HYPERGLYCAEMIC FEMALES: AN IGNORED ICEBERG

NAHEED H. SHEIKH*, RAZIA CHAUDARY*, M. ASHRAF
SEEMA HUSNAIN*, SHAHID MAHMOOD** AND MAMOON AKBAR*
*Departments of Community Medicine, *Allama Iqbal Medical College and
**King Edward Medical College, Lahore*

This community based study was conducted in a village of Lahore District, Pakistan. All 193 females (age 40 and above) residing in the village were interviewed and capillary venous blood glucose level was measured by Glucometer, randomly and 2 hours after 75 gram of glucose load (after informed consent). Cut off point was taken at ≥ 200mg/dl. Raised blood glucose levels were found among 54 (28%) females that is quite a high prevalence, of these 37 (68%) hyperglycaemic females were not taking regular exercise (p=0.004), 35 (65%) had family income / capita / month ≤ Rs800 (P= 0.029). Raised blood pressure (≥140/90) was among 21 (39%), highly significant (p=0.0034). Association of B.M.I & hyperglycaemia is non significant. Positive family history of diabetes was observed in 20 (37%) females (p=0.010). The study concluded that the total burden of hyperglycaemia among females is alarmingly high. There is a dire need to make the female population aware about diabetes, its prevention and control. Mass teaching, specifically regarding self estimation and self care is the need of the day. The objective of this study was to calculate the burden of hyperglycaemia among females and the underlying factors related to hyperglycaemia.

Key words: Hyperglycemia, Diabetes, hyperglycaemia & females.

INTRODUCTION

Diabetes has emerged as a major health problem in Pakistan. The National Survey conducted by the Diabetic Association of Pakistan, Karachi has shown that over 10% of the people age 30 and above are diabetic and an equal number is suffering from Impaired Glucose Tolerance Test (IGTT)[1].

Earlier it was regarded as a single disease entity, diabetes is now seen as a heterogeneous group of metabolic disorder, characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. Characteristically, the diabetic has a long term risk of developing progressive disease of the retina, kidney, damage to the peripheral nerves and aggravated atherosclerotic disease of the heart, legs and brain which are one of the leading causes of death in developing as well as developed countries[2].

Clinically diabetes mellitus (DM) can be Type 1 autoimmune & idiopathic, Type 2 predominantly insulin resistance and predominantly insulin secretory defects. Other specific types include impaired glucose tolerance and gestational diabetes mellitus[3].

The underlying cause of DM is insulin deficiency, which is absolute in Type I DM and partial in Type II. This may be due to a wide variety of mechanisms:

- Pancreatic disorders: Inflammatory, neoplastic and cystic fibrosis.
- Defects in the synthesis of insulin
- Destruction of Beta cells by virus and chemical agents
- Decreased insulin sensitivity
- Genetic defects
- Autoimmunity

Factors related to host and environment are age, sex, genetic factors, genetic markers, immune mechanisms, obesity, sedentary life style, diet, chemical agents, stress & socio-economic factors such as education, occupation, life style, income, marital status, religion, and urbanization. The most important epidemic feature of DM is that it is now common in the lower social class whereas 50 years ago the gradient was the reverse. One reason could be rapid changes in lifestyle in lower classes[2].

Epidemiologically the 2 hours blood glucose level after 75 grams of glucose intake is best alone

or with fasting blood glucose level. Automated biochemistry (Glucometer) has made it possible now to screen thousands of samples for glucose estimation. The criterion for the diagnosis of diabetes, proposed by W.H.O is as follows:

	Whole Blood	
	Venous	Capillary
Fasting	≥ 6.1 (≥ 110mg)	≥ 6.1 (≥110mg)
2 Hrs. after	≥ 6.1 (≥ 110mg)	> 11.1 (≥200mg)

Glucose concentration m.mol/l (mg/dl)[3].

A study conducted at Chinese University of Hong Kong revealed that 2847 women at 40 & above had plasma glucose 8-11 m.mol/L, the lowest social class has the highest prevalence of diabetes and glycaemic index[4].

Another six year mortality follow up of a random sample of 576 disabled women (age 65-101) was studied for diabetes, hyperglycaemia and mortality. The study revealed that in mild hyperglycaemia, hazard rate is 1.81 at 95 % confidence interval. While in moderate it is 2.02 and in severe hyperglycaemia the hazard rate is 2.22. It concludes that women with diabetes had a significantly increased hazard rate[5].

A study conducted by the Department of Nutrition and Epidemiology, Harvard School of Public Health on diet, lifestyle and the risk of Type II diabetes mellitus in women of middle age. After 16 years of follow up they documented 13300 new cases of Type II diabetes mellitus. Over weight or obesity or high body mass index was the single most important predictor of diabetes. Lack of exercise and poor diet selection was associated with a significantly increased risk of diabetes even after adjustment for the body mass index (BMI)[6].

A report was published in "Office on Women's Health" in September 1988 by the title of "Diabetes Mellitus in American women". Of the 30 million American women, 1.2 million have been diagnosed as diabetics. About 675000 women have diabetes but they are not aware of the disease (age about 50 years or older). Most of the women have type II diabetes and are related to or influenced by the same risk factors that are associated with type II diabetes mellitus in other populations, such as obesity, physical inactivity, family history of diabetes, gestational diabetes and impaired glucose tolerance[7].

Canadian study of health and aging (CSHA) conducted a study in 1997 with the purpose to estimate the incidence of diabetes among elderly people with gender differentiation and the relative risks of death and admission to an institution among elderly diabetic patients. The results with regards of incidence and prevalence vary widely from 8.9% to 16.6% with more incidences among females (60-69 years of age)[10].

MATERIAL AND METHODS

A cross-sectional study was conducted in a village community having a total population of 5000 people. All the females age 40 & above, residing in the area were included in the study. Total 200 females (40 & above) of the target group were residing in the study area, out of these 07 females refused to be the part of this survey. Therefore, 193 females were interviewed and capillary blood glucose level was estimated randomly and after 2 hours of 75 grams glucose load. The cut off point for diabetes was set at level ≥ 200 mg/dl. Trained team of doctors and field workers conducted this survey by using AMES glucose strips and Gluco-meter for testing the blood glucose level.

Inclusion criteria: All the married females of age 40 and above residing in the village Chum-rupur District Lahore are included in the study.

Exclusion criteria: All the females of same age group having some other endocrinal disorders and those who are not willing to participate in the study were excluded.

Limitation of the study: As the study demanded pricks by the use of lancets therefore, informed consent was taken. A few subjects (only 07 females) did not give consent & they were excluded from the study.

Underlying factors and their cut off values

1. Age: 40 years and above.

2. Sex: females

3. Family history of diabetes in first-degree relatives.

4. Hypertension ≥ 140/90 mm of mercury.

5. Obesity ≥ 26

6. Socio-economic factors are

   (i) Education: females who cannot read & write in national language are illiterate.

   (ii) Occupation: housewife (not paid at all for house hold work), self employed & household work on payment

   (iii) Income / capita / month Rs.800 is taken as cut off point for poverty instead of $1 / capita / day.

RESULTS

A total of 193 females (target group) were interviewed; related information is tabulated as in

Table 1. Of these 174 females were illiterate and 50 were hyperglycaemic (Table 2). Impact of exercise, income/capita/month, blood pressure and family history were found significant. Eighty one percent had not done any exercise 37 (68%) were hyperglycaemic (Chi-square = 8.09, P = 0.004) (Table 3). A total of 146 families living in the study area were below the poverty line and there were 35 hyperglycaemic in that group (Table 4). Out of 112 females having BMI more than 26, 36 females were hyperglycaemic (p=.130, R.R= 0.69) (Table 5). Twenty one (39%) of 54 hyperglycaemics were having B.P > 140/90 (Chi-square= 8.56) (Table 6). Thirty seven percent of hyperglycaemics had positive family history (Chi-square= 6.51) (Table 7).

Table 1. *Related Information*

Information	Facts
Total population	5000 people
Target population	193 females>40 years
Respondent's literacy rate	10%
No. of females having family income/ capita/ month < Rs.800	76%
Mean blood pressure	140/90 mm of Hg
Total No. of hyperglycaemic females	54
Prevalence of hyperglycaemia among females 40 yrs. & above	28%
Females having BMI > 26	58%

Table 2. *Education and hyperglycaemia (n=193)*

	Hyper-glycemia	No hyper glycemia	Total
Illiterate	50	124	174
Literate	04	15	19
Total	54	139	193

P = 0.479

Table 3. *Exercise and hyperglycaemia*

Exercise	Hyper-glycemia	No hyper-glycemia	Total
Yes	17	19	36
No	37	120	157
Total	54	139	193

P = 0.004 (highly significant)

Table 4 *Income per capita per month and hyperglycaemia*

	Hyper-glycaemia	No hyper glycaemia	Total
≤ Rs. 800/	35	111	146
≥ Rs. 800/	19	28	47
Total	54	139	193

P = 0.029 (highly significant)

Table 5 *Body Mass Index (BMI) and hyperglycemic*

	Hyper-glycemic	No hyper-glycemic	Total
BMI ≤ 26	18	63	81
BMI ≥ 26	36	76	112
Total	54	139	193

P = 0.130

Table 6. *Blood pressure and hyperglycemia*

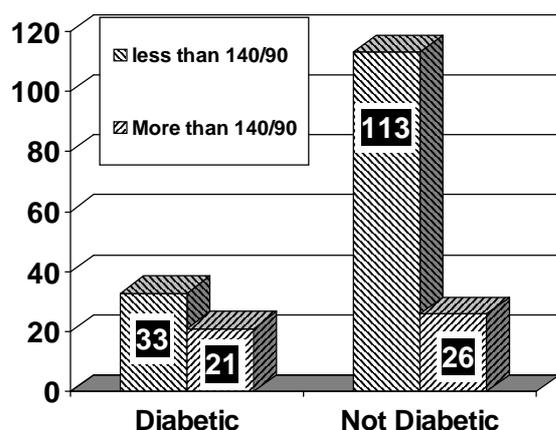|	Hyper-glycemia	No hyper-glycemia	Total
≤ 140/90	33	113	146
> 140/90	21	26	47
Total	54	139	193

P = 0.0034

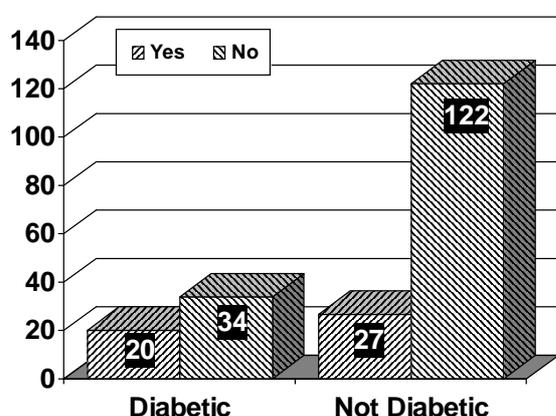**Figure 1.** Blood Pressure and Hyperglycaemia.

Figure 2. *Family history and hyperglycaemia.*

Table 7: *Family history of diabetes and Hyperglycaemic.*

Family History	Hyper-glycaemic	Not hyper-glyceamic	Total
Yes	20	27	47
No	34	112	146
Total	54	139	193

P = 0.010 (highly significant)

DISCUSSION

The present study revealed that the prevalence of hyperglycaemia among females residing in the village community is quite high i.e. 54 out of 193 (28%). Regarding underlying factors, the impact of exercise, income/capita/month, blood pressure and family history were found significant. A total of 35 (64%) hyperglycaemic females had income/capita/month Rs ≤ 800. Total of 81% had not been doing any exercise, 37 (68%) were hyperglycaemic (Chi-square = 8.09, P = 0.004). Among the hyperglycaemics 37% had positive family history of diabetes mellitus (Chi-square= 6.51) .21(39%). Among the 54 hyperglycaemics 21 were having B.P > 140/90 (Chi-square= 8.56). The study reveals that the prevalence of hyperglycaemia is more among those living below poverty line ($ one a day/capita), highlighting the fact that disease is no more restricted to the upper social class. Alarming non-significant results of BMI and hyperglycaemia is also supporting the same.

To find out the incidence of diabetes in an Australian aborigini population 8-year cohort study was carried out. Forty six cases of diabetes among 882 people, over 2,808 person-years of follow-up showing 20.3 cases/1000 person-years. The study concluded that incidence of diabetes in a lower BMI category (10.7 cases/1000 person-year) is two-five times greater than the corresponding rates for non aborigini population[11]. In 18 villages of eastern zone of Tigray, North Ethiopia, a study was carried out in 890 women having gestational age 24 weeks, the prevalence rate of gestational diabetes was found to be 3.7% (95% CI 2.5-4.9) which is very high in this part of country as compared to the other parts of Africa. It suggested a possible role of chronic malnutrition[12]. In rural community study area of Lahore, majority of the females (76%) belonged to poor families and therefore, exposed to decreased food intake which might also be the underlying cause of the hyperglycaemia. Park in his book also supports this statement that chronic malnutrition might cause damage to beta cells of pancreas leading to impaired carbohydrate tolerance[13].

This study **concludes** that the frequency of hyperglycaemia among females living in a village having low socioeconomic status and sedentary life style is quite high. This can be tackled by improving the standard of living and awareness among women through mass media regarding self care.

REFERENCES
1. Shera AS, Rafique G, Khwaja IA, Baquai S. National clinical practice guidelines 1999; 5-6
2. Park J E. Epidemiology of chronic non communicable diseases and conditions. In: text book of Preventive and Social Medicine 22nd ed. India. 2002. p. 289-90.
3. Shera AS, Rafique G, Khwaja IA, Baquai S. National clinical practice guidelines 1999; 5-6.
4. Ko GT, Chan JC, Yeung VT, Chow CC, Tsang LW. A low socio-economic status is an additional risk

factor for diabetes type –II in high risk. Hong Kong Chinese; cited on 12th May 2003 http:// www. db-pubmed /cmd /dept.

5. Balaum CS, Volpato S, Cappola AR, Chaves P, Xue QL, Guralnik JM& Fried LP. Diabetes, Hyperglycaemia and mortality in older women: the women, s health and aging study; Diabet Med. 2005 May: 22(5): 543-50.

6. Frank B. Joann E. Manson. Et.al. Diet, lifestyle and the risk factors of type 2 diabetes mellitus in women. N Eng J Med.2000; 345 (11): 790-5

7. National women's Health Information Center. American Diabetes Association Sept. 1998 202-690 www.4woman.govt

8. Canadian Medical Associiation Journal. 2000; 162: 769-72.

9. Daniel M, Rowley KG, McDermott R, et.al. Diabetes incidence in an Australian aboriginal population. An 8 year follow-up study Diabetes care. 1999. 22(12); 1993-9

10. Seyoum B, Kiros K, Hailelase T, Leole A. Prevalence of gestational diabetes mellitus in rural pregnant mothers in North Ethopia. Diabetes-res-clin-pract. 1999; 46(3): 247-51

11. Park J E. Epidemiology of chronic non communicable diseases and conditions. In: text book of Preventive and Social Medicine 22nd ed. India. 2002. p. 291.