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**Original Article**

# Knowledge and Practices of Patients Regarding Diabetes Self-Management: A Mixed Method Approach

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## ABSTRACT

Diabetes Mellitus is a major source of death globally and has shaken middle-income and low-income countries including Pakistan. **Objective:** To determine diabetes knowledge, and explore the patient's experiences of type-ii diabetes along with its self-management. **Methods:** A mixed-method design was used to carry out this study at a tertiary care hospital in KP Pakistan from April to September 2021. Information on patients' demographic characteristics, diabetes knowledge, and diabetes self-practices, patients' lived experiences of diabetes self-practices, and barriers to self-care activities were collected. Data were collected through a structured questionnaire and in-depth (IDIs) interviews for measuring diabetes knowledge, and its management. **Results:** Out of 215 recruited participants, the majority 90% had inadequate knowledge (score=0-4). 3.2% (n=07) had average knowledge (score=5-8) of diabetes, and its self-management. 60% of the participants were from the age group 50-59 years. 70% (n=151) of participants were from poor socioeconomic classes. The results showed an association between illiteracy, poverty, diabetes knowledge, and self-management (p-Value 0.001). The qualitative results expressed that the illiterate and low socioeconomic participants had inadequate diabetes self-management practices. **Conclusions:** The study inferred that the participants, who had inadequate knowledge about type-II diabetes and its management, were having poor self-care practices of diabetes.

## INTRODUCTION

DM is a major source of deaths globally [1]. It accounts for the ninth major cause of worldwide death by disease and has shaken middle-income and low-income countries including Pakistan [2, 3]. It is an emerging health issue confronted by developing countries within the last few decades [4]. According to World Health Organization (WHO 2016) report, the prevalence of DM is increasing globally [5]. International Diabetes Federation (IDF) reported the global burden of diabetes as 463 million with an estimated figure of 700 million by the year 2045 [6]. According to IDF, 6.6 million people are living with Diabetes in Pakistan with an expected figure of 14.5 million by the year 2025 [7]. Moreover, a study"Diabetes Prevalence Survey of Pakistan" conducted (2019) reports the prevalence of Diabetes type-II as 16.98%. This figure shows an alarming increase in the prevalence of diabetes Mellitus in Pakistan [8]. The aim of diabetes self-management was to manage the symptoms, endorse wellbeing, avoid acute complications of hypo, and hyperglycaemia, and stop the onset, and development of long-lasting problems. DM is a chronic condition that

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requires continuous decisions about diet intake, blood glucose monitoring, physical activities, and medication compliance [9, 10]. For attaining optimal blood sugar control in some persons with diabetes, proper diet, regular exercise, and maintenance of ideal body weight are required [11]. Moreover, failure to compliance could have a profound impact on the quality of life of the individual [12, 13]. Chronic complications include macro-vascular disease and micro-vascular diseases [14]. The current study is therefore aimed to determine diabetes knowledge and self-care practices. Moreover, the study findings may contribute to long-lasting prevention, performance, and control over diabetes mellitus. This study emphasizes the need to expedite lifestyle interventions, and encourages diabetic patients to better accomplish control over their diabetes.

## METHODS

After approval from ERB and AS&RB Institute of Nursing Sciences, Khyber Medical University, and Ethical Committee Department of Endocrinology Hayatabad Medical Complex Peshawar Pakistan, a mixed method study was conducted on diabetes type-ii knowledge, and its practices from April to September, 2021 in a tertiary care hospital. The study setting was Outpatient Department, Hayatabad Medical Complex Peshawar, Pakistan. It is a 500-bed tertiary care government hospital. The setting was selected based on feasibility, availability of samples and expectation of collaboration from medical and nursing professionals for collection of data. Recruited participants were adult men or women with known diabetes type-ii for two or more than two years, and aged 40-70 years. Participants with other comorbidities and unwillingness were excluded from the study. Sample size was calculated as 215 through Rao-soft calculator. A consecutive sampling technique was used for data collection [15]. Ten in-depth (IDIs) interviews were taken for the qualitative part of the study. All the participants who fulfilled inclusion and exclusion criteria were initially recruited in the qualitative phase of the study. The data were collected through an adopted diabetes questionnaire during May 2021 to June 2021. Informed written and verbal consent was taken before data collection. The questionnaire consists of two parts; demographic variables 14 questions and diabetes knowledge and practice 12 questions. The total score was 12. A score of one (1) mark was given to every correct answer, and a score of zero (0) was given to every incorrect answer. Level of knowledge and practice was assessed as a score of (0-4) was given for poor knowledge, a score of (5-8) was given for average knowledge, and a score of (9-12) was given for good knowledge. In the qualitative phase of the study, 10 in- depth interviews with participants (05 having had average to good knowledge and 05 having had poor knowledge) of diabetes, and its management was conducted. Consents were taken again from the participants for in-depth interviews. The questions were explained to the participants before data collection. In-depth face-to-face interviews were conducted with participants to explore their experiences with diabetes and its management. The topic guide was followed during the interview to simplify the data collection. The interviews were audio recorded and saved keeping the confidentiality of the participants in view. The data were also recorded on paper using handwritten notes, to avoid data loss. The thematic analysis was done to explain the quantitative findings [16]. All the statistical analysis was carried out using SPSS V.22.0. Descriptive Analysis was used to find the frequencies (f) and percentages (%) of gender, age, marital status, and socioeconomic status. Inferential statistics were used tofind association between literacy, socioeconomic status and diabetes knowledge. The thematic analysis approach was used and for data analysis Braun and Clark's six steps were followed [17]. In stage one, the data were explored for thematic analysis, and to get familiar with the data the audio record had been listened several times. In the second stage, codes were generated based on semantic and conceptual reading. In the third stage, themes were extracted from the codes. In the fourth stage, the entire themes were checked for representation with the data. In the fifth stage, naming the extracted themes was done, and finally, in the last stage, all the themes were written.

## RESULTS

The participant's characteristics are described in Table 1. The statistics shows that out of the total 215 participants, 123 illiterate participants were having poor knowledge (0-4 score). Seven matriculate participants were having average knowledge (5-8 score) of the total 0-12 score, while the remaining 15 intermediate participants were having average knowledge and the rest of the 8 participants were having good knowledge of diabetes (9-12). The statistics on educational level shows that 89.8% were illiterate, 7.0% were intermediate and 3.3% were matriculated. The result shows that most of the participants were illiterate, and their diabetes knowledge was inadequate in comparison to the participants with higher educational levels.

**Table 2:** Participants' Characteristics

| Variables | Frequency (%) |
|---|---|
| **Gender of the Participants** | |
| Male | 137 (63.7) |
| Female | 78 (37.3) |
| Total | 215 (100) |
| **Age of the Participants.** | |
| 40-49 | 35 (16.3) |
| 50-59 | 95 (44.2) |

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| | |
|---|---|
| 60-69 | 85 (39.5) |
| **Marital Status & Religion Of the Participants** | |
| Muslim & Married | 215 (100) |
| **Income of the Participants** | |
| Poor | 164 (76.3) |
| Middle | 51 (23.7) |
| **Family Structure of the Participants** | |
| Nuclear | 72 (33.5) |
| Joint | 127 (59.1) |
| Extended | 16 (7.4) |
| **When did You First Find out You Have Diabetes** | |
| 2-5 years | 28 (13.0) |
| 5-10 years | 63 (29.3) |
| More than 10 years | 124 (57.7) |
| **Fasting Blood Sugar Level Of the Participants** | |
| Mean | 150.99 |
| **Province of the Participants** | |
| KPK Pakistan | 215 |

The association of educational level with Thedacare score is shown in (Figure 1).

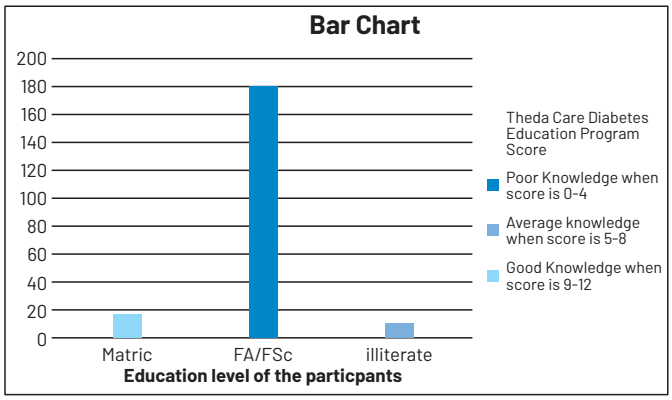


**Figure 2:** Educational Level of the Participants

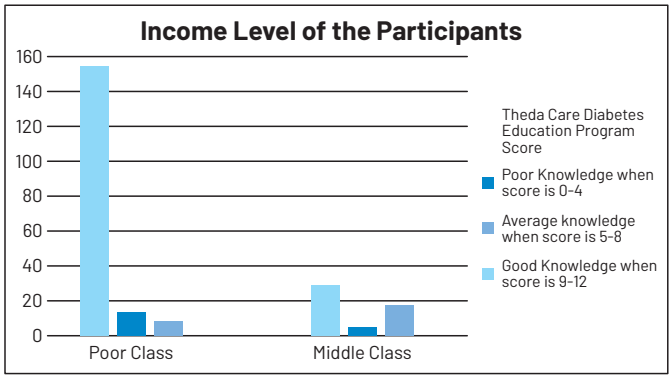


**Figure 2:** Educational Level of the Participants

A total of 80 varied codes were generated from the collected data. Axial coding was done and needless codes were removed. Only 12 codes were identified, after removing the needless codes. Four themes were created after arranging and categorizing the codes. These themeswere insufficient knowledge about diabetes, Knowledge, and practice of monitoring blood glucose, Exercise knowledge and practice, and Non-adherence to a healthy diet (See Figure 5).

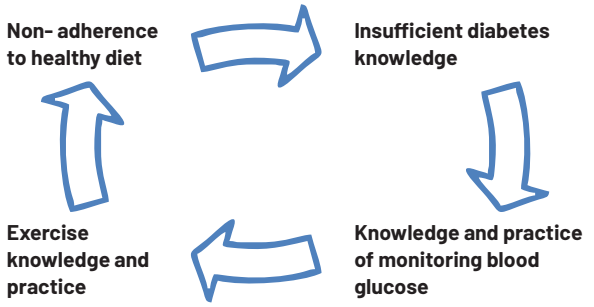


**Figure 6:** Themes

The participants demonstrated insufficient knowledge about diabetes (Table 2).

**Table 2:** Theme 1-Insufficient knowledge about diabetes and its management

| Theme 1 | Category Codes | Meaning units |
|---|---|---|
| Insufficient knowledge about diabetes | Unpredictable to come | *"Diabetes is an untreatable and dirty disease. It does not look into the age of humans and does not let you know when it comes in life."(Participant 2)* |
| | Ban of all blessings of the world. | *"DM is a condition in which when I eat something sweet, it excretes in my urine. It is the ban on all blessings In our bodies, there is the pancreas which divides the sugar but when it becomes diseased .....in urine. The power of the body excreted in the urine."(Participant 9).* |
| | Common in every age | *"DM is a disgusting and shameless disease. It is a fatal disease because it will die you soon. This disease does not let the affected one walk and perform daily activities also. It is common in every age."(Participant 03)* |
| | Diabetes was in my parents' initially | *"I don't know about this disease but initially it was in my parents. At the start, we were not aware of it. I always found my father's body extremities cool and sweaty. They were suffering from body aches and fatigue." (Participant 10, age =years).* |

The participants demonstrated inadequate knowledge about self-monitoring of blood sugar levels. Furthermore, they stated as their urine output increased think their blood glucose level is increased (Table 3).

**Table 3:** Theme 2-Self-Monitoring of Blood Glucose Level

| Theme 2 | Category Codes | Narrations/Quotations/meaning units |
|---|---|---|
| Monitoring blood glucose level | Recording sugar level | *"I never test my sugar level usually, but whenever my urine urges increases then I used to test my blood sugar level. I cannot check my sugar level by myself. Near to me, fasting sugar level didn't mean anything; everyone should check their sugar level randomly".(Participant 09) "I check my sugar level from the laboratory when my diabetes hurt me. Self- monitoring of blood sugar is useful, but I don't have a glucometer for checking my blood sugar". (Participant 03)* |

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| | | |
|---|---|---|
| | Increased urine output | *"I use glucometer for checking my blood sugar level but I cannot run it, and not knowing the values of normal sugar range. Self-monitoring is useful for controlling diabetes. I check up my sugar level when my urine output increased". (Participant 10)* |
| | Self- monitoring controls diabetes | *"All diabetic patients should know when his/her sugar level is high, and when it is low. Self-monitoring of blood sugar is necessary, and I used to check my blood sugar level with a glucometer. When my sugar is normal I am happy and satisfied otherwise sad. I am always curious about checking my blood sugar level". (Participant 03, Age=)* |

The participants expressed insufficient understanding of exercise knowledge and its practices (Table 4).

**Table 4:** Theme 3-Knowledge and Practice about Exercise

| Theme 3 | Category Codes | Narrations/Quotations/ Meaning Units |
|---|---|---|
| Exercise knowledge and practice | Exercise softens my blood | *"When I do Exercise, my blood pressure gets high, with exercises the blood get soft which....affects my sugar level. On the other hand, when I don't go exercise my blood becomes clotted which could be the reason for a heart attack. (participant 02, age=55)* |
| | Cannot walk due to my amputated leg. | *"Exercises have huge benefits .....Blood sugar, but I can't...to my amputated leg. I pray for all....suffering from diabetes. They should care for themselves because if I knew that my leg will be removed, I will have kept my legs in a cotton swab. Every diabetic patient should exercise on daily basis". (participant 03, age=60)* |
| | Burn out glucose | *"Exercise is useful in controlling my blood sugar. It burns out glucose and decreases blood sugar level. It also increases my blood pressure. I walk out daily for 10 minutes".(participant 09, age=50)* |

The majorities of the participants were reluctant to diet plan and expressed, compliance with the diet plan is tough to accomplish (Table 5).

**Table 5:** Theme 4-Non-adherence to a healthy diet

| Theme 4 | Category Codes | Narrations/Quotations/meaning units |
|---|---|---|
| Non-adherence to a healthy diet | Diet according to wish | *"I like eating and eating everything available, I have never planned for diet control, but I eat food at divided times. I like fruits whatever may be. I eat rice and bread. I get hurt when someone does not allow me to eat according to my wish".(participant 02, age=63)* |
| | Care in the diet is difficult | *"Avoiding anything in the diet is the toughest job for me. But compliance with something is more difficult. DM is the worst disease in which the subjects wish to eat those entire things which raises your blood sugar level"(participant 05, age=57)* |
| | Diet is blessing | *"Diet is a blessing, I cannot avoid it, and having no concern with diabetes, it is just by God". (participant 06, age=50)* |

Table 6 shows qualitative and quantitative results of two domains of diabetes. Domain 1: Diabetes knowledge. Domain 2: Practice of diabetes self-management (monitoring blood glucose level, exercise, and non-adherence to a healthy diet).

**Table 6:** Integrated Results Matrix

| Quantitative results | Qualitative results | Exemplar quotes |
|---|---|---|
| **Domain 1: Diabetes Knowledge** | | |
| *The illiterate and poor participants were having inadequate diabetes knowledge(0-4 score) while the participants from good socio-economics and literate classes had average to good knowledge(5-8 score)* | *On expression, the participants revealed no or little knowledge about diabetes mellitus while the educated and participants from the middle class expressed adequate knowledge about diabetes* | *"Diabetes is untreatable and dirty disease.... not look into the age of any.... and does not let you know when it comes in life." (Participant2) "I don't know.... disease but initially... Was in my parents....my father's body extremities cool and sweaty...body aches and fatigue." (Participant 10) "Diabetes is a condition ...something sweets, it excretes... urine. It is the ban of all blessings ....pancreas divides the sugar .....diseased it causes sugar in the urine. The power of the body excreted in the urine."(Participant* |
| **Domain 2: Practice of Diabetes self-management (monitoring Blood glucose level, Exercise, and non-adherence to a healthy diet)** | | |
| *The participants belonged to low socio-economic families and were illiterate having had inadequate practices of diabetes self- management and vice versa* | *The illiterate participants demonstrated inadequate practices of diabetes self-management while the literate and good socioeconomic participants verbalized and demonstrated adequate practices of DSM.* | *"I check my sugar level from the laboratory when my diabetes hurt me. Self-monitoring of blood sugar is useful, but "I don't have glucometer... checking... ...sugar". (p03) "Exercises have huge benefits in controlling my blood sugar, but I cannot walk due to my amputated leg....(p03)" "Diet is a blessing, I cannot avoid it, and having no concern with diabetes, it is just by God....."(p6)* |

## DISCUSSION

This mixed method approach was the first study on diabetes knowledge and its management in Khyber Pakhtunkhwa Pakistan. In this study most of the participants were found illiterate and were having inadequate knowledge of diabetes-II and its self-practices. There is a direct relationship between diabetes knowledge, its practices, and education level. Most of the participants were from poor socioeconomic class and their diabetes knowledge and self- management was poor. Moreover, there was also an association between poverty, and diabetes management. Thus education and socioeconomics levels profoundly impact on diabetes and its self-management. A study reported (2018) stated that

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illiteracy with diabetes, combined with its risk factors denoted the prevalence was high in underdeveloped and low- income countries. This study investigated knowledge about diabetes, attitude, and practices in the general population. It was concluded that knowledge related to diabetes risk factors, and diabetes management is low. An educational intervention was recommended to increase the understanding of diabetes prevention and treatment [18]. Similarly, the current study found most of the participants were lack of knowledge and only 3.3 % of the population reported average knowledge about diabetes. Another study reported (2021) while assessing knowledge and self-care practices of diabetes amongst diabetes type-II patients in a tertiary care hospital. A total of 167 patients were included by using consecutive sampling. The study highlighted the need to strengthen awareness of diabetes and also improvement in self-care activities related to diabetes [19]. However, a systematic review study was conducted (2021) which opposes the above study and aimed to assess intervention in diabetes practice of type 2 DM to know the most actual diabetes self-management approach for people suffering from diabetes type-II. HBA1c improvement was reported in a few of the studies and significant improvement in exercise was also observed. It was inferred that self-care activities have positive impacts on HBA1c levels in patients with diabetes type-II [20]. In the qualitative phase of the study, the illiterate and participants from the poor class shared their experiences of inadequate knowledge about diabetes, and its self-management such as non-adherence to diet control, inadequate practice of exercise, and self-monitoring of blood glucose levels while literate and participants from good socioeconomic class expressed adequate knowledge about diabetes and its self-practices. A study conducted (2018) aimed to explore patients' perspectives regarding diabetes and its management. The participants revealed a huge information need about diabetes and its management. In addition to signifying negative opinions about the illness and the participants showed negative outlooks and low self- efficacy to adhere to required self-care activities including diet, physical activity, and self-monitoring of blood glucose [21]. Another similar study was conducted (2019), aimed to highlight the thoughts and experiences of newly diagnosed patients to this diagnosis and the danger of emerging complications. Three main themes were generated: reaction to the diagnosis, concerns about the future, and lifestyle changes. Lifestyle changes were mainly accepted but hard to achieve. The patients were also concerned about the future consequences of the condition [22]. The current study and the study conducted by Pikkemaat et al., explore the similar thoughts, concerns, and experiences of the participants. In the current study, the findings revealed that diet control is hard, exercise is useful but hard to comply with. Theintegrated data were complementary and made emphasis on healthcare professionals must recognize the interaction of other factors, such as the health system, healthcare professionals, and the social and financial resources accessible to individuals. The findings also tell us to initiate creating these links using the viewpoint of diabetic patients. This must be united with the attainment of an understanding of how self-management occurs in social life, rather than seeing self-management as a procedure of people's compliance or adherence [22].

## CONCLUSIONS

The participants revealed inadequate knowledge about diabetes type-II that might have influenced their attitude towards their diabetes self-management. The participants also revealed the need for clear information about self-monitoring of blood glucose levels to achieve optimal control over diabetes. The current study revealed participant's negative attitudes towards lifestyle changes. However, some participants demonstrated positive attitudes toward diet control and physical activities but revealed poor compliance with it. This study divulges an association between educational level, income level, diabetes knowledge, and its management. The study also inferred that the participants who had little or inadequate knowledge about diabetes type-ii and its management were having poor self- care practices of diabetes.

## Authors Contribution

Conceptualization: NUI, BAS, DM
Methodology: NUI, DM
Formal analysis: DM, HA, SK
Writing-review and editing: NUS, BAS, HA, SK

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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