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An Estimation of the Potential Prevalence of "Syndrome X" amongst Diabetics Using Traditional Markers

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ABSTRACT: In order to estimate the potential prevalence of "Syndrome X" in newly diagnosed cases of insulinoplethoric diabetes mellitus, patients were selected from the emergency (accident) ward, University of Benin Teaching Hospital, Benin City, Nigeria. Both risk factors (plasma lipids) and allied metabolic aberration (plasma glucose and creatinine) were assessed in 100 subjects comprising of 60 patients (30 males, 30 females) within the ages of 35 to 70 years and 40 sex and age matched healthy control subjects. Results showed significant increase in patients mean plasma glucose, tricyglycerol and total cholesterol when compared with the respective mean control values at the 5% probability level, using ANOVA. Their lipoprotein-cholesterol profile also, showed a significant difference ($P<0.05$). The available evidence suggested that male patients between the ages of 51 and 70 years have the highest percentage (77%) of developing "Syndomre X" (artherogenic diseases), a secondary clinical complication if not properly managed. @ *JASEM*

Diabetes mellitus, hitherto, is a rare metabolic disorder that arises from a defect in carbohydrate metabolism, and it is caused by either relative lack (insulinoplethoric) or absolute lack (insulinopenic) of insulin production by the beta cells of the pancreas (Bacchus, 1976). Insulinoplethoric diabetes mellitus constitutes the majority of cases observed in the developing countries, Nigeria inclusive (Dowse and Zimmet, 1989) and characterized by decreased cellular uptake of glucose (especially by the hepatocytes), weight loss, mild severity, slow or no response to insulin therapy (Onyesom and Uadia, 1997). This category of patients are therefore, clinically judged not to be in urgent need of insulin to preserve life (Glatthaar, 1988).

Lately, the genetic predisposition to this type of diabetes is proving to be very strong. Recently, it has been demonstrated that mutations of the adenosine deaminase gene (Bell, 1991) and glucokinase gene (Froguet, 1992) occurred in familial aggregation in majority but not in all cases studied.

The correlation between the severity of this disease and increased plasma lipids (especially triacyglycerol and cholesterol) has been shown to be strong and positive (WHO, 1992) but the population that mostly stands the risk of developing secondary medicobiochemical complications amongst suffers in Nigeria is yet to be documented. This study thus, attempts to investigate and possibly highlight the sex and age group of these patients that are considerably exposed to such hazards, with the hope that efficient and dynamic management strategy could be properly initiated especially when the patient at high risk is diagnosed.

MATERIALS AND METHODS

Fasting blood samples were collected from sixty diabetic patients at the Emergency (Accident) Ward, University of Benin Teaching Hospital, Benin City, Nigeria while healthy forty non-diabetic, staff members of the same institution were used as control subjects.

Five milliliters of whole blood collected from each subject were transferred into 10.0ml lithium-heparinized bottle. But 0.10ml of the blood collected was deproteinized in uranylactate, and blood glucose was determined using the deproteinized sample within 1 hour of collection. The plasma obtained from the remaining lithium-heparinized whole was transferred into bidjou bottle and stored in the freezer for analysis, which was done within 48 hours. The amount of glucose in the sample was determined using the glucose oxidase method described by Trinder, (1969). The Wu method as modified by Greenwald (1928) was used to estimate the level of creatinine in the samples. Plasma triacylglycerol was qualified according to previous method (Searcy, 1961). Determination of the plasma total cholesterol was done using the enzymatic colorimetric method of Alain, *et al* (1974). HDL-cholesterol was investigated by the method of Burstein, *et al* (1960). Plasma LDL – and VLDL – cholesterol values were mathematically estimated (Friedwald, *et al.*, 1972). The reagents were supplied in commercial test kits.

RESULTS AND DISCUSSION

The results are shown in Tables 1.0 and 2.0. The mean plasma glucose values for both sex and age groups of diabetics were found to be significantly higher ($P<0.01$) when compared with their respective control mean values. The percentage mean difference between the male diabetics above fifty years, and the matched control mean value is relatively the highest. The mean plasma triacylglycerol (TAG) and total cholesterol values

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for the diabetics were higher, and these differences were found to be statistically significant (P<0.01). This pattern of change is similar to that observed for glucose. The mean plasma creatinine levels for the diabetics were higher compared to the control, but not significant (P>0.05). These data probably suggest that the disease has degrees of severity depending on the sex and age of the patient (Table 1.0).

Table 1.0 Plasma Glucose, Creatinine, Triacylglycerol And Total Cholesterol Values In The Experimental Subjects (Mn ±SEM, N = X)

Subject	Age (yr)	Glucose (mmol/L)	Cretinine (mmol/L)	TAG (mmol/L)	Total cholesterol (mmol/L)
Male diabetics (15)	30-50	9.65±0.45	75.0±10.0	2.45±0.13↑	7.30±0.26
Male controls (10)	30-50	4.70±0.17	65.0±12.0	2.02±0.25	5.58±0.28
Male diabetics (15)	51-70	11.02±0.53↑	77.0±11.0	2.79±0.17↑	7.48±0.21↑
Male controls (10)	51-70	4.73±0.16	60.0±9.0	2.20±0.29	6.63±0.27
Female diabetics (15)	30-50	10.69±0.51↑	67.0±11.0	2.57±0.19↑	6.42±0.25
Female control (10)	30-50	4.76±0.13	55.0±12.0	2.34±0.26	5.92±0.26
Female diabetics (15)	51-70	10.96±0.46↑	66.0±11.0	2.77±0.20↑	7.59±0.21↑
Female control (10)	51-70	4.75±0.14	53.5±12.3	2.25±0.30	5.61±0.28
Normal range (for caucassians)	Adult	3.50-6.00	44.0-106.0	2.00-2.50	4.00-7.00

↑ Significantly higher (P<0.01)
TAG = Triacylglycerol
X = Number (n) of experimental subjects in parenthesis.

HDL-cholesterol concentration is lower in diabetics irrespective of age and sex, though, with varying levels, when compared with the control values, but contrary, for LDL-cholesterol mean values. Nonetheless, these differences were found to be statistically significant at the 5% probability level. (Table 2.0) Low amount of HDL- and elevated levels of LDL-cholesterol are artherogenic (Syndrome X) risk factors.

The results (Tables 1.0 and 2.0) show the mean plasma glucose, triacylglycerol, total cholesterol, LDL- and VLDL-cholesterol values for the diabetic population to be significantly higher (P<0.01) when compared with their sex and age-matched control mean values, and these observations agree with those of Onyesom and Uadia (1997). The creatinine values for the diabetics were higher, though, not significant (P>0.05). However, HDL-cholesterol mean levels for the diabetic patients were lower than their respective control values (Table 2.0) 98% and 97.2% of the male and female diabetics, respectively, had plasma glucose levels that were greater than normal. 52% of male, and 57% of the female diabetics studied were clinically judged to be obese, using the BMI (Body Mass Index). Obesity exacerbates insulin resistance, and this could cause a further decrease in cellular glucose uptake (Cramp, *et al.*, 1976). These observations suggest that glucose is rarely metabolized and this leads to the utilization of lipids, free serum amino acids and tissue proteins by the cells to generate energy needed for physical, mental and metabolic activities, and this in turn aggravates the insulin insensitivity causing lipoprotein dysfunction (Gray and Howorth, 1979).

Table 2.0 Lipoprotein-Cholesterol Levels *(Mn± SEM, n = X)

Subject	Age (yr)	HDL-Cholesterol (mmol/L)	LDL-Cholesterol (mmol/L)	VLDL-Cholesterol (mmol/L)
Male diabetics (15)	30-50	1.34±0.15	4.78±0.29	1.18±0.12
Male controls (10)	30-50	1.54±0.18	3.09±0.23	0.95±0.14
Male diabetics (15)	51-70	1.23±0.15	4.97±0.34	1.37±0.15
Male controls (10)	51-70	1.69±0.21	3.89±0.27	1.04±0.30
Female diabetics (15)	30-50	1.40±0.20	4.68±0.31	1.22±0.16
Female control (10)	30-50	1.50±0.19	3.31±0.25	1.11±0.21
Female diabetics (15)	51-70	1.37±0.18	4.75±0.29	1.32±0.16
Female control (10)	51-70	1.51±0.18	3.04±0.27	1.07±0.18
Normal range (for caucassians)	Adult	0.78-1.69	1.70-4.69	0.90-1.20

* Differences are significant (P<0.01), X = Number (n) of experimental subjects in parenthesis.

77% of the male diabetics, within 51 – 70 years, were hyperlipidaemic, and their lipoprotein cholesterol profile also, showed elevated levels of LDL- and VLDL-cholesterol, but reduced HDL-cholesterol. The significant presence of these observed "Syndrome X" markers (risk factors) in this group of patients make them highly susceptible to becoming "Syndrome X" patients. Thus, aberrant lipid metabolism occasioned by diabetic complications could be informative in this context. So, proper investigation followed by a well planned and closely monitored management (dietary therapy), plus other complement treatment strategies, should be timely initiated when new cases involving the sex and age group at high risk (male patients above 50 years) are diagnosed, to avert the future possibilities of developing cardiovascular complications.

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