

## Long term complications of diabetes and co-morbidities contributing to atherosclerosis in diabetic population of Mirpur, Azad Kashmir

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### Abstract

**Objective:** To ascertain the prevalence of diabetes mellitus and its chronic complications along with co-morbidities contributing to atherosclerosis in the diabetic population of Mirpur, Azad Kashmir.

**Methods:** The cross-sectional study and was carried out at the Divisional Headquarter Hospital, Mirpur, Azad Kashmir, between January and August 2012. The patients selected were established diabetics. Data was collected through special questionnaire. SPSS version 14 was used to analyse the data.

**Results:** A total 3602 patients were interviewed initially. Of them 318 were diabetics; the prevalence rate being 8.83%. Of the 318 study subjects, 24 (7.3%) had a history of stroke; 4 (1.3%) had history of transient ischaemic attack; 17 (5.3%) had history of myocardial infarction; 27 (8.5%) and had a history of angina. Foot ulcers were present in 22 (6.9%) and 3 (0.9%) had an amputation. Diabetic retinopathy was found in 95 (29.9%), diabetic nephropathy in 25 (7.9%) and diabetic neuropathy in 126 (39.6%). Co-morbid hypertension was found in 153 (48.1%) of cases whereas co-morbid hypercholesterolaemia was found in 66 (20.8%) and 56.9% had family history of diabetes mellitus. Overall, 34 (10.7%) were smokers.

**Conclusion:** Diabetes is responsible for significant morbidity and mortality. Co-morbidities like hypertension and hypercholesterolaemia must be aggressively treated to prevent coronary heart disease.

**Keywords:** Diabetes mellitus, Hypercholesterolaemia, Stroke. (JPMA 63: 1383; 2013)

### Introduction

According to World Health Organisation (WHO),<sup>1</sup> 346 million people worldwide have diabetes. In 2004, an estimated 3.4 million people died because of high blood sugar. More than 80% of deaths occur in middle and lower income countries. WHO projects that deaths due to diabetes will double between 2005 and 2030. Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use can prevent the onset of type 2 diabetes mellitus (T2DM). It is estimated that prevalence of diabetes will rise from 6.4% in 2010 to 7.7% in 2030 with an estimated 69% rise in the number of adults with diabetes in developing countries.<sup>2</sup>

Diabetes can damage the heart, nerves, blood vessels, eyes and kidneys. Nearly half of diabetics die of cardiovascular disease. Combined with reduced blood flow neuropathy increases the chances of foot ulcers and amputation. After 15 years of Diabetes 2% of patients become blind and 10% develop severe visual impairment due to diabetic retinopathy. Besides, 10-20% of diabetics die of renal failure. Diabetic neuropathy affects 50% of diabetics. The overall risk of mortality in diabetics is twice that of their peers without diabetes.<sup>3</sup>

Chronic complications in diabetes are thought to be directly related to the duration of diabetes and intensive glycaemic control. The prevalence of these complications is due to rise along with the prevalence of diabetes. A previous study done in Pakistan showed,<sup>4</sup> Diabetic retinopathy in 43%, diabetic neuropathy in 39.6%, foot ulcers in 4%, hypertension in 64.6%, angina in 17%, myocardial infarction in 5% and stroke in 2.6%.

A search using terms 'diabetes and Azad Kashmir' gave no results on Cochrane database. A similar search of Pubmed/Medline database returned with one article by Rees et al, the target population of which was UK-based Kashmiri diaspora.

The current study was designed to ascertain the prevalence of diabetes and its chronic complications along with co morbidities contributing to atherosclerosis in the diabetic population of Mirpur, Azad Kashmir.

### Subjects and Methods

The cross-sectional study was conducted among established diabetics between 12 and 85 years of age presenting to the Medical Out-patient's Department (OPD) at Divisional Headquarter (DHQ) Hospital, Mirpur, Azad Kashmir, between January and August 2012.

A questionnaire was designed for patients with established diabetes to ascertain the presence of diabetic

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complications and co-morbidities along with medical history. The WHO criteria<sup>5</sup> for the diagnosis of diabetes was used and all subjects had fasting sugar levels measured. Patient's height and weight were also recorded to calculate the body mass index (BMI). Those with BMI of 25-29.9 (kg/m<sup>2</sup>) were classified as overweight, and those with BMI over 30 (kg/m<sup>2</sup>) as obese. Consent was taken from each patient and the data was collected anonymously. Fundoscopy was done to diagnose diabetic retinopathy. Serum urea and creatinine was measured to assess for diabetic nephropathy, while diabetic neuropathy was assessed by physical examination using Semmes Weinstein monofilament. Electrocardiography (ECG) was done to assess for ischaemic changes of coronary artery disease. It is estimated that cholesterol levels in excess of 14.8mg/dl are responsible for 50% of cardiovascular deaths.<sup>6,7</sup> Hence, for the purpose of our study, patients with fasting cholesterol levels in excess of 14.7mg/dl were considered to have hypercholesterolaemia.

Descriptive analysis of data was done using SPSS 14.

### Results

A total of 3602 patients were interviewed at the outpatient's department during the study period. Of these 318 were found to be diabetics. The prevalence was 8.83%. Mean age of diabetics was 51.83±12.45 years. There were 233 (73.3%) females and 85 (26.7%) males. Period since diagnosis at presentation was a mean of 6.74±5.447 years. Body mass index was a mean of 27.25±4.86.

Overweight diabetics were 124 (39%) and obese diabetics were 75 (23.6%). History of stroke was found in 24 (7.3%) and transient ischaemic attacks (TIA) in 4 (1.3%). History of myocardial infarction was found in 17 (5.3%) and Angina in 27 (8.5%).

Foot ulcers were found in 22 (6.9%) and amputation in 3

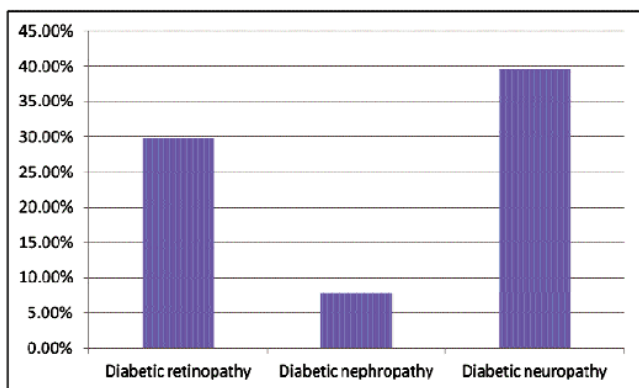
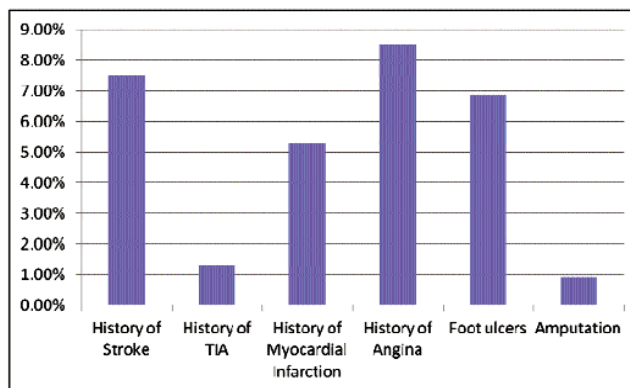


Figure-1: Prevalence of Microvascular Complications.



TIA: Transient Ischaemic Attack.

Figure-2: Macrovascular Complications.

(0.9%). Diabetic retinopathy was seen in 95 (29.9%), diabetic nephropathy in 25 (7.9%) and diabetic neuropathy in 126 (39.6%). Co-morbid hypertension was found in 153 (48.1%) and co-morbid hypercholesterolaemia in 66 (20.8%), 181 (56.9%) diabetics had family history of diabetes. There were 34 (10.7%) current smokers and had been smoking for a mean of 2.69±9.002 years.

### Discussion

Diabetes is a debilitating illness. Diabetics are at 1.5 to 2.5 fold higher risk of dying at any age compared to healthy controls.<sup>8</sup> Prevalence of diabetes in Pakistan was 6% in men and 3.5% in women in 2007 in urban population and 6.9% in men and 2.5% in women in rural population.<sup>9</sup>

In our study, the prevalence was 8.83%. According to a previous study, an increase in the prevalence of diabetes in Asia has been seen. In Bangladesh, the prevalence has risen from 4.5% in 1997 to 8.1% in 2005. Similarly in India, the prevalence of diabetes has risen from 8.2% in 1989 to 18.6% in 2006. Urbanisation and socio-economic progress played a major role in this rise. The mean age of diabetics in Asian Indians was 60-69 years in contrast to Chinese population where it is 69-70 years.<sup>8</sup> Mean age of diabetics in our study was 51.83 years. This represents a trend of diabetes developing at a younger age. Living environment and geographical factors may not explain these differences fully, suggesting a role for genetic factors as well.<sup>10</sup>

Obesity was reported in 18% of diabetics previously<sup>11</sup> in Middle East in 2004 compared to 23.6% in our study. BMI in diabetics has been reported at 26.26±4.72<sup>12</sup> in India compared to our reported BMI of 27.25±4.86. The difference in our view represents the rising trend of

obesity in developing countries.

History of stroke was found in 2.6% in a previous study<sup>4</sup> in Pakistan in 2004 compared to 7.3% in our study. In Taiwan, stroke prevalence was 2.5% in diabetics in 2000.<sup>13</sup> A study in China reported diabetes in 18.6% of stroke patients in 2007.<sup>14</sup> This difference in stroke prevalence is due to an increased prevalence of diabetes as well as the trend of developing diabetes at a younger age.

Myocardial infarction was found in 5.8% and angina in 8.5% in our study compared to 5% and 17% by an earlier study.<sup>4</sup> The cumulative prevalence of ischaemic heart disease in our study was 14.3% compared to 15.8% reported in Taiwan.<sup>13</sup> In China, a study in 1997 found ischaemic heart disease in 25.4%.<sup>15</sup>

Foot ulcers were found in 6.9% compared to 4% in a 2004 study.<sup>4</sup> Amputation was found in 0.9% in our study compared to 1% in the Chinese study.<sup>15</sup> In 2009 a study reported foot ulcers and gangrene at 12.9% in diabetics.<sup>16</sup>

Diabetic retinopathy was found in 29.9% in our study compared to 43% in the 2004 study.<sup>4</sup> In China, it has been reported in 37% of diabetics.<sup>15</sup> In Nepal, it was reported at 21.3% in 2011.<sup>17</sup> Diabetic nephropathy was found in 7.9% in our study compared to 20.2% by Shera et al.<sup>4</sup> Amutha et al found nephropathy in 8.4% of diabetics in India.<sup>18</sup> The study by Unnikrishnan et al found nephropathy in 29.1% of diabetics.<sup>18</sup> Diabetic neuropathy was found in 39.6% in our study sample, similar to Shera et al.<sup>4</sup> A nationwide survey in 2006 by the Korean Diabetes Association on the epidemiology of diabetic neuropathy found it in 44.7%.<sup>20</sup> In our view, these differences represent the geographical as well as genetic factors.

Co-morbid hypertension was found in 48.1% of diabetics in our study compared to 64.6% by Shera et al.<sup>4</sup> A study in United Arab Emirates found hypertension in 35% of diabetics.<sup>21</sup> In western population, hypertension has been reported at 40%<sup>22</sup> of study in Morocco reported hypertension in 70.4% of diabetics,<sup>23</sup> while it was found in 33% of diabetics by Xu et al.<sup>15</sup>

Hypercholesterolaemia was found in 20.8% of diabetics in our study. It was found in 24% in China.<sup>15</sup> In India, hypercholesterolaemia was reported in 12.9% of diabetics.<sup>24</sup>

A family history of diabetes was found in 56.9% of patients in our study. In Iran, it was found in 27% of diabetics.<sup>25</sup> A study in South Africa revealed family history of diabetes in 27.3%.<sup>26</sup> A study in India has reported family history of diabetes to be 14.8% in diabetics.<sup>24</sup> Again, geographical and genetic factors account for these

differences.

Of the diabetics studied, by the current study, 10.7% were smokers. A study in Oman reported smoking in 16.75% of diabetics,<sup>27</sup> while 20.5% in Kerala, India.<sup>28</sup>

Our study has its strengths and methodology limitations. It provides a useful baseline assessment and the results are generalisable as the sample was population-based. In this study, we have studied multiple long-term complications and co-morbidities. There was no loss to follow-up, making this study inexpensive and quicker to perform. Prevalence of multiple variables was assessed. It also provides a basis for causal links. The prevalence of complications and co-morbidities studied are important in public health terms for assessing the burden of disease in the specified population and in planning and allocating health resources.

In terms of limitations, it provides only a snapshot i.e. variables are measured at one point in time. The main outcome measure was prevalence. This study thus provides limited information. It cannot establish sequence of events. Only a hypothesis regarding causal links can be generated. This study is prone to selection and measurement bias. Regarding selection bias, as this study was carried out in the OPD setting, questions can be raised if the study sample was representative of the entire population. Length-biased sampling may have occurred as diabetes is a chronic illness and the cases may have been over-represented. As this study concentrated on established diabetics, there may have been cases which presented to the OPD but may have remained undiagnosed.

## Conclusion

Diabetes is responsible for significant morbidity and mortality in the affected population, but lack of demographic data hampers governmental steps to curb the disease. Further studies into the nature of diabetes in Azad Kashmir are required. Co-morbidities like hypertension and hypercholesterolaemia must be aggressively treated to prevent coronary heart disease.

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