



## Study and Prevalence of Diabetes Mellitus in Human Population of District Gilgit, Gilgit-Baltistan, Pakistan

Iftikhar Hussain<sup>1\*</sup>, Arif un Nisa Naqvi<sup>1</sup>, Bahreen Iftikhar<sup>1</sup>, Ghulam Abbas<sup>1</sup>, Qaim Mehdi<sup>1</sup> and Saira Amir<sup>2</sup>

<sup>1</sup>Department of Biological Sciences Karakorum International University Gilgit-Baltistan, Pakistan

<sup>2</sup>Department of Biosciences Comsats Institute of Information Technology, Islamabad, Pakistan

\*Corresponding Author E-mail: [ifti14561@gmail.com](mailto:ifti14561@gmail.com)

Received: 25.02.2019 | Revised: 30.03.2019 | Accepted: 8.04.2019

### ABSTRACT

*This study was conducted and carried out to determine the distributional significance and prevalence pattern of diabetes mellitus in human population of different areas of district Gilgit in respect of gender and location wise. Random samplings were done from different areas of district Gilgit. The areas were Main city Gilgit, Danyore, Sakwar, Oskandas and Jalalabad. During study period 1100 individuals were evaluated for Diabetes in different targeted areas of district Gilgit. A total of 1100 samples were studied and analyzed. Out of 1100 analyzed individuals 243 (22%) samples were found Diabetic and 857 (78%) were found Non-diabetic. In Gilgit city 792 suspected individuals were evaluated for diabetes found 158 (19.95%) diabetic and 643 (80.05%) Non-diabetic. In Danyore village 103 suspected individuals were evaluated for diabetes, the ratio of infestation was 21 (20.40%). In Sakwar 100 suspected individuals were evaluated for diabetes, 32 (32%) were found diabetic while 68 (68%) were found Non-Diabetic. In Oskandas village 58 suspected individuals were evaluated for significant diabetes. 15 (25.86%) were found diabetic and 43 (74.14%) were found Non-diabetic followed by in Jalalabad 47 suspected individuals were evaluated for significant diabetes 17 (36.17%) were found diabetic while 30 (63.83%) were found Non-diabetic.*

**Key words:** Diabetes Mellitus, Human Population, Different areas of District Gilgit.

### INTRODUCTION

The diabetes mellitus (DM) or simply diabetes is the malfunctioning of pancreas, in which it cannot produce insulin or the body has problem in utilizing insulin. According to National Diabetes Data Group (NDDG), Pakistan, it has main types 1 and 2. It is evolved as an epidemic all over the world. It is one of the metabolic disorders; if not properly

managed can lead to long term life threatening complications<sup>5</sup>.

According to World Health Organization (WHO) defines diabetes as a chronic metabolic disease that occurs either when the Pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces.

**Cite this article:** Hussain, I., Naqvi, A. N., Iftikhar, B., Abbas, G., Mehdi, Q., Amir, S., Study and Prevalence of Diabetes Mellitus in Human Population of District Gilgit, Gilgit-Baltistan, Pakistan, *Int. J. Pure App. Biosci.* 7(2): 26-33 (2019). doi: <http://dx.doi.org/10.18782/2320-7051.7348>

Diabetes is unfortunately one of the biggest public health challenges in human history and it is affecting even more people around the world each year. Even though the real aetiology of diabetes is not fully understood by experts, the associated risk factors are numerous ranging from genetic triggers to environmental ones.

Individuals with diabetes are 25 times more likely to become blind than individuals without this disease. In many developed countries, diabetic retinopathy is the leading cause of new cases of visual impairment and blindness among adults aged 20-74 years. Among people with type 1 diabetes; about 25% have diabetic retinopathy during the first 5 years and about 100% in two decades. Among people who have type 2 diabetes, around 21% have retinopathy at diagnosis, and more than 60% have diabetic retinopathy during the first two decades of the disease.<sup>2</sup> Diabetes occurs at a much younger age in South Asian countries than it does in developed countries. Pakistan has a population of 154 million. More than 10% of its adult population has diabetes. Although the country ranks 6th among countries with the highest burden of diabetes, 6 population-based data on the prevalence of diabetic retinopathy in Pakistan and on the visual impairment due to diabetic retinopathy are lacking. Data that are available are hospital-based<sup>3</sup>.

It is a complex chronic illness requiring continuous medical care with multifactorial risk reduction strategies beyond glycemric control.

The prevalence of diabetes is increasing in adult population of more than 20 years. It was 6.7% in 1995 while 7.1 in 2000. The highest percentages of increases in disease prevalence are likely to be in developing nations, with major increases in the Middle-East, Sub-Saharan Africa, South Asia, and Latin America. WHO listed 10 countries to have the highest numbers of people with diabetes in 2000 and 2030. According to this report, Bangladesh has 3.2 million of diabetic subjects in 2000 and the number is expected to increase to a staggering 11.1 million by 2030

placing her among the top 10 countries with diabetes<sup>1</sup>.

Diabetes mellitus is a common problem worldwide affecting 200 million people worldwide and causing 32 million deaths yearly. Its prevalence in Pakistan, whose population is about 154 million has 10% of adult population are diabetic and about same number having impaired glucose tolerance. Pakistan rank 6th in highest diabetic population.

It becomes imperative to detect and manage the disease as soon as possible because excessive fluctuations in blood glucose level can injure tissues throughout the whole body. About 382 million people, in 2013, have diabetes in the world and it is expected to rise up to 592 million by 2035 if serious attention is not drawn towards the problem<sup>6</sup>.

#### **Diabetes can be classified into four clinical categories:**

Type 1 diabetes (due to b-cell destruction, usually leading to absolute insulin deficiency). Type 2 diabetes (due to a progressive insulin secretary defect on the background of insulin resistance) Other specific types of diabetes due to other causes, e.g., genetic defects in b-cell function, genetic defects in insulin action, diseases of the exocrine pancreas (such as cystic fibrosis), and drug- or chemical-induced (such as in the treatment of HIV/AIDS or after organ transplantation) Gestational diabetes mellitus (GDM) (diabetes diagnosed during pregnancy that is not clearly overt diabetes). In type 1 diabetes mellitus, it has been shown that the frequency of complications is reduced by the maintenance of good glycemric control. In addition, it has been reported that patients with type 1 diabetes have more frequent complications with feeding behavior abnormalities and eating disorders, as well as a significantly faster progression of complications. It has especially been noted that complications of anorexia nervosa significantly increase mortality<sup>8</sup>.

One of the most potential factors which cause to pressure on the diabetic patient is the hypertension.

Hypertension and diabetes are one of the most serious disease threats all over the world that decreases the quality of human life. The indication and prevalence of other associated complications are increasing the rate of morbidity and mortality in most part of the third world developing countries. Oxidative stress is known to be a component of molecular and cellular tissue damage mechanisms in a wide spectrum of human diseases including hypertension, diabetes and increasing age. These risk factors is a common feature that has plagued Nigeria which has a present population of 170 million people but according to the United Nations, the population of Nigeria will reach 440 million by 2050, this will make Nigeria the 3rd most populous country in the world . Unfortunately, in the Northern part of Nigeria a large number of patients affected by this disease and its associated complications have unsatisfactory awareness and knowledge. Yet, more and more people die for ignorance of these complications<sup>7</sup>.

## MATERIAL AND METHODS

Blood samples were collected randomly from the population and after collecting the blood all the samples were analyzed through glumetric method<sup>10</sup>.

The glumetric device is consisting of the Blood glucose meter, Test strips, Code cap, lancing device, sterile lancet, control solution and carrying case. Very small samples of blood which may be obtained from the fingertip washed the hands or clean the finger with alcohol, if we will use alcohol then let it dry before pricking the finger. Pricked the site with a lancing device and put a little drop of blood on the test strip. Within 5 seconds the blood glucose meter reads the blood sugar level. The expecting blood glucose levels for the person without diabetes are, in fasting or before fasting the plasma glucose should be less than 7.0mmol/l (126mg/dl) and 2hours after meal the plasma glucose should be less than 11.1mmol/l (200mg/dl)<sup>10</sup>.



**Fig. 1: Appartus (Glumeter set) used to test Diabetes**



**Fig. 2: Glumetric Set used to test Diabetes in Human Population**

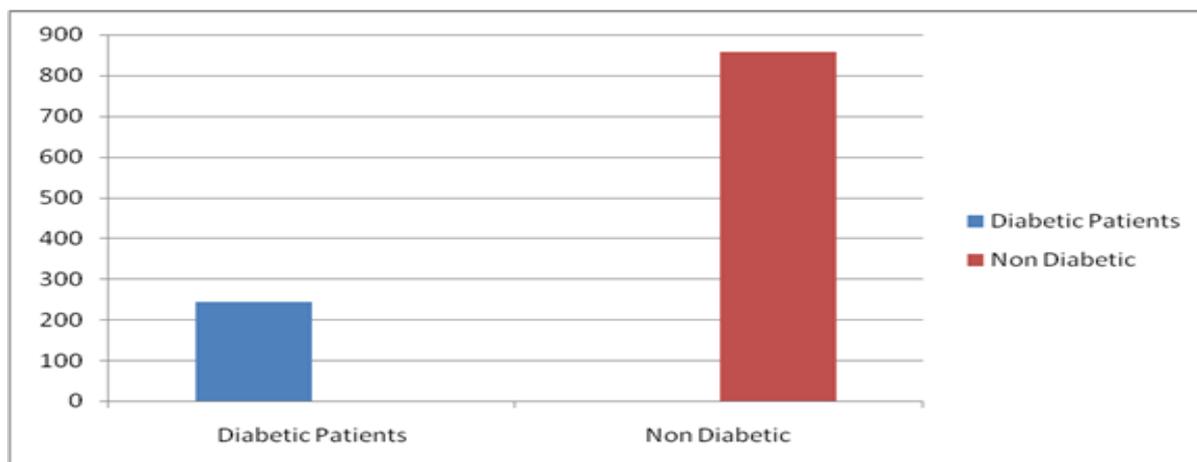
**RESULTS**

**Table 1: Overall Diabetic patients and Non Diabetic individuals in Human Population of Gilgit**

S.No.	Diabetic Patients	Non Diabetic	Total
1	243(22%)	857(78%)	1100

In the present study Diabetes Mellitus was studied in 1100 of total Human Population of Gilgit and found 243diabetic patients from

various location of Gilgit and 857 were found normal.



**Fig. 3: Overall Diabetic and Non Diabetic from the Human Population of Gilgit**

The results showed that the total samples were 1100 and out of this 243 were found diabetic

Patients and 857 were found Non diabetic.

**Table-2.1. Diabetic and Non-Diabetic Frequencies of Male and Female in the Human Population of Gilgit**

	Diabetic	Non-Diabetic	Total
<b>Males</b>	211 (22%)	707 (78%)	918
<b>Females</b>	32 (17%)	150 (83%)	182
<b>Total</b>	243 (22%)	857 (78%)	1100

The seclusion of male and female population was made in order to identify the potential diabetic patients and their sex and the subsequent trend in having diabetes. The

dominating figures in male are seen with a ratio of 211 and 32 of females and males respectively.

**Table-2.2. Cross tab Analysis of diabetic and Non-Diabetic with Gender**

DM * Gender Cross tabulation				
Count		Gender		
		Male	Female	Total
DM	Diabetic	211	32	243
	NON Diabetic	707	150	857
Total		918	182	1100

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.576 <sup>a</sup>	1	.109		
Continuity Correction <sup>b</sup>	2.271	1	.132		
Likelihood Ratio	2.690	1	.101		
Fisher's Exact Test				.118	.064
Linear-by-Linear Association	2.573	1	.109		
N of Valid Cases <sup>b</sup>	1100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 40.21.

b. Computed only for a 2x2 table

Total of 1100 samples of both male and female from five locations. The table indicates the Diabetic and non-Diabetic patients with respect to Gender and there is a relationship between the Diabetic patients with Gender at the significance level of **0.05**.

By applying the Chi square test the calculated value is 2.576 with degree of freedom 1 and

the tabulated value of chi-Square at degree of freedom **1** is **3.841**. The tabulated value of Chi-Square is greater than the calculated value i.e. **2.576**. Therefore we concluded that there is a relationship between Diabetic patients and Gender

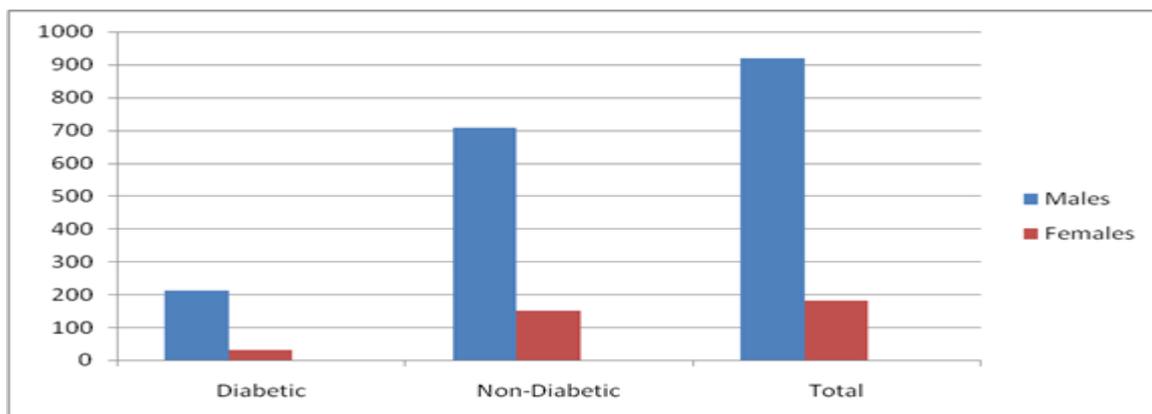


Fig. 4: Gender wise Diabetic and Non Diabetic in the human Population of Gilgit

The results showed that the Diabetic patients and Non diabetic individuals in human

population of Gilgit that males has highest ration as compare to females.

Table-2.3. Location Wise distribution and percentages of diabetic and NON Diabetic Patients in the Human Population.

Location	Diabetic Patients	NON Diabetic	Total
Gilgit	158 (19.95%)	634 (80.05%)	792
Danyore	21 (20.40%)	82 (79.61%)	103
Sakwar	32 (32%)	68 (68%)	100
Oskandas	15 (25.86)	43 (74.14%)	58
Jalalabad	17 (36.17%)	30 (63.83%)	47
Total	243 (22.09%)	857 (77.90%)	1100

In the present study total samples from Gilgit were 792, among these 158 were diabetic and 634 were Non-diabetic. Similarly 103 samples were studied from Danyore, counting of 21 diabetic and 82 were Non-diabetic, while 100

samples were studied from Sakwar and among these 15 were diabetic and 43 were Non-dietetic and the total samples studied from Jalalabad were 47, 17 were diabetic and 30 were Non-dietetic individuals were observed.

**DM \* Location**

**Table-2.4. Cross tab analysis of diabetic and Non-Diabetic Patients with Locations**

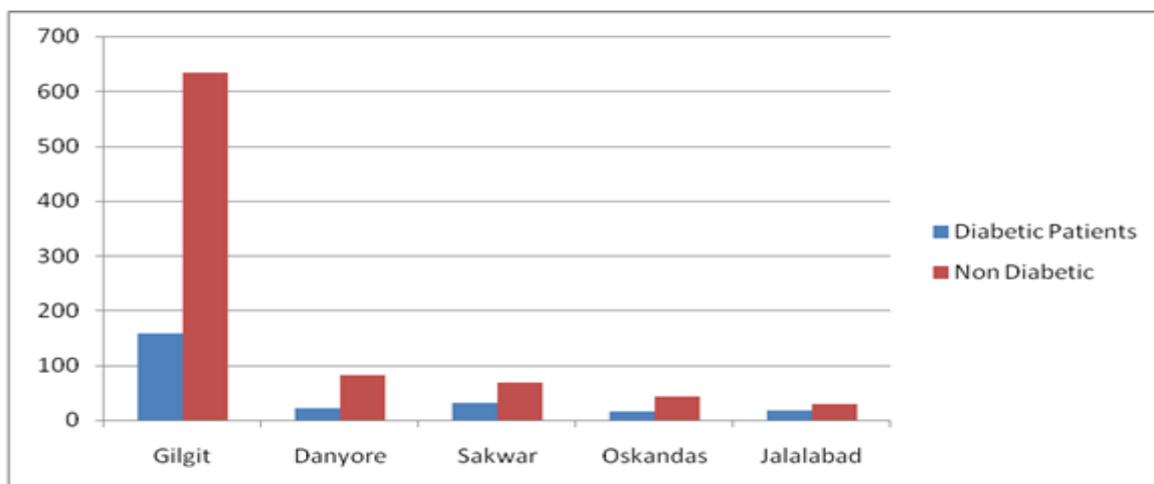
DM * Location Cross tabulation							
Count							
		Location					
		Gilgit	Danyore	Sakwar	Oskandas	Jalalabad	Total
DM	Diabetic	158	21	32	15	17	243
	NON Diabetic	634	82	68	43	30	857
Total		792	103	100	58	47	1100

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.881 <sup>a</sup>	4	.008
Likelihood Ratio	12.821	4	.012
Linear-by-Linear Association	11.022	1	.001
N of Valid Cases	1100		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.38.

The total of 1100 samples from five locations Gilgit, Danyore, Sakwar, Oshikhandass and Jalalabad. The data indicates the Diabetic and Non Diabetic patients in five locations. Is there is a relationship between the Diabetic patients with location at the significance level of **0.05**. By using Chi square test we got the calculated value of **13.881** with degree of freedom 4 and

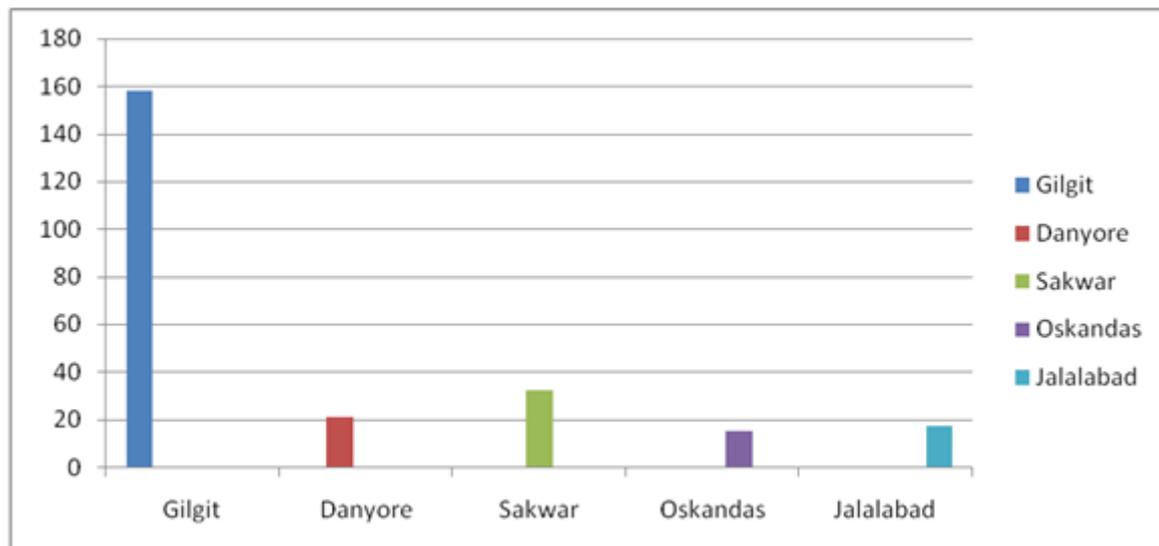
the tabulated value of chi-Square at degree of freedom 4 is **9.487**. Here the tabulated value of Chi-Square is less than the calculated value i.e. **13.881**. Therefore we concluded that there is a relationship between Diabetic patients with location.



**Fig. 5: Incidence of Diabetic Patients and Non Diabetic from Various locations of Gilgit**

The results Showed that the diabetic patients and non-Diabetic in five locations i.e. Gilgit, Danyore, Sakwar, Oshikhandass and Jalalabad. The chart indicates that Gilgit city has the highest Diabetic patients' i.e.158 out of

792 samples. The second highest diabetic patients are in Sakwar i.e. 32 out of 100 samples. However Oshikhandass has the least Diabetic patients i.e. 15 out of 58 samples



**Fig. 6: Incidence of Diabetic patients in Different locations of Gilgit**

The results showed that the Gilgit city has high percentage of Diabetic patients, second high diabetic percentage was found in Sakwar and Oshikhandass has the least Diabetic patients

### DISCUSSION

This limited research study was conducted to out to find the genetic diversity in the human population of district Gilgit. This study was also aimed to find out the ration of diabetes in the district Gilgit. The finding of this study was that in Gilgit there were total of 792 samples and among these 158(19.95%) samples were diabetic and 634(80.05%) were Non-diabetic.

Similarly there were 103 from Danyore, 21(20.40%) samples were diabetic and 82(79.61%) samples were Non-diabetic, while 100 samples from Sakwar and among these 15(25.86) samples were diabetic and 43(74.14%) samples were Non-dietetic and the total samples studied from Jalalabad were 47, among these 17 (36.17%)samples were diabetic and only 30(63.83%) samples were Non-dietetic. According to this present study which was conducted in different locations of district Gilgit shows the increasing rate of

diabetes among the population of Gilgit. Males have high ratio in diabetes as compared to females.

The number of people suffering from DM is increasing due to population growth, aging, urbanization, low physical activity and the high prevalence of obesity. Diabetes is one of the health problems that patients do not have an effective knowledge about their diet and blood glucose controlling methods<sup>9</sup>.

In Pakistan, 10% of adult population as diabetic and about same number is having impaired glucose tolerance. Pakistan ranked 6<sup>th</sup> in highest diabetic population country.

Mumtaz *et al.*<sup>11</sup>, found the prevalence of diabetes is increasing in an adult population of more than 20 years. It was 6.7% in 1995 while 7.1% in 2006, while in urban population, diabetes mellitus was prevalent in 6.9% of urban males while 6.0% of rural males were affected; and 3.5% of urban women and 2.5% of rural women were having DM.

Incidence of type 1 DM is less in Pakistan.

### CONCLUSIONS

This present study is the first documented report which provide the comprehensive and

baseline information of the genetic diversity of district Gilgit. The study presents the importance of Diabetes and its prevalence among the human population of district Gilgit. On the bases of this study the adult human population of district Gilgit is suffering of both types of diabetes type 1 and type 2 but unfortunately due to lack of awareness and people negligence, this diabetes spread with high ration in adult human population of district Gilgit. Diabetes is the silent killer like cancer which shows its effects at its last stage so diabetes is also called silent killer for humans.

### REFERENCES

1. Akhtar, A., Fetrmak, A., froz, A., Bhowmik, B., Ali, L., Hussain, A., Prevalence of Diabetes mellitus and its associated risk indicators in a rural Bangladeshi population. *The open diabetes journal*, **4**: 6-13 (2011).
2. Chhutto, A. M., Qadar, R. H., Abro, A. H., Shaiekh, A. M., Shaihk, A. B., Shaihk, N., Buriro, A. S., Awareness of diabetes mellitus and its complication in diabetic patients. *Medical Channel*. **15(4)**: (2009).
3. Din, U. J., Qureshi Khan, B. M., Ahmed, D. M. K., Prevalence of diabetic retinopathy among individuals screened positive for diabetes in five community-base eye camps in northern Karachi, *Pakistan. J. Ayub. med. Coll.* **18(3)**: (2006).
4. Khan, S., Abbas, M., Habib, F., Khattak, H. I., Iqbal, N., Prevalence of diabetes mellitus in mirpur and kotli districts of azad Jammu and Kashmir. *sharhed J. agric.* **23(4)**: (2007).
5. Parveen, F., Ahmad, E., Complication and risk factors of diabetes mellitus in the population of Usheri Dara, Dir Upper, Khyber Pakhtunkhwa, *Pakistan. Direct Research J. of Health and Pharmacology*. **4(1)**: 8-13 (2016).
6. Ruhee, D., Mohamoodally, F., Relationship between family meal frequency and individual dietary intake among diabetic patients. *J. Diabetic and Metabolic Disorders*. 14-66 (2015).
7. Oskoduwa, I. S., Umar, A. I., Ibrahim, S., Bello, F., Habila, N., Age-dependent alteration of antioxidant defense system in hypertensive and type 2 diabetes patient. *J. Diabetic and Metabolic Disorders*. 14-32 (2015).
8. Ogiso, K., Akao, A., Otsoji, M., Goto, T., Fuijiski, N., Minobe, M., Kinowaki, M., Matsukis, Type 1 diabetic complicated with uncontrollable adult cyclic vomiting syndrome: A case Report. *J. Diabetic and Metabolic Disorders*. 14-72 (2015).
9. Veghari, G., Sedaghat, H. J., Hosenini, A. S., Niknezad, F., Andoihamid, A., Tazik, E., Moharloe, Association between socio-demographic factors and diabetes mellitus in the north of Iran: A population-based study. *International Journal of Diabetes Mellitus 2*: 154–157 (2010).
10. WHO, Definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia. pp 50 (2006).
11. Mumtaz, A.S., Gillani, S., Yakta, E. D., Frequency of diabetic retinopathy in Pakistan after ten years of diagnosis of type 2 diabetes mellitus. *J. Ayub. Med. Coll.* **22(3)**: (2010).