INTEGRATING KNOWLEDGE: HEALTH LITERACY AND ITS EFFECT ON COMPLIANCE OF TYPE II DIABETES

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■ ABSTRACT

Objective: To find out the effect of Health Literacy (HL) on Treatment Adherence among Patients with Type II Diabetes Mellitus, covering both Pharmacological and Non-Pharmacological compliances.

Methodology: This research was conducted using cross-sectional survey on patients with the mean age of 55.15+.59 years from Mercy teaching hospital of Peshawar from March to August 2022. Chronic Disease Self-Management Program (CDSMP) and another questionnaire related with knowledge, risk factors and its complications were also used. Control on diabetes of patients was measured by the last HBA1C test results. Analysis was carried out using SPSS v.26, using descriptive statistic and Pearson correlation.

Results: In this study the response rate was 96.8%, with the mean age (n=242) of 55.15+.59 years. The Reliability of the scale Chronic Disease Self-Management Program (CDSMP) through Cronbach Alpha reliability was 0.88. Most of the patients were male (n=157, 64.8%), from OPD (n=238, 98%), and have diabetic family history (n=198, 80%) respectively. Majority of the patients were taking oral medications (n=135, 55.6%), have good diabetic control levels of HbA1c (n=104, 42.8%) and taken physician guide regarding diabetes knowledge and management (n=86, 35.4%) respectively. Statistically significant relationship was found between health literacy with pharmacological and non-pharmacological compliance (p=0.000) through Pearson correlation.

Conclusion: It is concluded that a high level of HL plays a vital role in the management of type II diabetes, also it is strongly related with improved glycemic control, indicating a strong positive relationship between knowledge acquisition and successful management of diabetes.

Keywords: Health Literacy; Compliance; Diabetes

■ INTRODUCTION

Type 2 Diabetes Mellitus (T2DM), one of the most common metabolic disorders, is caused by a combination of two primary factors: defective insulin secretion by pancreatic β-cells and the inability of insulin-sensitive tissues to respond appropriately to insulin. Given the vital role of insulin release and activity in maintaining glucose homeostasis, precise molecular mechanisms govern the synthesis, release, and detection of insulin. Stringent regulation of these processes is crucial to prevent metabolic disturbances that underlie the pathogenesis of diabetes.[1] Genetic factors contribute significantly to the development of diabetes mellitus, while lifestyle factors, including physical activity and dietary patterns, also exert substantial influence on disease onset and progression. Understanding the interplay between genetic and lifestyle factors provides valuable insights into the complex etiology of diabetes mellitus.[2]

Health literacy significantly influences the depth of knowledge individuals possess about diabetes.[3] The association between health literacy, self-care behaviors, and glycemic control in individuals with diabetes exhibits heterogeneity, partly attributable to variations in health literacy assessment methods. This variability has implications for the selection of appropriate health literacy measures in original research studies.[3] Low health literacy poses a potential barrier to effective self-management among patients with diabetes. Various strategies have been proposed to address low health literacy in diabetes self-management interventions; however, the content of these interventions and their outcomes have demonstrated mixed results.[4] A high prevalence of insufficient literacy rates is observed within the population of individuals diagnosed with diabetes, leading to potential negative consequences on health outcomes, and is linked with a smaller amount of knowledge regarding diabetes and also related to other various health outcomes and there are promising interventions that exhibit potential for enhancing dia-

betes outcomes among patients having low HL.[5] The utilization of QR-coded prescription bottles and flash cards as educational tools were present in an innovative approach for enhancing medication adherence, particularly for the diabetes, heart failure and hypertensive among populations with low health literacy levels.[6] There exists a strong positive correlation between sufficient diabetic health literacy and improved glycemic control. Significant associations are observed between diabetic health literacy, high adherence rates, and the achievement of optimal glycemic control targets.[7]

Health literacy emerges as a robust predictor of health status, exhibiting greater predictive power than socioeconomic indicators such as financial and employment status, education and national or traditional background. Consequently, nurses must prioritize the assessment and management of low health literacy to effectively assist patients with diabetes in achieving safety, informed decision-making, and optimal disease control.[8] Rubin et al. identified inadequate health literacy, characterized by insufficient knowledge about diabetes and hospital discharge instructions, as a prominent factor contributing to early readmission among patients with diabetes.

The study highlighted a general lack of awareness among patients regarding the significance of HbA1c in reflecting the average blood sugar levels over a three-month period, with a majority being unaware of their most recent HbA1c value.[9] Health literacy is the degree to which an individual can obtain, process, understand and communicate about health related information to make informed health decisions.[10] Patients exhibiting inadequate health literacy encounter challenges beyond simply reading labels on medication bottles or interpreting blood sugar values, dosing schedules, and appointment slips. Their difficulties extend to processing oral communication effective-ly and conceptualizing risks associated with their condition.[11]

Health literacy (HL) involves social and cognitive skills necessary for individuals to comprehend health information, make informed healthcare decisions, and adopt beneficial lifestyle choices. It includes functional, interactive, and critical HL categories, which involve skills like numeracy, information gathering, comprehension, and application for improved health outcomes. Adequate HL enables active engagement in decision-making and utilization of healthcare services, resulting in better self-care and treatment outcomes. Therefore, enhancing HL is crucial for preventing and managing chronic conditions.[12]

Limited understanding of health information and difficulties in calculating important factors are linked to inadequate control over blood sugar levels in diabetes. It is evident that focusing on improving literacy within comprehensive diabetes management and education programs leads to better health results. Type II diabetes is a widespread and long-lasting health condition that carries significant implications for public health. It is crucial to grasp how health literacy affects the commitment to treatment within this context to enhance the well-being of individuals dealing with diabetes and alleviate the strain on healthcare systems. Research conducted in this domain can yield valuable insights into how healthcare providers can customize their methods of communication and education to boost health literacy among Type II diabetes patients. Consequently, this can foster improved adherence to treatment plans and an overall enhancement in health. The study's primary objective is to fill a specific research gap concerning the role of health literacy in the management of Type II diabetes. Through an examination of this connection, the study contributes to a more profound comprehension of the factors that impact treatment adherence. However, there is a significant knowledge gap regarding the comparative impact of various strategies aimed at enhancing health literacy, encompassing interventions targeting patients, healthcare providers, and healthcare organizations. The main objectives of this study is to find out the effect of Health Literacy on Treatment Adherence among Patients with Type II Diabetes Mellitus, encompassing both Pharmacological and Non-Pharmacological Approaches. We also aim to measure the level of HL between these patients, which includes their general knowledge, risk factors, and potential complications. Additionally, we will examine the relationship between patients' adherence to their management strategies and their level of HL in both pharmacological and non-pharmacological aspects.

■ METHODOLOGY

A cross sectional study was conducted on patients with type II DM from the indoor and outdoor unit of endocrinology department of Mercy teaching hospital of Peshawar, with the Purposive sampling technique. The participants provided verbal informed consent prior to their involvement in the study. Ethical approval for the study was obtained from the Ethical Review Committee of Prime Foundation (Prime/ERC/2022-29). The sample size was 243, calculated by using Raosoft calculator with confidence level at 95%, margin of error of 5%, population size at 20000 and the response distribution at 80%. The duration of the study was 6 months from March to August 2022. All the adult patients more than 40 years of age were included who were diagnosed for at least 6 months with Type II Diabetes Mellitus. Patients with and without complications were included in the research and those patients who were not willing to give consent and mentally or psychologically unstable were excluded from the research. Complications are like retinopathy, neuropathy, hypertension, arrhythmias, heart failure, and kidney related issues were categorized as mild, moderate, severe and no complica-

tions based on severity of the cases. Informed verbal consent were taken from the patients and purpose of the study were explained to them. Chronic Disease Self-Management Program (CDSMP), developed by Stanford university was used.[13] The program incorporates elements that are encountered across the continuum of prolonged disease, such as exhaustion, medication, health management, decision-making, provider communication, and behavioral modifications pertaining to nutrition and exercise. The scale has the high internal consistency (α = .72–.91) and acceptable to good test–retest reliability (r = .65–.80).[14] Another questionnaire related with diabetes knowledge, risk factors and its complications were also used.[15] Control on diabetes of patients was measured by the last HBA1C test results. The last HbA1c test result <7 were considered as a good control and better compliance.[16] Questions were asked from the patients in their own native language. Data were analyzed by using SPSS V.26, using descriptive statistics for percentages and frequencies. Cronbach alpha reliability was used to find out reliability of scale. Pearson Product movement correlation test was carried out to check the association between health literacy and compliance of the patient. All statistical tests conducted in the study yielded significant results at a level of significance of p<0.05.

RESULTS

A total of 250 Patients participated in this study. Out of which 242 (96.8%) questionnaires were complete. The mean age of the sample was 55.15 $\pm$ 0.59 years, and mean weight of the population was 70$\pm$5kgs. The Cronbach Alpha Reliability of the CDSMP was 0.88. The majority of the students were males (n=157,64.8%) from OPD (n=238, 98%), majority of the patients have family history of diabetes (n=198, 80%) and have moderate secondary complications like retinopathy, neuropathy towards diabetes (n=87, 35.8%) respectively. Regarding

to the time duration of diabetes, majority of the participants have diabetes less than 2 years (n=88, 36%), followed by more than 2 years' duration (n=63, 26%), majority are taking oral medications (n=135, 55.6%), have good diabetes control with HbA1c <7% (n=104, 42.8%) and majority take physician guide regarding diabetes (n=86, 35.4%) respectively. Complete details are given in table 1.

The relationship between Health literacy regarding actively managing their health with pharmacological compliance showed a significant strong and positive relationship (p=0.004), using Pearson correlation coefficient are given in table 2. Similarly, the correlation between Health literacy with

non-pharmacological compliance showed a significant and positive correlation between weight with fatty/junk food (r=.326, p=0.000), whereas showed a non-significant relationship between weight and exercise (r=.092, p<0.01) are given in table 3 and showed a positive and significant correlation between overweight, fatty/junk food with control of diabetes (HbA1c) (r=.171, p=0.008) respectively given in table 4.

DISCUSSION

The global prevalence of diabetes is steadily increasing, necessitating urgent attention. Low- and middle-income countries bear a disproportionate burden of this escalating epidemic. These regions face unique

Table 1: Demographic details of the variable (n=242).

S. No	Variables		n (%)
1	Gender	Male	157 (64.8%)
		Female	85 (35.2%)
2	Mean Age	55.15 + 0.59 years	
3	Mean Weight	70+5kgs	
4	Family History	Yes	198 (80%)
		No	44 (20%)
5	Duration of Diabetes	<2 years	88 (36%)
		2-5 years	63 (26%)
		5-10 years	53 (22%)
		>10 years	38 (15%)
6	Secondary Complication to Diabetes (retinopathy and neuropathy)	Mild complications	45 (18.5%)
		Moderate complications	87 (35.8%)
		Severe complications	44 (18%)
		No complication	66 (27%)
7	History of Medication	Oral	135 (55.6%)
		Injectable	64 (26.3%)
		Both	39 (16.5%)
		None	4 (1.6%)
8	HbA1c	< 6%(Pre-Diabetes)	31 (12.8%)
		<7%(Diabetes with Good Control)	104 (42.8%)
		<8% (Diabetes with Moderate Control)	76 (31.6%)
		>8% (Diabetes with Poor Control)	31 (12.8%)
9	Health Literacy Rate	Physician Guide	86 (35.4%)
		Someone Else	83 (34.2%)
		Little Knowledge	42 (17.3%)
		No Knowledge	31 (12.8%)

Table 2: Pearson Coefficient Correlation between Health literacy (health management) with pharmacological compliance (n=242).

Measure	Health Management	Pharmacological Compliance
Health Management	1	
Pharmacological Compliance	.186** (0.004)	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Pearson Coefficient Correlation between weight, exercise and fatty/junk foods (non-pharmacological Compliance) (n=242).

Measure	Weight	Exercise	Fatty/junk food
Weight	1		
Exercise	.092 (.155)	1	
Fatty/junk food	.326** (0.000)	.171**(0.008)	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4: Pearson Coefficient Correlation between fatty food, over weight with Diabetes Control (HbA1c) (n=242).

Measure	Fatty/Junk Food	Over weight	HbA1c
Fatty/junk food	1		
Over weight	.171**(0.008)	1	
HbA1c	.289** (0.000)	.088 (.172)	1

**. Correlation is significant at the 0.01 level (2-tailed).

challenges in terms of limited resources, inadequate healthcare infrastructure, and socioeconomic factors that contribute to the high prevalence and poor management of diabetes. Addressing this growing burden in low- and middle-income countries requires comprehensive strategies that encompass prevention, early detection, access to quality care, and effective management approaches tailored to the specific needs of these populations.[17,18] In this study it is reflected that males of our society are more effected by this disease, which is in line with other similar studies.[19-22] However one of the study showed the contrast findings that there were no gender differences.[23]

A statistically significant positive correlation was identified between health literacy and improved compliance with both pharmacological and non-pharmacological aspects of diabetes management. This finding aligns with previous research conducted in countries such as the United States, which has consistently demonstrated the positive relationship between patients' disease knowledge, self-care practices, and treatment ad-

herence.[24,25] Majority of the patients were on oral medications which is in line with other research findings.[26,27]

Our study showed that those patients who were more compliant to both pharmacological and non-pharmacological aspect of the disease have better control over diabetes. It shows the importance of adhering to doctors guidelines and standards for control over diabetes type 2, this is in line with other study.[27]

Health literacy is very important for better compliance and good control over diabetes. The most important aspect in this regard is that health care professionals should make their patients aware about the disease, as it is seen in our study that those who were guided by the physicians have more adherence to both pharmacological and non-pharmacological aspects. Those patients who have sufficient health literacy and better compliance both pharmacological and non-pharmacological have better control over diabetes, which is in line with other studies.[28-31]

LIMITATIONS

The results of the study may not apply universally to all individuals with type 2 diabetes because factors such as socio-economic status, access to healthcare, and cultural background can affect how health literacy relates to treatment adherence. Moreover, health literacy is a complex concept, and the study have employed a particular tool and method that doesn't encompass all the aspects of health literacy related to managing diabetes. Various tools for measuring health literacy might produce different outcomes. These constraints underscore the requirement for additional research and a more complex comprehension of the complicated factors involving health literacy and its influence on diabetes management.

CONCLUSION

Based on our research findings, we can confidently conclude that a strong foundation in health literacy (HL) significantly contributes to the effective management of type 2 diabetes. Specifically, our study demonstrates that patients who possess a comprehensive understanding and heightened awareness of critical factors such as associated risks, potential complications, and necessary lifestyle adjustments show a marked improvement in their commitment to recommended treatment plans and interventions. Additionally, our research highlights a strong, positive correlation between an elevated level of health literacy and improved glycemic control. This underscores the robust connection between acquiring knowledge, particularly in the context of diabetes management, and the successful regulation of the condition. These results underscore the utmost importance of promoting health literacy initiatives and educational programs for individuals living with type 2 diabetes. Enhancing patients' grasp of their condition, its associated risks, and the essential lifestyle modifications required not only fosters better

adherence to treatment protocols but also contributes significantly to the enhancement of diabetes management and overall health outcomes.

◼ RECOMMENDATIONS

This study requires a broader implementation encompassing a larger population size derived from multiple health-care facilities. The examination of psychological and emotional facets in diabetic patients is imperative, aiming to establish the connotation between these factors and the management of diabetes. As the discipline advances, refined tools will be devised to accurately assess health literacy, while focused interventions will undergo rigorous evaluation and implementation within real-world clinical environments.

◼ ACKNOWLEDGEMENT

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Author's Contribution

Conflict of Interest

Grant Support and Financial Disclosure

Data Sharing Statement