Epidemiological study of diabetes mellitus DM among different ethnic segments of population in Pakistan: A nationwide ethnographapical study

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Abstract

Introduction
Diabetes mellitus is one of the leading causes of morbidity and mortality worldwide. It has been estimated that the number of people with diabetes mellitus will greatly increase in the upcoming years. This prevalence has been projected to be greatest in the region of South Asia although several developing countries have reported a rise in the patients suffering from this disease as well.

Methods
A cross sectional survey was conducted in health care settings of various cities of Pakistan for 8 months i.e. March 2013 to October 2013. It targeted patients diagnosed with diabetes mellitus with probability sampling technique. The survey employed descriptive statistics, cross tabulation, chi square test and epidemiological calculations of relative risks RR and prevalence rate PR.

Results
Prevalence of diabetes mellitus in adult population above 25 years was found to be 0.74 with RR of 1.4938. Type 2 DM was observed at a PR of 0.72 with RR of 1.4444. The Sindhi race of Urdu speaking origin was seen to be suffering from the disease for most part (28%), followed by Punjabi race (27%) and Sindhi race of Sindhi speakers (20%). The gender of patient and phenotype of DM were associated. (P value <0.05).

Conclusion
Diabetes Mellitus is emerging as a serious threat in Pakistan. There is an urgent need of establishing preventive and management programs to counter this rising disease.

Keywords: Epidemiology; Prevalence; Diabetes Mellitus DM; Ethnic; Pakistan.
INTRODUCTION
Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels.1 A major advance was made in the late 1960s when insulin-dependent diabetes mellitus (IDDM, type 1) was distinguished from non-insulin-dependent diabetes mellitus (NIDDM, type 2). Another milestone was the realization in the 1970s that in most cases IDDM has, presumably, an autoimmune origin2. This helped in better understanding of the etiology of diabetes mellitus and hence educated optimism regarding the prevention techniques. Diabetes epidemiology has had a profound impact on diabetes research, care and prevention. Diabetes and its complications pose a major threat to future public resources throughout the world3. Surveillance of diabetes is a necessary first step towards its prevention and control4. While the prevalence of diabetes can provide information about the burden of disease in the community, prevalence rates do not capture individuals' risks of developing diabetes during a defined period5 whereas the lifetime risk estimates the length and quality of life with disease are informative and easily understood measures of the effect of disease in individuals6. Studies have shown that in developing countries, the majority of people with diabetes are in the 45 to 64 year age range7. In contrast, the majority of people with diabetes in developed countries are >64 years of age. Assuming that age-specific prevalence remains constant, the number of people with diabetes in the world was expected to approximately double between 2000 and 2030, based solely upon demographic changes8. Increasing evidence of effective interventions, including changes in diet and physical activity or pharmacological treatment to reduce prevalence of diabetes, provides an impetus for wider introduction of preventive approaches9. Furthermore, improved survival may contribute to increasing prevalence of diabetes in the future especially in developed countries10. Prevalence rates of DM vary considerably amongst different populations and ethnic groups11. Several studies have shown that South Asian migrants and their offsprings have higher prevalence rates of DM than the native host populations12. According to National Institute of Diabetes and Endocrinology, with an estimated prevalence of 7.6 per cent at present, it is estimated that by 2030, Pakistan will have the fourth largest diabetic population in the world — around 13.8 million people13. Despite geographical differences and cultural diversity amongst the ethnic groups in Pakistan, all carry a similarly high risk of DM14. In a number of studies conducted in Pakistan, marked association between glucose intolerance and hypertension was observed with indication of a gradient from normoglycaemia, through IGT, to diabetes15. This study was carried out to estimate the epidemiological rate of diabetes in Pakistan in reference to prevalence and its relationship with gender, co morbidities and the phenotypes of diabetes mellitus.

METHODS
A cross sectional survey was conducted in health care settings of various cities of Pakistan for 8 months i.e. March 2013 to October 2013. The survey consisted of research instrument in the form of a questionnaire which targeted patients diagnosed with diabetes mellitus DM with probability sampling technique. The inclusion exclusion criteria included all patients diagnosed with diabetes mellitus and all other patients were excluded. Prior to the data collection, a written consent was obtained from the patient. The survey employed descriptive statistics, cross tabulation, chi square test and epidemiological calculations of relative risks RR and prevalence rate. A statistical significance of p values <0.05 for chi square was accepted. The epidemiological results are expressed as upper and lower limits of 95% confidence interval. SPSS v20 (Statistical Package for Social Sciences version 20) and MedCalc® was used to interpret the data.
Results

Of the total 152 patients screened the prevalence of diabetes mellitus in adult population above 25 years was found to be 0.74 (0.6675 to 0.8014 for 95% CI) with a relative risk of 1.4938 (1.208 to 1.8531 for 95% CI). However in geriatrics was 0.22 (0.2901 to 0.4364 for 95% CI) with a relative risk of 0.4444 (0.3137 to 0.6297 for 95% CI) (SD 0.44). In terms of phenotype of diabetes mellitus, type 2 DM was observed at a prevalence rate of 0.72 (0.6464 to 0.7834 for 95% CI) with a relative risk of 1.4444 (1.1615 to 1.7963 for 95% CI). The type 1 DM was observed at 0.21 (0.1544 to 0.2791 for 95% CI) with a relative risk of 0.4321 (0.3036 to 0.6149) (SD 0.42). The results are tabulated in table 1.1.

<table>
<thead>
<tr>
<th>Population</th>
<th>Prevalence Rate</th>
<th>95% CI</th>
<th>Relative Risk</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>0.74</td>
<td>0.6675 to 0.8014</td>
<td>1.4938</td>
<td>1.208 to 1.8531</td>
</tr>
<tr>
<td>Geriatric</td>
<td>0.22</td>
<td>0.2901 to 0.4364</td>
<td>0.4444</td>
<td>0.2901 to 0.4364</td>
</tr>
<tr>
<td>Disease Phenotype</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 1 DM</td>
<td>0.21</td>
<td>0.1544 to 0.2791</td>
<td>0.4321</td>
<td>0.3036 to 0.6149</td>
</tr>
<tr>
<td>Type 2 DM</td>
<td>0.72</td>
<td>0.6464 to 0.7834</td>
<td>1.4444</td>
<td>1.1615 to 1.7963</td>
</tr>
</tbody>
</table>

When the ethnicity and disease of DM was cross tabulated, The Sindhi race of Urdu speaking origin was seen to be suffering from the disease for most part (28%), followed by Punjabi race (27%) and Sindhi race of Sindhi speakers (20%). Similar results were observed for races of Baloch (10%) and Pukhtoons (12%) with latter being slightly higher. and the results being statistically insignificant (P value >0.05, SD 0.25). Majority of the population suffering from diabetes mellitus appeared to be married (92%) with few being unmarried (8%). SD 0.25. Graph 1.1 demonstrates the findings.

Graph 1.1 Ethnographic data of patients

When the gender and type of DM were cross tabulated, statistical significance was obtained with P values<0.05). Males with type 1 DM were found to be N = 11, observed to N = 18, expected. However, males with type 2 DM were found to be N = 67, observed to N = 60, expected. The females were seen as N = 24 observed to N = 17, expected and in case of type 2 DM, N = 50, observed to N = 57, expected. Graph 1.2 demonstrates the cross tabulation results of the findings.
Majority had high blood sugar (81.9%) and a third of population was seen with co morbidity of hyperlipidemia (32.1%). A third (31.5%) did modify their diet due to this reason and almost half (56.8%) appeared to undergo exercise such as brisk walk, etc.

Discussion
Escalation in rates of diabetes, especially type 2 (NIDDM) diabetes in Pakistan is posing threats to the economy and quality of life of people due to poor glycemic control and very high rates of complications. Reports from National diabetes survey and National health survey differs both in observations regarding prevalence of diabetes and in relative burden of diabetes in various provinces and among males and females. Epidemiology and causes for prevalence of diabetes in Pakistan have a number of risk factors. Mainly the genetic predisposition and environmental dynamics are the major contributors in the high prevalence rate of diabetes in Pakistan. The complications associated with diabetes which leads to morbidities and mortalities are the core causative factors in the establishment of this disease as a solemn social burden.

This study was aimed at establishing the epidemiology and the related determinants of diabetes in Pakistan. The studies done on prevalence of diabetes in the migrant South Asian populations elsewhere have consistently shown a much higher prevalence of diabetes than the indigenous population of the Indian subcontinent and the native population of the host country. In the Coventry diabetes study, Simmons et al. noted diabetes in 11% of Asian men and 8% of Asian women as compared to 3% in white men and 4% in white women. The higher prevalence rate thus observed in the population as a whole is consistent with the higher rates predicted in the region and role of genetics in predisposition of South Asians to diabetes.

In contrast with other studies in migrant South Asian communities and the recently conducted studies in India where the prevalence rates of NIDDM and IGT increased with age in both men and women whereas a lower prevalence is seen in geriatrics. This is suggestive of introduction of interventions that may help prevent primary diabetes in this group.

Ethnic differences have been observed with in the country, this could be attributed to the role of lifestyle, genetic or environmental differences which are observed across Pakistan.

A positive family history of diabetes, obesity and abdominal fat distribution have been described as related risk factors in a number of studies. A strong association was observed with the co morbidities in the study. Also the high carbohydrate dietary pattern observed as a traditional paradigm contributes to oxidative stress and the overall increment in
prevalence. It was observed that the females in Pakistan irrespective of ethnicity were seen to suffer from Type 1 DM for most part, a possible explanation to this finding can be attributed to the fact that females in Pakistan suffering from polycystic ovarian syndrome PCOS exhibit diabetes and obesity as a triage of co-morbid conditions. The Urdu speaking race of Sindhi ethnicity was observed to have highest incidence of the disease which is explicable since studies have shown that Indian emigrants in Pakistan which settled in the country after independence which later integrated in the country and became the inhabitants of Sindh had this ailment. In case of the Punjabi race, it was almost at par with the former however in this the issue can be attributed to the lack of health awareness among individuals in the Punjab state and the overall susceptibility of the IndoPak population to DM since the both races are descendants of Indian Subcontinent. Contrastingly, the low incidence among other ethnicities underscores the theory as the Balochi and Pukhtron race are descendants from Iran and Afghan / Central Asian origin respectively. Intervention through education is the most effective method for prevention and management of diabetes.

Conclusion
With rising trend and prevalence of diabetes in Pakistan and the expected further increase, it is essential to increase the level of awareness, the importance of physical activity and improvement in the availability of the dietetic services to ensure more components preventive and management of diabetes.

Author’s Contribution
MR conceived the idea with ST and jointly prepared the introduction, the methods and study design was formulated by the AA and AS, the data was collected across Pakistan by IM, MA, KAZ, MN, SSS and FH. The data was entered in analytical software by AA, ZN and MR, the discussion and conclusion was done by ST and AA. The abstract was prepared by AS and final editing of the manuscript was done by AA and ST.

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Conflict of Interest
The authors declare no conflict of interests exists.

References


