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ORIGINAL ARTICLE

Glycemic Control Among Type 2 Diabetics: Comparison of Patients Coming to Specialized Clinics vs General Clinics for Diabetes

KHAWAR HUSSAIN QURESHI[1], SYED HASAN DANISH[2], FARAH AHMED[2]
[1]*MCPS student (HCSM) College of Physicians and Surgeons Pakistan, Karachi*
[2]*Department of Community Medicine Sciences Ziauddin Medical College*
Corresponding author: Khawar Hussain, Email: khq63@yahoo.com, Cell: +92-333-8608130

ABSTRACT

Objective: To analyze the difference of glycemic control (Mean HBA1c) between patients consulting at specialized Diabetic clinic and those coming to usual general practices.
Study Design: Quasi Experimental study
Place and Duration: OPDs of general Practice clinics and Outpatient department of a specialized diabetes clinic at Sialkot for 3 months.
Methodology: Total n=250 patients were inducted using consecutive sampling technique carried for 3 months. The sample was divided into two groups "Diabetes Specialist clinics" (n=125) and with traditional setup without a team approach as "general practice clinics" (n=125).In this study patients included were of both gender with age group comprising > 40 years and history of T2Dm for at least one year. Type1 dm, gestational diabetes and those without signing consent were excluded. Data was collected using structured questionnaire by primary investigator after informed consent and at the end of three months the difference of means of HBa1c of two different groups. Analysis was done on SPSS version 22 using independent sample t-test. Mean and standard deviation were taken for numerical data, while for categorical data, percentages and frequency were taken out. Statistically significant p value was viewed as < 0.05.
Results: When Independent T Test was applied, in specialist clinic HBA1c was 8.51±1.23 whereas in General practice clinic it was 9.57±1.62 with statistically significant difference (p value 0.000). When ANOVA applied to see differences in HBA1c among those with primary, secondary, Intermediate and graduate level education, statistically insignificant results were found (p value 0.373). Likewise, when compared by duration of diabetes, statistically insignificant results were found (p value 0.379). Results were statistically insignificant (p value 0.95), when compared based on rural and urban residence.
Conclusion: The study shows statistically significant difference in glycemic control (HBA1c) levels between those coming to general practice clinics and those consulting at specialized diabetic clinics.
Keywords: Diabetes, Diabetes Specialist clinic, HbA1C

INTRODUCTION

Diabetes, worldwide, has emerged as a pandemic and a major public health issue due to its high magnitude of burden of disease and its socio-economic impact. In 2021, the people suffering from diabetes were around 10.5 percent of the total global adult population.

According to (IDF) international diabetes federation atlas (2021), approximately 537 million adult people of age between 20 years to 79 years, were living with diabetes. By year 2030, these figures are projected to rise to 643 million and by year 2045 these are projected to rise to 783 million diabetic patients. (1) Almost 73 million people are living with diabetes in middle-east and north Africa (MENA). (2) MENA region is having the largest diabetic population (12.8%) in year 2019 and by the year 2045 it is estimated to be a worrying ratio of 15.7% of population, as per reports of world economic forum. IDF and WHO have included Pakistan as a part of MENA region. Pakistan was having 8 million diabetics population in year 2000. But in year 2019 number of diabetics had jumped to 33 million of adult population and by year 2045 it is estimated to be the 62 million in magnitude.(3) In Pakistan, mortality rate among diabetic patients is increasing mainly due to severe complications associated with diabetes . Here the maximum magnitude of complications is noted among patients of age groups ranging from thirty years to eighty years.(4)

The JADE- (Joint Asia Diabetes Evaluation) program has developed a care-model and advocates a transition in clinic settings, work processes and workflow dynamics, coordinated by doctor and nurse team , which is supported by proactive leadership and an integrated network of health-care professionals to provide, holistic care based on best practices, to provide statistical support for executive decision making and a mechanism of regular feedback which is resulting in significant differences in results as and when compared with published epidemiological data. (5) Zarora et al, published a clinical outcome study in Jan 2021, and observed that Glycaemia and cardiovascular risk factors can be reduced in Type 2 diabetics by moving to an integrated diabetes care service. (6) A pre–post study was conducted in Australia, to see improvements in diabetes management using Nurse led model of diabetes education and supported that there model will improve adherence to the best practices and recommendations regarding health promotion, risk factor modifications and self- management of diabetes. (7) Results of a meta- analysis published in 2022 observed a positive impact on HBa1c , cardiac markers and risk factors modifications, when diabetes specialists were integrated in a working plan with primary health care professionals.(8) Another study in Philippines (2022), addressed the issue as Diabetes ecosystem and concluded that efforts can evolve a diabetes ecosystem, which involves awareness compaigns , screening activities, early and accurate diagnosis and affordable treatment plans. when all these are supplemented with medical education and trainings to empower the health care professional teams and individuals, then better health outcomes can be generated. (9) IDF supported research in south Asia in 2022, to integrate a clinical care model around preventive compatible strategy. Findings of that study were very convincing to probe and improve the clinic climate, organization culture and communication networks skills and trainings to successfully practice and implement the guidelines and recommendations, to enhance diabetes care. (10) It was concluded that a good self-care plan is associated with better and improved glycemic control. (11)

To control diabetic complications there is need of some evidence-based intervention to help population at large to prevent from these life-threatening complications. American diabetes association (ADA), 2018- guidelines, have emphasized the "engagement of dedicated health care professionals coordinating and working in a patient-centered environment with high-quality care, incorporating care management teams including nurses, dietitians, pharmacists, and other providers". (12) A study published in Jan 2022, and other recently published number of randomized control trials, all have shown impactful results of education in terms of the mean difference in HBa1c in intervention groups. (13) At primary care level there are multiple barriers such as insufficient infrastructure, poor team approach, and lack of

planning for carrying out recommended specialized care services. (14)

This research analyzed the difference of glycemic control (Mean HBA1c) between patients consulting at specialized Diabetic clinic and those coming to usual general practices, on the base that, in Pakistan the local data on this topic is lacking.

METHODOLOGY

This was quasi experimental study. Target population was diabetic patients coming to OPDs of general practice clinics and outpatient department of a specialized diabetes clinic at Sialkot, Pakistan. Consecutive sampling technique was used to induct participants from start of November 2021 to end of January 2022. Total N= 250 samples were collected. Based on availability of a multi-dimensional educator's team and practices ,in accordance with the recommendations of American Diabetes Association (ADA) and International Diabetes Federation (IDF), one group was labelled as "diabetes specialist clinics" (n=125), where it was supported with the services of trained nurses, dietitians, foot specialist and diabetes specialists, to educate the diabetic patients and the other group, practicing traditional setup without a multidimensional team approach was labelled as "general practice clinics" (n=125). One setting was diabetes specialist clinic with multi-dimensional team approach and well-focused educative process and the other setting belonged to traditional general physician based primary care clinics. All patients were included with a history of T2DM for equal to or more than one year and having age more than 40 years, of any gender, while DM type1 and Gestational Diabetes Mellitus and patients without signing a consent were excluded. Informed and understood consent was taken from the patients. Nature of study with details was explained to them. Data was collected by the primary investigator. The data in both groups was collected with a customized validated structured questionnaire tool. In routine, at a usual general practice clinic, the traditional primary physicians attend, examine, assess and manage the diabetic patients single handedly. At a specialized diabetic clinic, a team-based approach was provided to empower patients through education and trainings to improve the outcome of targeted management by having face to face interaction with educators, one-by-one patient. The team of educators comprised of Nurse, Dietician, Pharmacist, Trained Foot care technician and a volunteer social worker. Every patient had to move through a designed flow of services and a number of stations for Self-management education by this trained team providing healthy lifestyles awareness and guidance like quitting tobacco, selecting diet and nutrition, physical activity plans, weight management tips, Sick day rules, Self-monitoring of blood glucose (SMBG) routines, insulin injection techniques. Impact achieved by education, by change in their knowledge attitude and practices, upon their glycemic control were checked and documented in a structured prospective document in the diabetes specialist group. Outcome measure of the study was difference of means of HBa1c among patients at both clinics. All collected data was entered in excel sheets and analyzed on software, SPSS version 23.

All international guidelines recommend checking of regular HBa1c for all patients with diabetes to assess the persistence of blood glucose levels in target range. (14,15,16) Over a certain time, single HBa1c test provides valuable information regarding excursions of blood glucose levels , thus rendering it a reliable biomarker for the prognosis and diagnosis of diabetes. (17) For testing and monitoring of diabetes, HBa1c is now recommended as a gold standard of care (soc), specifically for type 2 diabetes. The cut-off value for diagnosis of diabetes is ≥6.5% , as recommended by American Diabetes Association (ADA). (18) For assessing the good glycemic control during previous two to three months , HBa1c is considered the most accurate test. (19)

In this study, mean and standard deviation were calculated for numerical data. While frequencies and percentages were calculated for categorical data. At the end of three months . The difference of means of HBa1c of two different groups was calculated and analyzed using independent sample t- test. Statistically significant results were viewed at p value of < 0.05.

At every phase of the trial autonomy, beneficence, non-maleficence and justice to patients were ensured. Privacy, data secrecy was maintained and informed consent obtained from start.

RESULTS

We had a total of n=250 participants. Out of them n=125 (50%) were part of Diabetes Specialist clinic and n=125 (50%) were part of general physician clinic. Among Diabetes Specialist clinic there were n=47 (37.6%) males and n=78 (62.4%) females. Among General physician clinic there were n=61 (48.8%) males and n= 64 (51.2%) females. When seen by location among Diabetes Specialist clinic there were n=81 (64.8%) from urban areas and n= 44 (35.2%) from rural areas whereas among General physician clinic there were n=61 (48.8%) from urban areas and n= 64 (51.2%) from rural areas. When assessed by literacy levels in Diabetes Specialist clinic most were Matriculates n=45 (36 %) and Intermediate pass n= 40 (32%) while n=17(13.6%) were without any education. Merely n=11(8.8%) were graduates and n=12(9.6%) had completed Primary education. When seen in General physician clinic similarly most were Matriculates n= 47(37.6 %) then were those without education n28= (22.4%) and Intermediate pass n=26(20.8%). Then came graduates n=11(8.8%) and primary pass participants n=13(10.4%). When Ethnicity was seen it was observed that among Diabetes Specialist clinic n= 123(98.4%) were Punjabi and only n=2(1.4%) were Pathans. Similar situation was seen in General physician clinic where n = 125 (100%) were Punjabi. Results have been presented in Table-1

Table 1: Descriptive Statistics of Participants

		Diabetes Specialist Clinic		General Physician Clinic	
		n	%	n	%
Gender	Male	47	37.6	61	48.8
	Female	78	62.4	64	51.2
Area	Urban	81	64.8	61	48.8
	Rural	44	35.2	64	51.2
Education	None	17	13.6	28	22.4
	Primary	12	9.6	13	10.4
	Matriculation	45	36	47	37.6
	Intermediate	40	32	26	20.8
	Graduation	11	8.8	11	8.8
Ethnicity	Punjabi	123	98.4	125	100
	Pathan	2	1.4	0	0

When segregated by duration of diabetes among general physician clinic n=54(43.2%) patients had diabetes for five to ten years, n=39(31.2%) suffered from it by ten to twenty years, n= 16(12.8%) had it for more than twenty years. Only n=9(7.2%) had history of two to 5 years and n=7(5.6%) had a history of one to two years. When seen in diabetes specialist clinic n=57(45.6%) patients had diabetes for five to ten years, n=40(32%) suffered from it by ten to twenty years, n= 13(10.4%) had it for more than twenty years. Only n=11(8.8%) had history of two to 5 years and n=4(3.2%) had a history of one to two years. The findings have been presented in Table-2

Table 2: Diabetes Duration among Participants

	Diabetes Specialist Clinic		General Physician Clinic	
	n	%	n	%
>20 Years	13	10.4	16	12.8
10-20 Years	40	32	39	31.2
5-10 Years	57	45.6	54	43.2
2-5 Years	11	8.8	9	7.2
1-2 Years	4	3.2	7	5.6

When Independent T test was applied between HBA1C levels from patients from both types of clinics the results of

difference between the two groups were statistically significant (P value 0.000) as shown in Table-3.

Table 3: Hba1c Levels In Diabetes Specialist Clinic And General Physician Clinic

	Number of participant patients=n	HBA1C		P value
		μ	SD	
Diabetes Specialist clinic	125	8.51	1.23	0.000
General physician clinic	125	9.57	1.62	

When segregated by gender it was seen that HBA1C among n=108 males (43.2 %) was 9.17±1.51 and among n=142 (66.8%) females was 8.94±1.54 as seen in Table-4. When Independent T test was applied between HBA1C levels among patients by gender the difference was seen to be statistically insignificant (p value 0.269). Differences in HBA1c by Area of residence have been shown in Table - 5.

Table 4: Comparison of HBA1C among Gender

	Number of group patients=n	HBA1C		P value
		μ	SD	
Male	108	9.17	1.51	0.269
Females	142	8.94	1.54	

Table 5: Comparison of HBA1C between Urban and Rural areas

	Number of group patients=n	HBA1C		P value
		μ	SD	
Urban Residence	142	9.049	1.562	0.95
Rural Residence	108	9.037	1.496	

When seen by literacy levels among those with no formal education the mean HBA1c was 9.02±1.68, among those with Primary education had mean HBA1c 8.78±1.04, those with secondary education had mean HBA1c 9.27±1.69, those who had passed Intermediate had mean HBA1c of 8.82±1.32, whereas graduates had mean HBA1c 9.05 ± 1.47. When ANOVA was applied however the differences between mean HBA1c were insignificant. (p value 0.373) as shown in Table-6.Similarly, when differences were seen among mean HBA1c by duration of diabetes mellitus the findings showed no significance. (p value 0.379)

Table 6: One Way Analysis Of Variances of Participants HBA1C by Education

	df	SS	MS	F	P
Between Groups	4	9.997	2.499	1.068	0.373
Within Groups	245	573.499	2.341		

DISCUSSION

ADA has suggested that at the time of diagnosis, all T2DM patients should receive, diabetes self-management education (DSME). DSME was found helpful for diabetic patients in achieving target glycemic control, target HBa1c , and desirable overall health status, and thus T2DM was associated with improved glycemic control. (20)

Mandana et al, published a study conducted to see impact, by education, on HBa1c of patients with T2DM in Karaj, city of Iran. They concluded that education was very effective in managing diabetes type 2 and reducing HBa1c (p<.001). (21) In a study done in USA, it was showed that diabetes control was better in patients treated by specialized endocrinology clinic than those treated by the primary care clinics. (22) In a study conducted at Riyad, Saudi Arabia, it was concluded that diabetes is poorly controlled at primary care settings. (23) In a multi-center study (SPA-edu), Nebosia M Lalic, observed in Serbia that the centers which offered a structured program of diabetes self-education were showing better and enhanced clinically significant reductions in HBa1c. (24)

In current study, Demographically the two groups were comparable. In Diabetes specialist clinics the Mean HBA1C was 8.51 ±1.23, while in General Physicians clinics the Mean HBA1C was 9.53±1.62. Although, according to ADA, this level of HBA1C indicates a poor control of diabetes, which is alarming, but this is consistent with the conclusions of other international studies. The practical implication of the finding in current study is very significant in our social background where the health education and awareness level are already lacking. Generally, the good glycemic control is not as per targets.

In PANORAMA study, the results showed that among the European patients with T2DM, 37·4% of them had a1c ≥7%. (25) while, in the RECAP- DM study almost 25% had good glycemic control. (26)

Another research in UK found that more than 60% of patients were having poor diabetes control with HBa1c >7%. (27) An other study conducted on Malaysian patients with T2DM found, two-thirds of patients had poor T2DM glycemic levels with their HBa1c scores ≥6.5%. (28) A similar research study conducted in USA for patients with Diabetes followed up by primary care clinics, only 41.6% got good glycemic control. (29) In contrast, in a study in Qatar, they concluded that the outcomes in specialized diabetes clinic were not superior to a usual standard care (30).

In current study, diabetic patients attending the Diabetes specialist clinic were provided with a trained and proactive Diabetes Self-Management Education by Team approach. This approach was consistent with the international standards and guideline by IDF and ADA. The customized validated data collection tools were used. These validated processes and work flows helped to communicate the patient centered approaches, based upon evidence of best practices. Generalization of the findings of this study needs further controlled trials. For better control of Diabetes, the culture and working environment are needed to improve in Diabetes clinics both at general and specialist levels. The current healthcare environment calls for patient-centrality and strategies to promote a team-based approach. The health managers should be assigned to show and support the planning and implementation of quality improvement activities esp. in reshaping and remodeling the Diabetes clinics process work flows. Practically, findings of present study strongly support implementing diabetes self-management education (DSME) for patients in all clinical settings, at all primary, secondary and tertiary levels, and researchers of this study strongly recommend this to be adopted.

To treat diabetic patients to target, American Diabetes Association (2018) Guidelines, have emphasized the need of a well-organized work flow with systematic approach and the "engagement of dedicated health care professionals coordinating and working in a patient-centered environment with high-quality care, incorporating care management teams including nurses, dietitians, pharmacists, and other providers". (31) Future research should focus on understanding more about the impact of trainings and DSME on HBA1C with behavioral and psychosocial outcomes.

CONCLUSION

This study suggested that there is very significant difference in the outcome of diabetes management among specialist diabetes clinics and usual general practices. This difference is primarily due to adoption of best practices recommended by ADA and IDF, by the specialist diabetes clinics. Clinically these findings are very important for all clinicians, emphasizing that a designed work flow with a multi-dimensional team approach at all levels of diabetes practices has significant impacts on the outcome of treatment modalities.

Disclosure: None
Conflict of Interest: None

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