Knowledge About Complications of Diabetes Mellitus and its Association with Treatment Compliance Among Type 2 Diabetics Visiting a Public Sector Diabetes Clinic
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Author’s Contribution
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Abstract
Background: Despite effective methods of treatment, half of the diabetic patients fail to achieve good glycemic control. Type 2 Diabetics who have knowledge about their disease and treatment can play an active role in their diabetes care and are more likely to achieve optimal blood glucose and HbA1c levels. The objective of this study is to assess knowledge of complications of type 2 Diabetes mellitus and its association with treatment compliance in patients visiting a public sector diabetes clinic.

Material and Methods: The study was a descriptive correlational study conducted at the Diabetes Clinic of Benazir Bhutto Hospital that encompassed 180 participants who were positive for type 2 diabetes mellitus. The study took place in 6 months from February to July in 2018. The participants were selected by non-probability convenience sampling, and informed consent was taken from the participants. They were assessed by a questionnaire-based interview. Data were analyzed via the Statistical Package for Social Sciences (SPSS), version 22 by applying descriptive statistics.

Results: Out of 180 participants, mean age was 51.53 years (72.8% females and 27.2% males), 46.7% were taking oral hypoglycemic agents while 53.3% were on insulin. Respondents compliant to anti-diabetic drugs were 73.8%. The main reasons for non-compliance include forgetting to take medicine (43.5%), side effects of medications (10.9%), feeling that too many medications were prescribed (10.9%), or high dose was given (8.7%), and interference with meal plans (8.7%). A higher score of knowledge was associated with better compliance with treatment.

Conclusion: The knowledge of complications of diabetes and compliance to treatment is inadequate in patients visiting diabetes clinics. Those who have higher scores showed better compliance to the treatment.

Keywords: Diabetes mellitus, knowledge, complications, treatment compliance.
Introduction

In 2014, World Health Organization (WHO) estimated that 422 million people are suffering from diabetes. It is estimated that the global prevalence of diabetes will increase from 2.8% to 4.4% between 2000 and 2030. While, in Pakistan, the prevalence of diabetes is much higher than global estimate being 16.2% in men and 11.7% in women. Uncontrolled diabetes leads to life-threatening chronic complications of which cardiovascular and renal diseases account for 63% mortality collectively in the diabetic population. Poor glycemic control also has a significant effect on the quality of life and the onset of depression.

Diabetes also imposes significant economic burden with the medical expenditures attributable to hospitalizations, medications, outpatient visits, and treatment of chronic complications. People with diabetes, on average, have medical costs that are 2.3 times higher than people without the disease. As the prevalence of diabetes continues to increase; it is estimated that the total cost of diabetes will exceed $174 billion.

Diabetes can affect many different organ systems in the body and, over time, can lead to serious complications. Complications from diabetes can be classified as microvascular or macrovascular. Microvascular complications include nervous system damage (neuropathy), renal system damage (nephropathy) and eye damage (retinopathy). Macrovascular complications include cardiovascular disease, stroke, and peripheral vascular disease. Peripheral vascular diseases may lead to bruises or injuries that do not heal, gangrene, and, ultimately, amputation. In 2002, diabetes was the sixth leading cause of death, with 73,249 death certificates listing diabetes as the underlying cause of death and an additional 224,092 death certificates listing diabetes as a contributing cause of death. Diabetes is likely to be underreported as a cause of death, due to many life-threatening complications associated with it. Overall, the risk of death among people with diabetes is almost twice that of people of similar age who do not have diabetes.

Lack of education and knowledge about the disease, according to previous studies, is significantly associated with poor glycemic control. According to a survey conducted in Northern Ghana, people with inadequate knowledge and low health literacy on diabetes complications, will likely have suboptimal glycemic control and increased risk of getting complications as they often have challenges understanding and following medical instructions. In Bangladesh, the knowledge of diabetes was significantly associated with education, gender, income, and duration of diabetes. A study described that there is a high prevalence of poor glycemic control and complications in patients with diabetes having insufficient knowledge of their disease and its complications.

Patients empowered with diabetes knowledge can take an active role in diabetes care and achieve better glycemic control which can decrease or delay the onset of complications. Diabetes is increasing day by day, and at the same time, Pakistan has a much higher prevalence compared to global estimates. A multi-sectorial approach is needed, where the government together with other sectors such as the health, education and local government sectors work collaboratively in the development of locally tailored diabetes education programs to promote healthy self-care behaviours relevant for the prevention of diabetes and its complications. Healthcare providers need to intensify education on diabetes, treatment, and complications utilizing linguistically and culturally appropriate educational resources to enhance patients' knowledge.

The objective of this study is to assess awareness and knowledge of complications and its relation to treatment compliance of people with type 2 diabetes visiting a public sector diabetes clinic.

Materials and Methods

The descriptive correlational study of 6 months duration from February to July in 2018 was conducted among people with type 2 diabetes visiting the diabetes clinic at Benazir Bhutto Hospital. Using non-probability convenience sampling, 180 participants who had type 2 diabetes were selected as the study population. All those participants who were having type 2 diabetes mellitus were included in the study except those who showed clinical manifestations of diabetic complications such as gangrenous foot or retinopathy, etc. Diabetics who were already educated about diabetes in counselling programs and those who were medical personnel, including doctors, nurses and medical students were excluded from the study. Informed consent was taken from the participants.

The participants were interviewed based on a self-designed questionnaire, developed after extensive literature search and was qualitatively assessed by the
institutional research committee. The questionnaire evaluated social and demographic parameters (such as age, gender, address, level of education, occupation, and monthly income), disease status including duration of diabetes, medication history, and treatment compliance. Questions regarding the knowledge about diabetes and its complications, including cardiovascular, cerebrovascular, renal, retinal, and neurological complications, were also included. It also assessed lifestyle changes and psychological effects like depression, inability to concentrate and patients’ perception regarding treatment compliance and complications of diabetes.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 22. Knowledge scores from the questionnaire were categorized as low, moderate, and high. Descriptive statistics were used to analyze the data. Knowledge scores were correlated with treatment compliance using Pearson’s correlation, and p values < 0.05 was considered statistically significant.

### Results

Among 180 participants of the study, 27.2% (n=49) were males, and 72.8% (n=131) were females with a mean age of 51.53 ± 10.3 years. On categorization 22.8% (n=41) participants were between 30 to 44 of age, 49.4% (n=89) from 45 to 59 and 27.8% (n=50) were 60 years old or above. Almost all (98.3%) of the respondents were married. The mean duration of diabetes was 9.1 ± 8.3 years. Among participants, those having a positive family history of diabetes were 76.1% (n=137).

Table 1 describes the education status of the participants of the study. Oral anti-diabetic drugs were used by 46.7% (n=84) of the respondents while 53.3% (n=96) used insulin.

| Education Status         | N (%)   |
|--------------------------|---------|
| Uneducated               | 78 (43.3%) |
| Primary/Secondary education | 47(26.1%) |
| Matric                   | 30(16.7%) |
| HSSC or above            | 25(13.9%) |

The mean knowledge score was 8.44 ± 3.8 with 40.6% (n=73) participants having a low knowledge score, 33.3% (n=60) having a moderate knowledge score, and 26.1% (n=47) having high knowledge scores. The following figure represents the knowledge of patients regarding complications of Diabetes.

![Knowledge scores of participants](image)

About 73.9% (n=133) of the respondents were compliant to medications, whereas, 26.1% (n=47) were non-compliant. Table 2 describes the causes of non-compliance among the participants of the study.

| Cause of non-compliance       | N (%)   |
|-------------------------------|---------|
| Forgets to take medicine      | 20(43.5%) |
| Lack of finance               | 5(10.9%) |
| Side effect of medications    | 5(10.9%) |
| Believes that a high dose is given | 4(8.7%) |
| Taking them for many years    | 3(6.5%) |
| Interference with meal plans  | 4(8.7%) |
| Too many medications          | 5(10.9%) |

Although the relation between compliance to anti-diabetic drugs (insulin and oral anti-diabetics) and knowledge score is statistically insignificant (p=0.05) but more compliance to treatment was shown in patients with higher knowledge scores than those with lower scores (47.2% vs 41.6%). Other details regarding knowledge score and treatment compliance are shown in Table 3.

| Total score of knowledge | Compliant to medications | Noncompliant to medications |
|--------------------------|--------------------------|-----------------------------|
| Low score                | 52                        | 73                          |
| Moderate score           | 39                        | 60                          |
| High score               | 42                        | 47                          |
| Total                    | 133                       | 180                         |

Table 3: Relation of knowledge score with compliance to anti-diabetic drugs
There was no significant association between the anti-diabetic drug type and treatment compliance ($p=0.751$), as shown in Table 4. Similarly, there was no significant relationship between age ($p=0.537$) and knowledge scores, but there was a significant association between level of education ($0.001$) and the duration of diabetes ($p=0.004$) with knowledge scores.

### Table 4: Cross-tabulation between medications prescribed and compliance to anti-diabetic drugs

| Medications prescribed | Compliant to medications | Noncompliant to medications |
|------------------------|--------------------------|-----------------------------|
| Oral Drugs             | 63                       | 21                          |
| Insulin                | 70                       | 26                          |
| Total                  | 133                      | 47                          |

### Discussion

Diabetes mellitus is a syndrome with disordered metabolism and inappropriate hyperglycemia due to either deficiency of insulin secretion or a combination of insulin resistance and inadequate insulin secretion to compensate. Diabetes can lead to serious complications, resulting in certain diseases that affect multiple systems, eventually causing early death. Generally, metformin is given as first medication whereas sulfonylureas, meglitinides, thiazolidinedione, SGLT2 inhibitors are also given. The study describes a positive association between knowledge about complications of diabetes and treatment compliance which is in accordance with previous studies describing that, lack of compliance is associated with a lack of knowledge and attitude problems.\textsuperscript{14} It is well understood that better disease control cannot be ensured without knowledge and patient involvement.\textsuperscript{15} A study from Malaysia showed higher knowledge, attitude, and practice scores among patients.\textsuperscript{16} Our study also describes that one out of four individuals (26.1%) have good knowledge scores which are higher than previous results in Pakistan (13%) but it is in accord with a study in India where 24.8% of diabetics had good knowledge scores.\textsuperscript{17,18} This study did not illustrate any relation of insulin use and duration of diabetes with treatment compliance. On the contrary, other studies have described that insulin use and increased duration of diabetes is associated with poor compliance.\textsuperscript{17,19} It was also stated that the patients who are noncompliant to treatment have a very poor understanding of the disease.\textsuperscript{19} Overall, patients coming to public sector diabetic clinic have low knowledge and awareness regarding complication of diabetes which can be life-threatening.\textsuperscript{20} As the study employed non-probability sampling, and the setting was only one public sector diabetes clinic, the findings cannot be generalized to the type 2 diabetic population, especially those who are not in contact with medical care.

Our study emphasizes the need for comprehensive diabetes education encompassing the risk factors, complications, management, diet, physical activity, life-style, self-management, and medication adherence among others. The findings also highlight the need for creating mass awareness and intensifying education measures for diabetes at large, including at risk populations, the population at pre-diabetes phase and diabetic patients in particular along with identifying other factors that might affect glycemic control. Therefore, traditional diabetes education might not be sufficient to control diabetes. Innovative strategies should be identified and adopted to further improve the quality of diabetes education to make it more effective. The study also underscores the need for further research to identify other critical factors enhancing glycemic control. The current study highlights certain beliefs and misconceptions. Strategies must be made to improve the knowledge about diabetes and its complications among patients with type 2 diabetes to ensure better compliance. This will also empower the type 2 diabetics to participate in better control of their disease.

### Conclusion

About 40.6% of the patients visiting a Diabetes Clinic have very little knowledge and awareness regarding complications of diabetes and compliance to treatment. They have a limited knowledge of the causes, risk factors and management strategies of diabetes. There is no significant association between the anti-diabetic drug type and treatment compliance. Our study also shows that there is a weak relationship between knowledge, duration of diabetes and glycemic control. The study also underscores the need for further research to identify other critical factors enhancing glycemic control.

### References

1. World Health Organization. Global report on diabetes. World Health Organization; 2016.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes care. 2004 May 1;27(5):1047-53.
3. Shera AS, Rafique G, Khwaja IA, Ara J, Baqui S, King H. Pakistan national diabetes survey: prevalence of glucose intolerance and associated factors in Shikarpur, Sindh Province. Diabetic medicine. 1995 Dec 1;12(12):1116-21.
4. Morrish NJ, Wang SL, Stevens I, Fuller JH, Keen H, WHO Multinational Study Group. Mortality and causes of death in the WHO Multinational Study of Vascular Disease in Diabetes. Diabetologia. 2001 Sep 1;44(2):514.
5. Carreira M, Anarte MT, Ruíz MD, Félix IC, Machado A, Dominguez-Lopez M, González IM, Esteva ID, Valdes S, González-Romero S, Soriano F. Depression in type 1 diabetes mellitus and associated factors. Medicina clínica. 2010 Jul;135(4):151-5.
6. Bains SS, Egede LE. Associations between health literacy, diabetes knowledge, self-care behaviors, and glycemic control in a low income population with type 2 diabetes. Diabetes technology & therapeutics. 2011 Mar 1;13(3):335-41.
7. Després PD, Harris-Hayes M, Schootman M. Epidemiology of diabetes and diabetes-related complications. Physical therapy. 2008 Nov 1;88(11):1254-64.
8. Baderi M, Solan Y, Darraj H, Sabai A, Maftouh M, Alamodi S, Alsabaani A. Factors associated with long-term control of type 2 diabetes mellitus. Journal of diabetes research. 2016;2016.
9. Adam L, O'Connor C, Garcia AC. Evaluating the Impact of Diabetes Self-Management Education Methods on Knowledge, Attitude and Behavior of Patients with Type 2 Diabetes Mellitus. Canadian Journal of Diabetes. 2017 Nov 23.
10. Afaya RA, Bam V, Azongo TB, Afaya A. Knowledge of chronic complications of diabetes among persons living with type 2 diabetes mellitus in northern Ghana. Plos one. 2020 Oct 28;15(10):e0241424.
11. Islam SM, Niessen LW, Seissler J, Ferrari U, Biswas T, Islam A, Lechner A. Diabetes knowledge and glycemic control among patients with type 2 diabetes in Bangladesh. SpringerPlus. 2015 Dec 1;4(1):2841.
12. Habib SS, Aslam M. Risk factors, knowledge and health status in diabetic patients. Saudi medical journal. 2003;24(11):1219-24.
13. White RD. Patient empowerment and optimal glycemic control. Current medical research and opinion. 2012 Jun 1;28(6):979-89.
14. Mira JJ, Llanas G, Gil V, et al. The variability in the care for diabetic and hypertensive patients as a function of the styles of a physician’s practice. Aten. Primaria, 1999;25:73.
15. McNally IC, Andrews J. The importance of patient education and patient involvement in the treatment of diabetes. Pharma J 2000; 265.
16. Ambigapathy R, Ambigapathy S, Ling HM. A knowledge, attitude and practice (KAP) study of diabetes mellitus among patients attending Klinik Kesihatan Seri Manjung. NCD Malaysia 2003; 2:6-16.
17. Raj CP, Angadi MM. Hospital-based KAP study on diabetes in Bijapur, Karnataka. Indian J Med Spec. 2010 Jul 1;12(2):80-3.
18. Badruddin N, Basit A, Hydrie MZ, Hakeem R. Knowledge, attitude and practices of patients visiting a diabetes care unit. Pakistan Journal of Nutrition. 2002;1(2):99-102.
19. Sapkota RP, Upadhyaya T, Gurung G, Parker M, Raman R, Pardhan S. Need to improve awareness and treatment compliance in high-risk patients for diabetic complications in Nepal. BMJ Open Diabetes Research and Care. 2018 May 1;6(1):e000525.
20. Al-Maskari F, El-Sadig M, Al-Kaabi JM, Afandi B, Nagelkerke N, Yeatts KB (2013) Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. PLoS One 8(1):e52657.