



RESEARCH PAPER

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Assessment of type 2 diabetes prevalence in the Pakistani population of a less developed District in North Punjab

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Abstract

The aim of this study was to assess the current prevalence rate of type 2 diabetes in a backward rural area. This cross sectional study was conducted during April 2019 to November 2019; data was collected from diabetic patients visiting the local hospitals of district. In order to get data a stream lined questionnaire was developed, that includes type 2 diabetes diagnosis, medications, outcome, life style and success of treatment. Data was analyzed later on by SPSS version 21. The demographic data showed that 56% of diabetic patients visited the hospital were of low income class. The prevalence of diabetes was 54% in males and 61% in females. Hba1c test was also used to check the glycemc control level of patients. 12% patients had the family history of type 2 diabetes. The most commonly prescribed medicines were metformin, Glucophage and getryl respectively. In case of insulin mixtard and humulin was given. Results also showed that more than 60% of patients don't have any awareness that when and how to self-monitor their sugar level. 5% patients had the diabetic foot infection. It was first ever study from this area showing that situation is very alarming because of higher prevalence rate, so there is a dire need to look into the complexity of the matter.

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Introduction

Diabetes mellitus is a major public health concern all around the world. Although medical science has improved over the years but still the diabetes is incurable (Meo SA, 2009). The prevalence of type 2 diabetes is a global threat and can cause severe issues (Gavin, 1997). 425 million people around the globe are suffering from type 2 diabetes (Global burden of disease, 2015). In 2016 death toll due to type 2 diabetes raised up to 1.6 million people worldwide (Basit *et al.*, 2017). WHO has declared diabetes mellitus as 7th leading death cause in USA (Buowari OY, 2013). According to international diabetic federation (2013) 592 million people will be affected by type 2 diabetes till 2035 (Zenebe, 2019). There are different factors responsible for this disease including obesity, poor nutrition, life style and different sweets (Borges *et al.*, 2011).

The treatment cost of diabetes mellitus is almost \$174 billion per year (Fowler MJ, 2008). In Pakistan 35 million adults are considered to be diabetic (Balagamwala M, 2013). The diabetes prevalence was reported at 11% (10). Mostly people over the age of 40 years suffered from diabetes type 2 (Nishter, 2004). The patients suffering from type 2 diabetes may have micro vascular and macro vascular complications (12). It is very difficult to treat diabetes after its development (Habib SS, 2013). Pakistan is in top ten countries with high diabetes type 2 prevalence rates. In a survey published in 2017 the focus of study was on urban area population. Saira gul *et al.* (2012) conducted a survey to check the diabetes prevalence in tertiary care hospitals of Karachi. Pakistan medical association (2014) conducted a screening study at baqai institute to find out the undiagnosed diabetes among the masses. In (2015) Nasir *et al.* stated that diabetes is spreading largely due to lack of public awareness. A study by Jaffar *et al.* showed that more than 50% answers were wrong about diabetes awareness.

Keeping in view the above situation a cross sectional study was conducted in a back ward district of Pakistan, in order to access the current practices, prevalence to treat the type 2 diabetes of patients visiting the local hospitals of the area.

Material and methods

Study area

Attock is the backward district of north Punjab, Pakistan. Local hospitals were selected for study. Type 2 diabetic patients visiting the local hospitals along with their prescription were approached.



Fig. 1. Map of district Attock.

Study design

A multi-dimensional questionnaire was developed; type 2 diabetic patients after informed consent were included. Patients who were taking the medicines, visiting the hospital routinely and having the prescription and laboratory tests reports along with them were recruited.

Sampling

The sampling was done according to the following formula by. (Adeniyi OV, Yogeswaran P, Longo-Mbenza B, *et al.*, 2015).

$$n = (Z_{1-\alpha})^2 \times (P(1-P)) / D^2$$

The significance level was taken as >0.05 .

Total 222 patients were included in the study by adjusting 10% factor, using the Hulley SB *et al.*, 2007 formula.

$$1 / (1-0.1) \times 246$$

$n=222$ patients were included in the study as 22 who were selected preliminary, were excluded.

Inclusion criteria

Patients of the age of 40 to 75 with type 2 diabetes were included in the study. Patients with pre diabetes or undiagnosed diabetes and who were under the age of 40 were excluded from study.

Data collection

Both male and females were recruited for the study. Patient's demographic data was collected on questionnaire. Names, address, phone numbers were kept confidential. Patient's marital status was also asked. Occupation was categorized as Govt job, agriculture and other, for female's house wives option was also added. Literacy level was included as illiterate, class 1-10 and higher education. Monthly income was taken as low, medium and high. Medications were also added in order to know which one was mostly used or patients were satisfied as tablets, insulin, both or others. Family history was added as yes or no. Exercise was categorized as daily, often, not at all. Smoking was included as no smoking, 1-10, 20 or more cigarettes/day. Disease status was taken as controlled or uncontrolled.

Data analysis

Data was analyzed by using SPSS version 21. Mean \pm SD was calculated for different variables. Univariate and Multivariate analysis was done among different variables. P value >0.05 was considered as statistically significant.

Results

89 (40.1%) males and 133 (59.9%) were females. 201 (90.5%) were married while 21 (9.5%) were un married. In case of age 138 (62.2) were in the range of 40-60 years. 60 (27%) were in the range of 61-75 years of age. 24 (10.8%) were >75 . 40 (18%) were Govt servants, while 94 (42.3%) were from agriculture. 39.1% belongs to other occupations. 140 (63.1%) were from low income class, 62 (27.9%) belongs to average or medium income class and only 20 (9%) patients were from a higher income class. 70 (30.5%) patients were illiterate no formal education was obtained from any specific institute. 107 (48.2%) were those patients who got education up to secondary level. 45 (20.3%) were those who got higher education. 60 (27%) patients said they have a family history of type 2 diabetes 162 (73%) patients said that they don't have family history. 95 (42%) patients only checked their sugar level when they visited the hospital. 63 (28.4%) patients suffered from different infections (e.g. mouth, hands, groin, urine,

eyes etc.) due to diabetes and 20 (4%) had suffered from diabetic foot infection. 62 (27.9%) people were frequently smoking. 100 patients were checked by hba1c test in order to access their glycemic control and results showed that 64% females hba1c level was high e.g. >7 . All patients were not screened by hba1c test because of limited resources of study. The results of statistical analysis showed that in case of univariate analysis there is statistical significance between males and females patients diabetes prevalence rate. Multivariate analysis showed that there is a link of low income and smoking on the high prevalence rate.

Table 1. Demographic data of the type 2 diabetes patients.

Demographic data	N	%
Gender		
Males	89	40.1%
Females	133	59.9%
Marital status		
Married	201	90.5%
Un married	21	9.5%
Education		
Illiterate	70	31.5%
Grade 1-10	107	48.2%
Higher education	45	20.3%
Occupation		
Govt service	40	18%
Agriculture	94	42.3%
Others	87	39.1%
Income		
Daily wages	113	50.9%
Govt servants	47	21.2%
Agriculture	62	27.9%

Table 2. Multivariate analysis of the significant statistics.

Variables	B	S.E	WALD	P value
Gender				
Males				
Females	1.304	0.305	6.543	0.003
Marital status				
Married	-2.422	.785	9.516	0.002
Un married				
Income				
10-20K/pkr	1.767	.834	4.483	0.002
21-40k/pkr				
41-60/pkr				
Smoking				
10/day				
20 or more/day	2.477	.450	30.433	0.000
Weight				
Normal				
Overweight	3.076	1.339	5.227	0.002
Insulin therapy				
Followed				
Not followed	1.606	.715	5.050	0.002
Constant	.405	.199	4.143	0.004

DECISION CYCLE FOR PATIENT-CENTERED GLYCEMIC MANAGEMENT IN TYPE 2 DIABETES

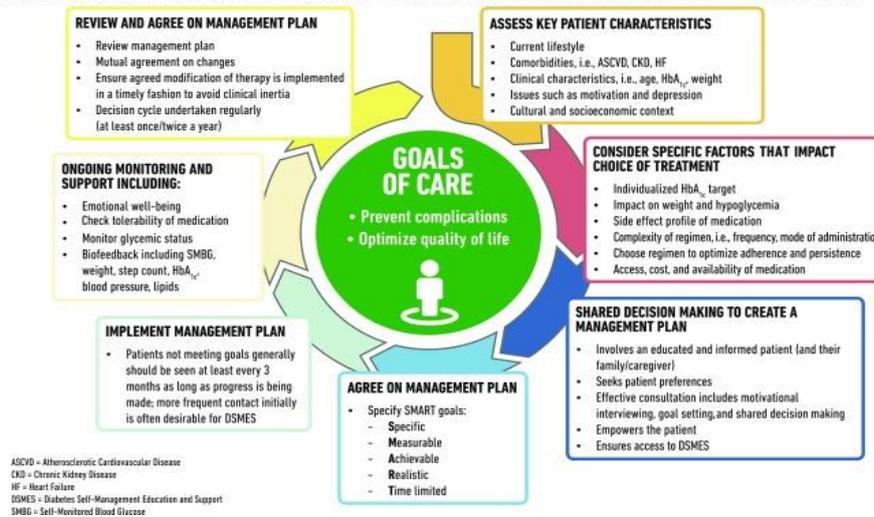


Fig. 2. Patient centered glycemic management.

Decision cycle for patient-centered glycemic management in type 2 diabetes. (Adapted from Davies *et al.*).

Table 3. Comparison of variables mean with diabetes duration.

Variables	Mean± SD	p value
Age	52.90±9.54	0.000
Income	41022±13391.81	0.0001
HbA1c	8.00±.754	0.000
Cholesterol level	1.750±.5000	0.002

Table 4. Comparison of International diagnostic standards with current study practices.

WHO standards	ADA standards	Current study practices
The test should be performed using a glucose load containing the equivalent of 75-g anhydrous glucose dissolved in water.* OR A1C ≥6.5% (48 mmol/mol).	Criteria for the diagnosis of diabetes FPG ≥126 mg/dL (7.0 mmol/L).	FPG test performed as an initial diabetes test. Random blood glucose is performed as a secondary test.
Consider the following which may assist in differentiating subtypes: » age at diagnosis » family history » physical findings, especially presence of obesity » presence of features of metabolic syndrome.	The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.	No proper follow up. Lack of trained doctors and other Para medical staff.
Fasting plasma glucose; 2-hour (2-h) post-load plasma glucose after a 75 g oral glucose tolerance test (OGTT); HbA1c; and a random blood glucose in the presence of signs and symptoms of diabetes. People with fasting plasma glucose values of ≥ 7.0 mmol/L (126 mg/dl), 2-h post-load plasma glucose ≥ 11.1 mmol/L (200 mg/dl) . HbA1c ≥ 6.5% (48 mmol/mol); or a random blood glucose ≥ 11.1 mmol/L (200 mg/ dl) in the presence of signs and symptoms are considered to have diabetes.(NGSP).	HbA1c test is the major tool for assessing glycemic control and has strong predictive value for diabetes complications (1–3). Thus, A1C testing should be performed routinely in all patients with diabetes at initial assessment and as part of continuing care.(DIABETES CARE)	No proper diagnostic criteria followed according to international standards. HbA1c test is used for limited numbers of patients. No proper diagnostic labs are available.

Table 5. Hba1c based hyperglycemic rate among patients.

Hba1c	Males	Females
5-7	21(42%)	18(36%)
>7	29(58%)	32(64%)

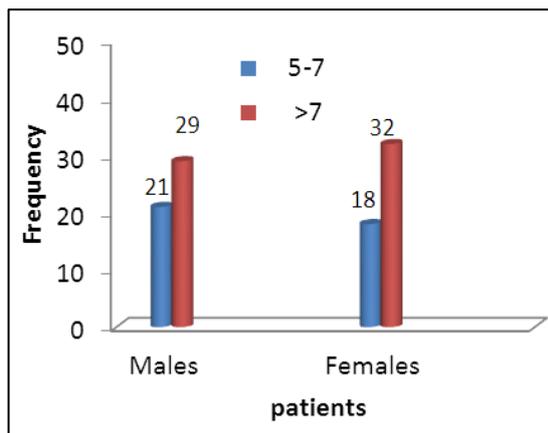


Table 6. Comparison of rural and urban areas patients points of view.

Problems in treatment	Lack of facilities	Lack of patients cooperation
Urban area patients	65%	35%
Rural area patients	48%	52%

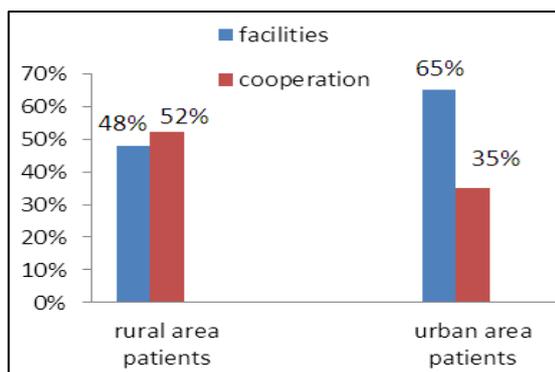
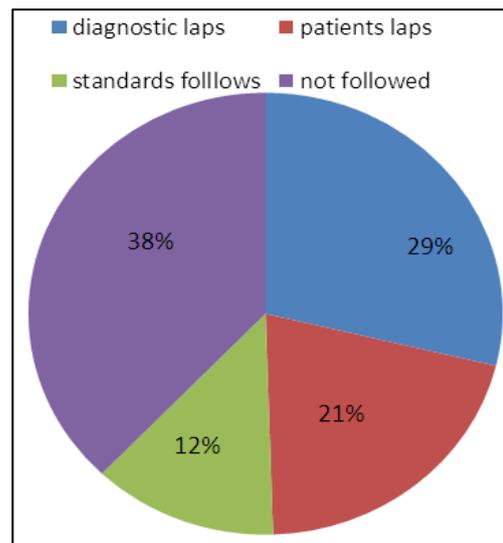


Table 7. Effect of noncompliance of WHO standards on therapeutic response and disease management in current study.

Diagnostic laps	Patients laps	Diagnostic standards followed	Diagnostic standards not followed
Lack of laboratories Lack of equipment Overcrowded hospitals No separate diabetes counters.	Lack of awareness Expensive tests No diet plan followed Prefer nonprofessional people or chemists.	Only 25% doctors properly diagnosed the disease. Proper follow up of patients. Diet plan along with life style changes.	Same medicine in prescription again and again No diet plan provided to patients. 41% doctors ultimately refer patients to other hospitals.
No proper therapy No follow up	61% patients don't take diabetes seriously in case of diet control.	Only 13% patients of higher income and higher education follow the instructions. 39% patients were able to control their disease.	57% patients of lower income class don't follow the instructions. 61% patients are unable to control their diabetes.



Discussion

The aim of this study was to find the current status of treatment of type 2 diabetes in a backward area of Pakistan. According to Aamir *et al* (2019) HBA1c is the most credible diagnostic test for diabetes, but as this is less developed area the HBA1c is expensive test so it is not possible for hospital to carry out HBA1c for all patients. Only patients with family history and those who required surgery were provided HBA1c facility. The Anjana RM *et al* (2016) showed that fasting plasma glucose (FPG) was used as a diagnostic tool (Anjana RM, 2017). In this study FPG was also used as a diagnostic test. The results showed that the uncontrolled disease status in females was significant as $p < 0.005$. That may be because of the fact that majority of women in this area are house wives and also not much literate, that is a big reason of their uncontrolled diabetes. As this was really first report of prevalence from this district no previous record was found about this area. A study by saira gul., *et al.* (2017) from Attock showed that 50% of the patients involved in the study were females (Saira Gul., *et al.*, 2017). Another study from Tambo district of South Africa (2016) also involved majority of female's patients (Adeniyi OV, 2016). Survey on type 2 diabetes from Pakistan stated that prevalence was 11.77% (Aamir AH *et al.*, 2018). In our study the prevalence was 54% in males and 61% in females which is very high when compared to the previous studies. The prevalence is higher in low monthly income people with \$100-120/month.

According to international diabetic federation (2014) low income class countries of Asia and Africa are mostly victims of this disease. In present study smoking was significant and p value was .000 with people smoking 20 or more cigarettes/day. Previously Amir AH., *et al.* (2019) showed that there was no relation found between smoking and type 2 diabetes. Family history is not significant in this study as it was significant in previous studies by Amir AH *et al* (2019). Insulin was also administrated to the patients of uncontrolled diabetes. Even than patients reported that they are still unable to control their diabetes. In a previous study by Hannele (2001) suggested that insulin dose should be given to the patients according to their self-monitoring glucose level (Yki-Järvinen, 2001). 13% of the patients in current study were suffering from other complications also e.g. cardiovascular, obesity, high blood pressure. As majority of females in present study were house wives, they are not really involved in physical activities or exercise. Initially metformin was prescribed by doctors as a treatment, it was also reported that because of low literacy rate in females and house hold activities they were unable to take medicines according to the prescription. 11% of patients were unable to self-monitor their glycemic level. Jonathan. B (2010) stated that if metformin is initially started then it will be helpful for patients to control their glycemic control at early stage. According to Funda Dalti (2017) type 2 diabetes prevalence goes upwards with older age. In current study the patients with the age of 61-75 with type 2 diabetes duration of 8-10 years were suffering from many other complications. As diabetic foot is very critical condition, 4% of the patients in current study suffered from infection and surgery was done. Danek (2011) stated that diabetic patients are more prone to infection than non-diabetic patients.

Conclusion

This was really first study conducted in this area to find out the prevalence and current practices to treat the type 2 diabetes. There is a need of proper diabetes care unit in order to provide the best facilities to the local people. Large numbers of patients in current study were females and most of them were house wives.

It is very important to provide them good health care system at town level. This study will open a gateway to develop a strategy against diabetes in this area.

References

- Aamir AH, Ul-Haq Z, Mahar SA.** 2019. Diabetes Prevalence Survey of Pakistan(DPS-PAK): prevalence of type 2 diabetesmellitus and prediabetes using HbA1c: a population- basedsurvey from Pakistan. *BMJ Open* 2019. **9**, e025300. <https://dx.doi.org/10.1136/bmjopen-2018-025300>
- Adeniyi OV, Yogeswaran P, Longo-Mbenza B.** 2016. Cross-sectional study of patients with type 2 diabetes in OR Tambo district, South Africa *BMJ Open*. 2016; **6**, e010875. <https://dx.doi.org/10.1136/bmjopen-2015-010875>
- Anjana RM, Deepa M, Pradeepa R, Mahanta J, Narain K, Das HK, Adhikari P, Rao PV, Saboo B, Kumar A, Bhansali A.** 2017. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR–INDIAB population-based cross-sectional study. *The lancet Diabetes & endocrinology* **5(8)**, 585-96. [http://dx.doi.org/10.1016/S2213-8587\(17\)](http://dx.doi.org/10.1016/S2213-8587(17))
- Basit A, Fawwad A, Qureshi H, Shera AS.** 2018. Prevalence of diabetes, pre-diabetes and associated risk factors: second National Diabetes Survey of Pakistan (NDSP), 20162017. *BMJopen* **8(8)**,e020961. <http://dx.doi.org/10.1136/bmjopen-2017-020961>
- Balagamwala M, Gazdar H.** 2013. Agriculture and Nutrition in Pakistan: Pathways and Disconnects 1. *IDS Bulletin* **44(3)**, 66-74. <https://doi.org/10.1111/17595436.12032>
- Brown, Jonathan B, Christopher Conner, Gregory A, Nichols.** 2010. Secondary failure of metformin mono therapy in clinical practice. *Diabetes care* **33(3)**, 501-506. <https://doi.org/10.2337/dc09-1749>
- Buowari OY.** 2013. Diabetes mellitus in developing countries and case series. *Diabetes mellitus - Insightsand Perspectives*. Rijeka, Croatia: In Tech Open. **23**,131 <http://doi.org/10.5772/50658>

Fowler MJ. 2008. Micro vascular and macro vascular complications of diabetes. *Clinical diabetes* **26(2)**, 77-82.

<https://doi.org/10.2337/diaclin.26.27>

Gavin III JR, Alberti KG, Davidson MB, DeFrantz RA. 1997. Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes care* **20(7)**,1183.

<http://doi.org/10.2337/diacare.20.7.1183>

Habib SS, Aslam M. 2003. Risk factors, knowledge and health status in diabetic patients. *Saudi medical Journal* **24(11)**, 1219-24.

Hulley SB, Cummings SR, Browner WS. 2014. *Designing clinical research.* 3rd Ed. Lippincott Williams & Wilkins; 2007. International Diabetes Federation Guideline Development Group. Global guideline for type 2 diabetes. *Diabetes research and clinical practice* **104(1)**, 1.

Kapur A. 2007. Economic analysis of diabetes care. *Indian Journal of Medical Research* **125(3)**, 473. <http://dx.doi.org/10.4103/ijmr.IJMR129119>

Little RR, Rohlfing CL, Sacks DB. 2011. National Glycohemoglobin Standardization Program (NGSP) Steering Committee. Status of hemoglobin A1c measurement and goals for improvement: from chaos to order for Report of a World Health Organization consultation. Use of glycated haemoglobin (HbA1c) in the diagnosis of diabetes mellitus. *Diabetes Res Clin Pract* **93**, 299-309.

Nishtar S, Faruqui AM, Mattu MA, Mohamud KB, Ahmed A. 2004. The National Action Plan for the Prevention and Control of Non-communicable Diseases and Health Promotion in Pakistan- Cardiovascular diseases. *JPMA. The Journal of the Pakistan Medical Association* **54(12Suppl 3)**, 14-25.

Nishtar S. 2004. Prevention of non-communicable diseases in Pakistan: an integrated partnership-based model. *Health research policy and systems* **2(1)**, 7.

Wukich, Dane K. 2011. "Surgical site infections after foot and ankle surgery: a comparison of patients with and without diabetes." *Diabetes care* **34**, 2211-2213.

Yakaryılmaz, Funda Datli, Zeynel Abidin Öztürk. 2017. "Treatment of type 2 diabetes mellitus in the elderly. "World journal of diabetes **8**, 6. <https://doi.org/10.2337/dc11-0846>

Yki-Järvinen Hannele. 2001. Combination therapies with insulin in type 2 diabetes. *Diabetes care* **24(4)**, 758-767.

<https://dx.doi.org/10.2337/diacare.24.4.758>

Stratton IM, Adler AI, Neil HAW. 2000. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. *BMJ* **321**, 405-412.