowledge absent	Knowledge present
Definition of diabetes mellitus	7 (5.8%)	113 (94.2%)
Awareness that diabetes mellitus is not a communicable disease	7 (6%)	113 (94%)
Awareness of early symptoms of diabetes mellitus	14 (11.7%)	106 (88.3%)
Food substances to be reduced by diabetics	32 (26.7%)	88 (73.9%)
Diabetic person must perform regular exercise like walking	10 (8%)	110 (92%)
Diabetes mellitus is curable	89 (74%)	31 (26%)
Association of diabetes with obesity	32 (26.7%)	88 (73.7%)
Diabetics are more prone to develop hypertension	30 (25%)	90 (75%)
Diabetics should regularly examine their feet	13 (10.8%)	107 (89.2%)
Awareness of organs affected in diabetes		
Kidneys	17 (9.6%)	103 (90.4%)
Eyes	12 (5.3%)	108 (94.7%)
Nerves	42 (31.6%)	78 (68.4%)
Heart	43 (32.5%)	77 (67.5%)
Number of patients who thought that an extra dosage can be harmful	24 (20%)	96 (80%)
Number of patients who thought they needed to go for regular eye checkups	26 (22%)	94 (78%)
A diabetic patient who is smoker should quit smoking	12 (10%)	108 (90%)
Awareness that diabetics should carry an identity card	52 (43.3%)	68 (56.7%)
Awareness that diabetics should carry a candy	44 (36.7%)	76 (63.3%)
Awareness that diabetes is hereditary	30 (25%)	90 (75%)

**Table 2: Adherence to treatment.** 

Yes	No	Adherence to medications
108 (90%)	12 (10%)	Medication taken regularly
19 (15.8%)	101 (84.2%)	Number of patients who had stopped taking the medications on their own
8 (6.7%)	112 (93.3%)	Number of patients who had taken a double dose on skipping their regular dose
40 (33.3%)	80 (66.7%)	Number of patients who forgot to carry their medication while travelling or leaving home
17 (14.2%)	103 (85.8%)	Number of patients who increased the dosage of their medication on their own depending on their symptoms

Table 3: Knowledge scores of patients on diabetes and its complications.

Percent	Frequency	Knowledge
55.8	67	>80%
37.5	45	60-80%
6.7	8	<60%
Total	120	100

Table 4: Treatment scores among diabetic patients.

Percent	Frequency	Treatment (%)
64.2	77	>80
22.5	27	60-80
13.3	16	<60
Total	120	100

Table 5	: Association betw	veen knowledge a	nd treatment adherence.	
nce (%)	Knowledge (%)			Total
	>80	60-80	<60	Total

**Treatment Adheren** 77 21 (27.3%) >80 52 (67.5%) 4 (5.2%) 11 (40.7%) 15 (55.6%) 27 60-80 1 (3.7%) 4 (25.0%) 9 (56.3%) 16 <60 3 (18.8%) **Total** 67 (55.8%) 45 (37.5%) 8 (6.7%) 120

#### **DISCUSSION**

The present study showed that only 55.5% of patients had adequate knowledge about the disease. Knowledge on diabetes ranged from 23.8% to 45% in various studies in India. 11-13

A study conducted in 2013 by the Department of Pharmacology at Vydehi Institute of Medical Sciences and Research Centre, Bangalore established that more than 50% of the participants were non-adherent to diabetes treatment.<sup>14</sup> However, in our study it was heartening to note that 64.2% were adhering to their medication.

This study revealed that 94.2% of the patients knew the definition of diabetes and only 5.8% of them were not aware of it. However in the study done by Thungathurthi et al only 50% of the population was aware of it. 15 Also, 94% of patients in our study knew that diabetes is not a communicable disease whereas a study by Wee showed that only 72.9% were aware that diabetes is not contagious. 16

Nisar et al observed that 33.8% of diabetics were aware that increased urination was an early symptom which was in contrast to our study which showed that 88.3% of the patients were aware. 17

In our study, we found that 73.9% of the diabetics knew that they must bring about a change in their diet like reducing excess intake of sweets but a study done in Kolar showed that 93.5% of diabetics were aware of this. This shows that there is a lack of knowledge regarding food habits among diabetics and because of this they would not be able to control the disease adequately. 18

A study done in Pondicherry observed that only 56% of the diabetics knew that regular exercise would improve blood sugar levels whereas in our study 92% said that diabetics must perform regular exercise like walking for 30 minutes a day. This present study shows that diabetics today are more aware of the importance of exercise.<sup>19</sup>

The present study showed that 26% felt that diabetes was curable but in a study done in rural Sullia, Karnataka 47.5% felt the disease was curable. This indicates that some patients are still under the misconception that diabetes is completely curable.<sup>20</sup>

In a study done in Chennai (CURES-9), only 11.9% of the subjects reported that obesity is a risk factor for diabetes but in our study 73.7% were aware of the association of diabetes and obesity. This indicates that diabetics have become more conscious of their weight and have realized that weight gain could lead to complications of diabetes.<sup>21</sup>

The study done by Wee in Singapore observed that 68.6% of the diabetics were aware that hypertension is a complication of diabetes and in the present study 75% knew that diabetics are prone to co-morbidities like hypertension. This awareness would help them in regularly going for follow ups to check for co-morbidities associated with diabetes.<sup>16</sup>

In the study conducted by Kaur et al in Chandigarh, it was observed that 63.3% of diabetics took care of their feet through regular washing.<sup>22</sup> In the study by Tham et al in Singapore 75.8% of diabetics took regular care of their toes and feet.<sup>23</sup> However, it was heartening to note that in the present study 89.2% of diabetics regularly examined their feet. This highlights the fact that diabetics have understood that their feet need extra care and attention.

Among complications associated with diabetes, only 64.5% patients were aware that heart is also affected in diabetes. According to a study done in Ludhiana, 64.4% patients knew that diabetes affects the heart which correlates with our study. 24 The present study also revealed that 68.4% were aware that nerves were affected in diabetes and a study done in Malaysia also demonstrated that 65.5% of diabetics knew that it could lead to loss of sensation in arms and legs.<sup>25</sup> The present study showed that 94.7% knew that diabetes could lead to retinopathy and 90.4% knew that kidneys were also affected in diabetes. However in a study by Muninarayana et al, only 54.8% and 41.9% knew that eyes and kidneys could get affected.<sup>18</sup>

In this study, we found that 80% of the patients knew that an extra dose of medication could be harmful which is a good indicator that shows that they take their medications judiciously though further studies need to be done on this aspect.

In a study conducted in Iran, only 5% were aware of the fact that diabetics should go for regular eye examination.<sup>26</sup> However our study revealed that 78% of the patients were aware of this. Regular eye examinations

would help in early detection of complications like cataract and diabetic retinopathy which could be rectified for enabling good vision.

In the present study, 90% of the subjects agreed that diabetics should avoid smoking but in a study done in Kolar, only 67.7% were of the opinion that cessation of smoking is a must among diabetics. This shows that there are some patients who do not know that smoking could have a synergistic effect on the complications of diabetes.

A large proportion in this study was unaware of the fact that they needed to carry an identity card (43.3%) and candy (36.75%) with them all the time. This was similar to the findings in a study done in Singapore where 54.7% did not know that they should eat a candy if they had an episode of hypoglycemia. <sup>23</sup> Awareness in this field will help to mitigate the effect of hypoglycemia.

In our study, only 25% of the patients did not know that their children were at a risk of getting diabetes but according to Mookambika et al 71% of the patients were ignorant that diabetes was hereditary.<sup>27</sup> Knowledge on this needs to be improved so that family members of diabetics could go for screening and early detection of diabetes so as to prevent long term complications.

Regarding compliance to treatment, 90% of patients in our study took their medications regularly which was similar to the findings in a study done by Mangaiarkarasi et al which observed that 85% of the patients were regularly taking their medications. <sup>19</sup> The main reasons for non-adherence among the remaining 10% were that they tended to forget their medications (4%), had financial problems (2.6%), felt that the medications could cause side effects (2%) and the rest (1.3%) thought that the medications were ineffective.

A study from Maharashtra demonstrated that 25% of the diabetics would stop taking their medications on their own if they felt better. But in the present study only 15.8% of diabetics did so which indicates that now patients are well aware of their treatment regimen and hence are better adhered to it.

A majority (93.3%) of patients in our study did not take a double dose after missing a dose which correlates with the findings mentioned by Thungathurthi et al in a study conducted in Warangal where 92.7% patients did not take a double dose if they missed the treatment regimen. <sup>15</sup>

Our study also highlighted that 33.3% of the patients forgot to carry their medication while travelling or leaving home. This may indicate that they did not understand the seriousness of their condition and were not aware of the consequences of omitting medications. We also observed that 14.2% of the patients increased the dosage of their medication on their own if the symptoms

became worse. Further studies need to be done with respect to adherence to drug therapy.

An association was found between the knowledge and treatment adherence of the patients. Patients having more knowledge better adhered to the treatment. Therefore 67.5% of the patients who had more than 80% knowledge adhered better to their treatment. These findings were consistent with the findings of a study conducted in a medical college in Pune where it was found that 45% of patients had adequate knowledge about diabetes and 93.33% of patients were adherent to drug therapy. This highlights the importance of educating patients regarding the disease so as to obtain better compliance to medications.

#### **CONCLUSION**

Patients having more knowledge adhered better to the treatment. This highlights the importance of empowering patients with knowledge regarding the disease to obtain maximum benefit from their treatment.

Governments worldwide including India committed to halt the rise of Diabetes by 2025 at the World Health Assembly in 2013. Managing diabetes involves interaction with people and helping them to manage their disease by door to door campaign, mass media campaign, improving access to healthy foods and opportunities for physical activities.

Adequate steps need to be taken at all levels starting from Central government up to the local level. Accredited Social Health Activists (ASHAs) under National Health Mission can help the people at the grassroot level. Behavior change communication should be given to all diabetics during their first contact and reinforced during every contact session so as to prevent the long term complications. This highlights the need for a combined effort by every member of the society in beating Diabetes.

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