

## Diabetes in Pakistan

M. Zaman Shaikh

### **Prevalence of Diabetes**

Diabetes mellitus is one of the most common endocrine disorders. The prevalence of this chronic metabolic disorder is on the rise all over the world. Pakistan with a population of 154 million has more than 10% of its adult population as diabetics and an equal number of people are suffering from impaired glucose tolerance (IGT) (1-3). At present, Pakistan ranks 6<sup>th</sup> among the countries with the highest burden of diabetes mellitus (4). The prevalence of diabetes and the number of people with diabetes, more than 20 years of age in Pakistan for 3 points in time, i.e., the years 1995, 2000 and 2025 has been estimated to be 6.7%, 7.1% and 8.7% respectively (5). Their absolute number is also staggering, both in rural and urban areas. In the rural areas: 2.16 million, 2.45 million and 4.23 million will have diabetes; while in the urban areas the expected numbers are: 2.18, 2.84 and 10.23 in millions. During the 3 points in time indicated, the total number of males is expected to be: 2.63, 3.21 and 8.67 in millions. The respective number for females is: 1.7, 2.1 and 5.8 in millions. Total number of diabetics is expected to be: 4.34, 5.3 and 14.5 in millions. Pakistan will have an increase from 4.3 million in 1995 to 14.5 million in 2025 (5). In a recent survey (6), total numbers of subjects examined were 5433, which include 1839 males (1208 in rural and 685 in urban areas) and 3540 females (2243 in rural and 1297 in urban areas). The prevalence of diabetes in the urban versus the rural areas was 6% in men and 3.5% in women against 6.9% in men and 2.5% in women respectively. Newly diagnosed diabetes was 5.1% in men and 6.8% in women in urban areas and 5% in men and 4.8% in women in rural areas. IGT in the urban versus the rural areas was 6.3% in men and 14.2% in women against 6.9% in men and 10.9% in women, respectively. Overall glucose intolerance (DM + IGT) was 22.04% in urban and 17.15% in rural areas. The major risk factors identified were age, positive family history and obesity especially central obesity.

On the other hand, incidence of type 1 diabetes mellitus (T1DM) is reported to be very low in Pakistan according to a study by Staines et al (7). The incidence of T1DM among children aged upto 16 years found to be merely 1.02/100,000 per year. Shera et al (8), in their study in Karachi to assess the acute and chronic complications in subjects with T1DM, reported the results as: In 1<sup>st</sup> group which consisted known T1DM (62.1%), male predominance was seen (57.8 VS

42.2%), mean age at presentation was 19.1 +/- 10 years. Mean duration of diabetes was 16±9 years. Two percent subjects presented with diabetic ketoacidosis (DKA), while 21% had a history of DKA. Among the subjects with >10 years of diabetes, 20.1% had hypertension, 5.5% had nephropathy, 2.9% had neuropathy and 7.7% has retinopathy. In Group 2 (newly diagnosed T1DM) significant number of subjects (40.8%) diagnosed between 11 and 20 years of age presented with polyuria (81.3%), polydipsia (77.2), polyphagia (56.7%), and weight loss (79.5%). Ketonuria was positive in 4.9% while 5.8% presented with DKA.

### **Metabolic Syndrome**

Today we observe more and more obesity, insulin resistance, type 2 diabetes mellitus (T2DM) i.e., almost all the features of classical "Metabolic Syndrome" in young children and adolescents in Pakistan. To assess metabolic risk factors, insulin resistance and life style in type 2 diabetic children aged 8-20 years, and to compare these with non-diabetic children of same age, Shaikh et al (9) reported that children with type 2 diabetes have higher BMI and blood pressure than control, but also lead a less healthy life style. This suggests that both genetic and life style factors contribute to the increased risk of metabolic syndrome in children and early preventive measures toward changing life style could help in prevention (9). In type 2 diabetic population, prevalence of metabolic syndrome is very high, which is attributable to both genetic and environmental factors in Pakistan. This coincides with the similar prevalence of this syndrome in other South Asian countries. In a study by Basit et al (10), obesity in terms of waist circumference was found to be 46-68% of the Pakistani population, with a strong association found between arm fat and insulin insensitivity. Hyper-triglyceridemia was found to be present in 27-54% of the population, whereas 68-81% had low level of HDL. Fifty percent were found to be at high risk of metabolic syndrome. With the high prevalence of all the metabolic risk factors, the prevalence of metabolic syndrome in Pakistan according to different definitions is reported to range from 18% to 46%. This prevalence is comparable to the data from 8 other South Asian countries (10).

Mohsin et al (11) reported that 91 out of 106 patient (85.5%) with type 2 diabetes, presenting at a tertiary care hospital, had metabolic syndrome. Majority (95%) was females. Abdominal obesity was present in 91% females and 86% males. Low LDL-C levels were

present in all females and 83% males. Seventy-eight percent females and 63% males had elevated levels of triglycerides. Hypertension was present in 68% and 73% females and males respectively. Thus, a very high prevalence of the metabolic syndrome is noted in type 2 diabetic population.

Diabetes dyslipidemia is an essential component of metabolic syndrome. To assess the pattern of diabetic dyslipidemia, one recent study by Khan et al (12), done in Karachi, revealed interesting findings. Serum triglycerides and VLDL were raised in both male and female diabetics. No significant difference was observed in levels of serum total cholesterol, LDL-C, HDL-C and LDL/HDL ratio. The mean value of TG/HDL ratio for male diabetics was higher than that for the male non-diabetics. A statistically significant difference was found in TG/HDL ratios for the female diabetics and non-diabetics. Therefore, evaluation of TG:HDL ratio may provide a good tool to monitor and manage the lipid abnormalities in diabetics.

## DIABETIC COMPLICATIONS

### *Retinopathy*

Diabetes is notorious for its complications. In Pakistan, due to relatively late diagnosis of T2DM, many of these complications are already present at the time of presentation. In a study by Din et al (13), a total of 912 subjects were screened for diabetes mellitus in 5 country-based eye camps in Northern Karachi. Of these 160 (17.5%) had diabetes 1.8% has T1DM and 15.9% had T2DM. One-hundred eight individuals visited the hospital for ophthalmic examination and 15.7% were found to have diabetic retinopathy. The prevalence of diabetic retinopathy was higher among individuals with T1DM, in those with longer duration of diabetes and among women. The commonest form of diabetic retinopathy was non-proliferative (76.5%); 35.3% was mild, 29.4% was moderate and 11.8% was severe, followed by maculopathy (17.6%) and proliferative diabetic retinopathy (5.9%).

### *Oral Cavity*

Sustained hyperglycemia affects almost all tissues in the body and oral cavity is no exception (14). One cross-sectional descriptive survey was done on 240 type 1 and type 2 diabetic patients visiting the diabetic clinic of Lahore (15), 35.4% of the patients had knowledge about the oral complications of diabetes, for example, xerostomia, opportunistic infections, greater accumulation of plaque, delayed wound healing, susceptibility to periodontal disease, oral paresthesia and altered taste. Only 17.7% of this group knew about this issue from their treating physicians. Fifty-seven percent did not know that diabetes predisposed them to oral disease, and 7.6% denied any existence of a

link between diabetes and oral health. Only 2% of the participants brushed their teeth 3 times a day and 22% brushed twice daily. Knowledge regarding oral complications of diabetes that was imparted by physicians was significantly related to brushing frequency ( $p=0.005$ ); 53.4% of counseled patients brushed 2 or 3 times daily, while only 22.3% of un-counseled patients brushed 2-3 times per day.

### *Stroke*

In another study by Zafar et al (16) at Karachi, pattern of stroke in diabetics have been described and compared with non-diabetics. Out of 50 diabetic patients, 44 (88%) has ischemic stroke and 6 (12%) had intracerebral hemorrhage. In non-diabetes, 29 (58%) had ischemic stroke, while 21 (42%) had intracerebral hemorrhage. Sub-cortical infarcts are more common in diabetics than non-diabetics.

### *Patient Attitudes and Physician Knowledge*

Compliance and adherence of not only patients, but also physicians to quality diabetes care is lacking in Pakistan. To highlight this issue, one study was done recently (17). One hundred patients admitted to a tertiary care hospital in Karachi were interviewed and examined to determine attitudes, perceptions and education about diabetes in the patients and their care provided. Ninety-six has T2DM with on oral hypoglycemic agents (OHA), 13 on life style modification alone, 14 on insulin alone and 10 on combination of insulin and OHA. Complications included autonomic neuropathy in 49%, hypertension in 46%, IHD in 28%, erectile dysfunction in 43% of males and feet complications in 14%. Thirty-one percent patients were doing self monitoring blood glucose (SMBG) with only 16 monitoring more than once weekly. Only 34 patients undertook any physical exercise, with 19 doing regular exercise for the prescribed period and 33 followed the diet prescribed to them. Fifty-nine percent did not have a detailed foot examination in the past 2 years. Only 49% received any type of diabetic education. HBA1c was measured in 65, lipid profile in 55 and urine for micro-albuminuria in only 18 patients over the preceding year. Blood pressure was at recommended levels in 38 patients, while LDL-C was above recommended levels in 50%. Only 11% achieved the combined recommended goals of lipid, blood pressure and glycemic control.

Another survey on 104 physicians, conducted in Karachi revealed inadequacies of current physician's knowledge and practice of optimal and acceptable diabetes care (18).

A questionnaire-based cross-sectional study was carried out to assess awareness of diabetes among rural and urban diabetics of Punjab. In urban diabetics, the

mean awareness was 18±2, and in rural diabetics, mean awareness was 13±2. Correct answer was out of a possible 25. Thus, rural diabetics are far less knowledgeable about diabetes, its management and complications (19).

### **Diabetes Care Costs**

Globally, the direct healthcare cost of diabetes for people in the 20-79 age group is estimated to be at least US\$ 153 billion annually (20). The health-care cost of one diabetic patient varies hugely between countries, e.g., from US\$ 13 in Bangladesh to US\$ 11,157 in the USA per year (21). The biggest impact of the disease is on adults of working age, particularly in developing countries (22) like Pakistan. In South Asian countries, the majority of people live on or below the poverty line and having lack of access to health care services, lack of national welfare schemes and provision of health insurances for the poor population. The poor people cannot afford to pay for the health care services; hence they are diagnosed late with diabetes resulting in acute and chronic complications (23). To estimate the cost of managing diabetes in Pakistan, a study was conducted on 345 diabetic patients from 6 different out-patient clinics of Karachi. The annual mean direct costs for each person with diabetes was estimated to be in PKR 11,580/= (US\$ 145). Medicines accounted for the highest share of direct cost (46%), followed by lab investigations (32%). Increasing age, the number of complications and longer duration of the disease significantly increased the burden of cost on society ( $P < 0.001$ ). Comparing cost with family income, it was found that the poorest segment of society is spending 18% of total family income on diabetic care.

### **Preventive Strategies**

By primary prevention, earlier detection and a reduction in diabetic co-morbidities and complications through improved diabetes care, many resources could be saved (24). Quantifying this high prevalence of diabetes mellitus, very low level of awareness of this silent killer and poor state of health-care delivery system; it is important to allow rationale of planning and collection of resources, especially in the era of primary prevention of this deadly disease.

### **REFERENCES:**

1. Shera AS, Rafique G, Khuwaja IA. Pakistan National Diabetes Survey. Prevalence of glucose intolerance and associated factors in North West Frontier Province (NWFP) of Pakistan. *J Pak Med Assoc* 1999; 49(9):206-11.
2. Shera AS, Rafique G, Khuwaja IA. Pakistan National Diabetes Survey. Prevalence of glucose intolerance and associated factors in Shikarpur, Sindh province. *Diab Med* 1995; 12(12):1116-21.
3. Shera AS, Rafique G, Khuwaja IA. Pakistan National Diabetes Survey. Prevalence of glucose intolerance and associated factors in Baluchistan province. *Diab Res Clin Pract* 1999; 44(1):49-58.
4. Wild S, Roglic G, Green A. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diab Care* 2004; 27(5):1047-53
5. King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025. Prevalence, numerical estimates and projections. *Diab Care* 1998; 21(9):1414-31.
6. Shera AS, Jawad F, Maqsood A. Prevalence of diabetes in Pakistan. *Diab Res Clin Pract* 2007; 76:219-22.
7. Staines A, Hanif S, Ahmed S. Incidence of insulin-dependent diabetes mellitus in Karachi, Pakistan. *Arch Dis Child* 1997; 76:121-3.
8. Shera AS, Mian Z, Basit A, Maqsood A, Ahmadani MY, Fawad A, et al. Trends of type 1 diabetes in Karachi, Pakistan. *Pediatr Diabetes*. 2008 Aug; 9(4 PTZ):401-6.
9. Shaikh RA, Jabbar A, Michels RP, De Vries JH. Metabolic risk factors, insulin resistance and lifestyle in children of type 2 diabetes patients in Karachi, Pakistan. *Diab Res Clin Pract*. 2008 Jun; 80(3): 399-404.
10. Basit A, Shaera AS. Prevalence of metabolic syndrome in Pakistan. *Metab Syndr Relat Disord*. 2008 fall; 6(3):171-5.
11. Mohsin A, Zafar J, Nisar YB, Imran SM, Zaheer K, Khizar B, et al. Frequency of the metabolic syndrome in adult type 2 diabetes presenting to Pakistan Institute of Medical Sciences. *J Pak Med Assoc* 2007; 57(5); 235-9.
12. Khan SR, Ayub N, Nawab S, Shamsi TS. Triglyceride profile in dyslipidemia of type 2 diabetes mellitus. *J Coll Physician Surg Pak*. 2008; 18(5):270-3.
13. Din J, Qureshi MB, Khan AJ. Prevalence of diabetic retinopathy among individuals screened positive for diabetes in five country-based eye camps in northern Karachi, Pakistan. *J Ayub Med Coll Abbottabad* 2006; 18(3):40-3
14. Mealey B. Diabetes Mellitus In: *Burket's Oral Medicine Diagnosis and Treatment*. 10<sup>th</sup> ed. 2003, 563-577.
15. Mirza KM, Khan AA, Ali MM. Oral Health knowledge, attitude, practices and sources of information for diabetic patients in Lahore, Pakistan. *Diab Care* 2007. 30(12):3046-7.
16. Zafar A, Shahid SK, Siddiqui M, Khan FS. Pattern of stroke in type 2 diabetic subjects versus non-diabetic subjects. *J Ayub Med Coll Abbottabad*

- 2007 Oct-Dec; 19(4):64-7.
17. Jabbar A, Hameed A, Chawla R. How well do Pakistani patients and physicians adhere to standards of diabetes care? *Int J Diab Dev Ctries*. 2007; 27(3):93-6.
  18. Akhtar J. Quality of diabetes care and management of general physicians in Karachi, Pakistan (letter) *Diab Care* 2007; 30(4):e27.
  19. Sabri AA, Qayyum MA, Saigol NU, Zafar K, Aslam F. Comparing knowledge of diabetes mellitus among rural and urban diabetics: *McGill J Med* 2007; 10(2):87-9.
  20. IDF. Costs of diabetes (<http://www.eatlas.idf.org/> costs of diabetes/2007).
  21. Logminiene Z, Norkus A, Valius L. Direct and indirect diabetes costs in the world. *Medicina (Kaunas)* 2004; 40(1):16-26.
  22. WHO, Diabetes Programme. [http:// www.who.int/diabetes/en](http://www.who.int/diabetes/en).
  23. Caro JJ, Ward AJ, O'Brian JA. Life-time costs of complications resulting from type 2 diabetes in the US. *Diab Care* 2002; 25(3):476-81
  24. Khuwaja LA, Khuwaja AK, Cosgrove P. Cost of diabetes care in out-patient clinics of Karachi, Pakistan. *BMC Health Services Res* 2007; 7:189.



*AUTHOR AFFILIATION:*

**Prof. M. Zaman Shaikh**

Department of Medicine

Director, National Institute of Diabetes and Endocrinology

Dow University of Health Sciences

Karachi, Sindh-Pakistan.

Email: [drzamanshaikh@yahoo.com](mailto:drzamanshaikh@yahoo.com)