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RESEARCH ARTICLE

PREVALENCE OF DIABETES MELLITUS ON MALE AND FEMALE PATIENT OF DIFFERENT AGE GROUP ON HOSPITAL BASED DATA OF CHITWAN MEDICAL COLLEGE TEACHING HOSPITAL

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ABSTRACT

Diabetes mellitus is a metabolic disorder and a major health problem of all countries. It is estimated that in 2010 there were globally 285 million people (approximately 6.4% of the adult population) suffering from this disease. This number is estimated to increase to 430 million by 2030. Information regarding the diabetes incidence of different age group and gender in the inhabitants of Chitwan is very high. Diabetic profile tests were performed using blood sugar fasting (BSF), blood sugar random (BSR), blood sugar post prandial (BSPP) and HBA_1C in the patients who visited OPD of CMCTH, a tertiary care teaching hospital in the central region of Nepal. Out of the 10,665 surveyed subjects, only 584 subjects (5.47%) between the age group 30-70, [males: 53.6% (n=313)] and [females: 46.4% (n=271)] were confirmed diagnosed of having diabetes on the basis of WHO and ADA diagnostic criteria. All the parameters of diabetic profile tests estimation in patients were significantly higher ($p<0.005$) than that of normal individuals.

Key words: Diabetes mellitus, Blood sugar and HBA_1C.

INTRODUCTION:

Diabetes mellitus is a metabolic disorder that either arrives during the early years of growth (juvenile diabetes) or later in life (maturity onset diabetes) [1]. This disorder results from a defect in insulin production, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism [2]. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels [3]. Previously, National Diabetes Data Group classified diabetes into major types according to descriptive of their clinical presentation: Non-insulin dependent diabetes mellitus (NIDDM) and Insulin dependent diabetes mellitus (IDDM). The new classification system identifies four types of diabetes mellitus: type 1, type 2, "other specific types" and gestational diabetes [4].

The pathogenesis of diabetes includes reduce insulin secretion, decrease glucose usage and increase glucose production. Diabetes is classified into: type 1 diabetes (insulin dependent diabetes mellitus or IDDM) due to islet β-cell destruction, type 2 diabetes (non insulin dependent diabetes or NIDDM) due to varying degree of insulin resistance and/or insulin secretary defects, other specific types of diabetes, and gestational diabetes (where the diabetes is diagnosed for the first time in pregnancy)[5].

Diabetes mellitus is a serious disease with significant impact on health, quality of life, and life expectancy of individuals, as well as health care system [6]. It is estimated that in 2010 there were globally 285 million people (approximately 6.4% of the adult population) suffering from this disease. This number is estimated to increase to 430 million by 2030 in the absence of better control or cure. Two main reasons for the increase of this disease are an increasing ageing population and obesity [7]. In 2011, the maximum number of people with diabetes is in the 40 to 59 age group. More than three-quarters of the 179 million people with diabetes in this age group live in low- and middle-income countries. There is little gender difference in the global number of people with diabetes for in 2011. In 2011, there are about four million more men than women with diabetes (185 million men vs. 181 million women). However, this difference is expected to decrease to two million (216 million men vs. 214 million women) by 2030. The number of people with diabetes in urban areas is 172 million while 119 million live in rural areas. By 2030, the difference is expected to widen with 314 million people living in urban areas and 143 million in rural areas [8].

The diagnostic criteria for diabetes mellitus have been modified from those previously recommended by the NDDG or WHO. There are three ways to diagnose diabetes, and each must be confirmed, on a subsequent day, by any

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one of the three methods. For example, one instance of symptoms with casual plasma glucose ≥200 mg/dl (11.1mmol/l), confirmed *on a subsequent day* by: (*1*) FPG ≥126 mg/dl, (*2*) OGTT with the 2-h post load value ≥200 mg/dl, or (*3*) symptoms with a casual plasma glucose ≥200 mg/dl, warrants the diagnosis of diabetes [9].

Substantial rise in the prevalence of type 2 diabetes in Asia in recent years has raised serious concerns about cardiovascular consequences. However, in developing countries, many of these subclinical conditions are not diagnosed until the onset of complications such as myocardial infarction or stroke [10]. Thus, in underdeveloped countries in Asia, such as Nepal, it is essential to initiate early detection of these chronic diseases, so that preventative action can minimize the consequences.

Among SAARC countries, Nepal is a leading country that has highest prevalence of prediabetes [11]. In the context of Nepal, total 23.2 million populations lived in urban areas. The percentage of diabetes dominancy in urban and rural areas is 25.9% and 3.1% respectively. According to Nepal Diabetes Association (NDA), approximately 15% of people more than 20 years and 19% of people more than 40 years of age and above are affected with diabetes in urban areas [12]. As per WHO estimation, more than 436,000 people are affected with diabetes in Nepal and expected to increase to 1,328,000 by 2030. There is significant increase in diabetes percentage from 2002 (19.04%) to 2009 (25.9%) in Nepal. The reasons behind high prevalence of DM in Nepal are low literacy rate, lack of knowledge, changing life style and lack of health care facilities [13].

Different study regarding the prevalence of diabetes mellitus has been carried out in different areas of Nepal. The purpose of this study is to outline the number of population suffering from diabetes in chitwan and its surrounding area. This study, therefore, aims to establish (a) the prevalence of diabetes mellitus in different age group, (b) male-female patients as diagnosed prior to and during the study attending the OPD of Chitwan Medical College, Chitwan, Nepal using different diabetic profile tests such as blood sugar fasting (BSF), blood sugar random (BSR), blood sugar postprandial (BSPP) and HbA_1C.

MATERIALS AND METHODS:

Study area: The study was carried out at outpatient department of Chitwan Medical College Teaching Hospital, Bharatpur, Chitwan.

Study designation: Cross sectional study was carried out to identify the prevalence of diabetes mellitus on hospital based data.

Study duration: The study was conducted for a period of 3 months starting from February 2013 to April 2013.

Inclusion criteria:

Patients of 30–70 years age group confirmed of having diabetes on the basis of above mentioned diabetic profile according to guidelines of ADA and WHO criteria were only included for experimental group as well as the patients of the same age group who were healthy included for control group.

Exclusion criteria:

Patients diagnosed for diabetes without following ADA and WHO criteria were excluded and diabetic patients having <30 and >70 years were excluded in this study.

Methods:

Venous blood samples were drawn in the morning by standard 3 ml disposable syringe, after subjects had fasted for 8-10 hours (overnight) for fasting blood glucose analysis. For random blood glucose analysis blood was drawn randomly and for postprandial blood glucose analysis, blood was collected after 2 hours following a complete meal. Blood sample was collected in the vial containing sodium fluoride and sent to the laboratory within one hour of collection, and centrifuged at 3000 RPM for 10 minutes. Then plasma samples were analyzed for blood glucose using a Human automatic analyzer HumaStar300.

Blood glucose estimation was carried out in the patient's plasma by glucose oxidase/peroxidase method using commercially supplied reagents [14]. HbA_1C estimation was carried out in the patient's blood sample by SMART HbA_1C assay [17].

Data analysis:

The statistical software SPSS (version 17) was used for data analysis. The mean values of all the parameters of diabetic profile tests were analyzed. Data were expressed as mean ± SD. Unpaired student's t-test was used for group wise comparisons and p-value of <0.05 was considered statistically significant.

RESULT AND DISCUSSION:

Out of the 10,665 surveyed subjects, only 584 subjects (5.47%) between the age group 30 - 70, [males: 53.6% (n=313)] and [females: 46.4% (n=271)] were confirmed diagnosed of having diabetes on the basis of WHO and ADA diagnostic criteria. In 2003, it was estimated that approximately 194 million people worldwide, or 5.1% in the age group 20-79, had diabetes. This estimate is expected to increase to some 333 million or 6.3% in the adult population, by 2025[15].

Among the control male subjects, the highest level of fasting blood glucose (FBG), blood sugar random (BSR) and

postprandial blood sugar (BSPP) was 127.70±4.80 mg/dl (age group 51–60), 131.50 ±4.08 mg/dl and 130.55±3.52 mg/dl (age group 61–70) while the lowest was 96.93±4.94 mg/dl, 121.87±7.99 mg/dl (age group 30–40) and 127.70±4.80 mg/dl (age group 51-60) respectively. On the other hand, in experimental male subjects, the highest FBG, BSR and BSPP was as high as 186.10±3.86 mg/dl, 268.00±5.12 mg/dl and 294.00±6.80 mg/dl (age group 61–70) while the lowest was 143.70±5.06 mg/dl, 259.00±5.06 mg/dl and 215.00±6.64 mg/dl (age group 30-40) respectively.

Similarly, in female control subjects, the highest level of fasting blood sugar (FBG), blood sugar random (BSR) and postprandial blood sugar (BSPP) was 109.85±4.73 mg/dl, 126.64±7.24 mg/dl and 109.85±4.73 mg/dl (age group 61–70) while the lowest was 100.3±3.69 mg/dl (age group 41–50), 115.32±6.46 mg/dl and 121.5±7.68 mg/dl (age group 30–40). In experimental female subjects, the highest FBG, BSR, BSPP respectively was 192.82±7.16 mg/dl, 246.78±10.72 mg/dl and 274.52±4.75 mg/dl (age group 61–70) and lowest was 139.10±4.63 mg/dl, 218±10.99 mg/dl and 257±8.70 mg/dl (age group 30–40). Prevalence of diabetes rise with the advancement of age in all populations in which age-specific data were examined. The age groups 61-70 have the greatest number of persons with diabetes in both the sexes. Data of our study showed that there is a male predominance in the incidence of diabetes. There is report that some 800,000 people are suffering from diabetes in Nepal. As shown by a study conducted by Nepal Diabetes Society (NDS), the prevalence rate for the disease is 25 % for the age-group 20 to 40 years and 33 per cent for people aged 40 years and above [16]. The HbA_1C value for the experimental male of age group 30-40, 41-50, 51-60 and 61-70 was found to be 10.68±1.14%, 9.7±1.8%, 9.87±1.58% and 8.55±1.31% respectively, while in female it was 10.27±1.57%, 11.40±0.75%, 8.6±1.31%% and 9.25±1.68. There was significant difference between the control and experimental male and female in all age groups (p=0.000). Table 3 and 4 shows the level of HbA_1C of male and female patients of different age group. The prevalence rate of HbA_1C in this study was 4.6% which is in agreement with the prevalence rates for Asian/others which was 4.2%. Alarming prevalence rate of HbA_1C observed in male and female experimental group was 9.7% and 9.9% against the control group with 6.1% and 5.9% respectively which was higher to that described as 8.7% for males and 8.1% for females that had been reported for Asians. The overall HbA_1C in this study was 9.8 % which is in accordance with the earlier published data of Aljibri and Bokhari [18].

From the observation of our present study we may conclude that there is an increasing tendency to develop diabetes mellitus in the population of chitwan and its surrounding area. Thus, it is essential to initiate an early detection of this chronic disease, so that a preventative action can be taken to minimize the consequences.

Table 1: Plasma levels of fasting, PP and random blood sugar of control and experimental male and female of different age group

Age group	Parameters	Male			Female		
		Control	Experimental	P-value	Control	Experimental	P-value
30-40	BSF (mg %)	96.93±4.94	143.70±5.06	0.000	100.7±6.68	139.10±4.63	0.000
	BSPP (mg %)	129.10±5.11	259.00±5.62	0.000	121.5±7.68	257±8.70	0.000
	BSR (mg %)	121.84±7.99	215.00±6.64	0.000	115.32±6.46	218±10.99	0.000
41-50	BSF (mg %)	104.20±5.69	153.90±6.04	0.000	100.3±3.69	147.37±7.06	0.000
	BSPP (mg %)	129.38±5.78	266.50±3.84	0.000	128.8±4.99	253.0±8.7	0.000
	BSR (mg %)	121.90±7.90	252.00±12.96	0.000	119.4±6.24	229.4±8.85	0.000
51-60	BSF (mg %)	115.00±5.77	174.47±5.60	0.000	106.4±4.0	169.8±8.9	0.000
	BSPP (mg %)	127.70±4.80	283.00±9.03	0.000	124.04±6.08	275.85±3.86	0.000
	BSR (mg %)	123.38±4.60	259.90±6.05	0.000	119.28±7.46	234.46±13.09	0.000
61-70	BSF (mg %)	113.00±2.44	186.10±3.86	0.000	109.85±4.73	192.82±7.16	0.000
	BSPP (mg %)	131.50±4.38	294.00±6.80	0.000	129.61±5.71	274.52±4.75	0.000
	BSR (mg %)	130.55±3.52	268.00±5.12	0.000	126.64±7.24	246.78±10.72	0.000

Values are expressed as mean ± SD (n= 584).

Table 2: Plasma levels of fasting, PP and random blood sugar of male versus female experimental group

Parameters	Male	Female	P- value
BSF (mg %)	164.54±18.66	162.22±23.59	0.030
BSPP (mg %)	275.62±16.26	259.70±10.04	0.034
BSR (mg %)	248.73±23.41	232.16±16.14	0.022

Values are expressed as mean ± SD (n= 584).

Table 3: HbA_1C value of control and experimental male and female patients of different age group

Age group	Parameters	Male			Female		
		Control	Experimental	P-value	Control	Experimental	P-value
30-40	HbA1C%	6.19±0.55	10.68±1.14	0.000	6.16±0.61	10.27±1.57	0.000
41-50	HbA1C%	6.03±0.69	9.7±1.8	0.000	5.57±0.67	11.40±0.75	0.000
51-60	HbA1C%	6.30±0.59	9.87±1.58	0.000	5.9±0.96	8.6±1.31	0.000
61-70	HbA1C%	5.70±0.82	8.55±1.31	0.000	6.00±0.57	9.25±1.68	0.000

Values are expressed as mean ± SD (n= 584).

Table 4: HbA_1C value of male versus female experimental group

Parameters	Male	Female	P- value
HbA_1C	9.7±1.77	9.9 ±1.36	0.00

Values are expressed as mean ± SD (n= 584).

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