Endocrinology

PROFILE OF DIABETES IN AN INDUSTRIAL HOSPITAL

Suresh K. Sinha*	Senior consultant Endocrinologist Aditya Birla Memorial Hospital, Pune *Corresponding Author
Nagarajan Raghupathy	Consultant Endocrine surgeon Aditya Birla Memorial Hospital, Pune

ABSTRACT **Aim-**To know the prevalence of obesity and status of blood sugar and lipid control in diabetics attending Endocrine clinic in an Industrial hospital.

Patients and Methods-Prospective cross-sectional, observational study comprising of 259 patients conducted during the year February 2014 to January 2016.

Results-The patient population consisting of 150 females and 109 males. Majority of the diabetics (89.18%) were middle aged(between 40-60 years). Only 6.1% of diabetics were older than 60 years. Mean age in males was 54±5.83, but in female diabetics Mean age was 50.64±6.25 years. Mean BMI was comparable in both the sexes (males-25± 3, females-24.97± 4.12). Around a quarter of male diabetics were in normal weight category, whereas 30% of females were having normal BMI. 70% of females and 74.31% of males were in overweight, obese to very obese category. Of note 33% of females fell in the category of Metabolic syndrome and only 8% of males had Metabolic syndrome. Blood sugar was well controlled in 28% females, uncontrolled in 58% whereas, 50.45% of males had good control of blood sugar. Interestingly 69.33% of female diabetics had low HDL-C and only13.76% males were having low HDL-C. One third of both males (34.86%) and females (36.66%)had LDL-C in the range of 70-100 mg/dl. 32.02% of diabetic males and 24.6% of females had triglyceride 150mg/dl. 56% females had triglyceride between 151-400 mg/dl and 44.9% of male diabetics had triglyceride between 151-400 mg/dl.

Conclusion-Obesity and metabolic syndrome is quite common in diabetics, more so in females. Over and above, with available treatment, blood sugar and lipids remain uncontrolled in majority of patients.

KEYWORDS : Metabolic syndrome, Obesity, HDL-Cholesterol, LDL-Cholesterol, Triglyceride.

1.Introduction

Type 2 Diabetes is a major public health problem. The International Diabetes Federation estimated in 2014 that 387 million people have diabetes worldwide. This has risen to 433 millions by 2015. India has 69.2 million diabetics. Given the considerable disparity in availability and affordability of diabetes care, as well as low awareness of disease, the overall outcome even among treated patients is far from ideal1. As per WHO in 2016, primary health care practitioners in low income countries do not have access to the basic technologies needed to help people with diabetes. Shashank et al2 have highlighted the current challenges and barriers to diabetes management in low and low middle income groups. Healthcare systems in these countries do not have capacity to meet the needs of people with chronic conditions such as diabetes. Mohan et al3 stated that health care system has not matured. Limited studies available on diabetes care in India indicate that 50 to 60% of diabetic patients do not achieve glycaemic target of 7%.

2.Material & Methods

A prospective and cross-sectional study was conducted to assess the prevalence of metabolic syndrome and obesity as well as to analyze the status of fasting plasma sugar, and pattern of lipid profile in diabetic patients attending the Endocrine clinic of Bokaro General Hospital attached with Bokaro Steel Plant. The study duration was two years (February 2014 to January 2016). Diabetic patients consisted of already diagnosed, treated with antidiabetic and anti dyslipidaemic medications. Diabetic patients with hypertension, CAD, or CVA and other chronic conditions were not included. History was taken and clinical examination was done in all enrolled patients. Anthropometric measurements such as Height to the nearest centimeter without shoes by stadiometer, Weight in light clothes without footwear to the nearest kilogram and Waist measurement at the level of Superior iliac crest was done. Sample for Fasting plasma sugar was collected after 8 hours of fast and for assessment of lipids was collected after 12 hours of fast.

3.Results

A total of 259 patients were included in the study. Out of which 150 were females and 109 were males. Mean age of patients was 52.44± 3.69(males :54.92± 5.83, Females:50.64± 6.25). The mean BMI of Diabetic patients was 24.98 ±3.6 (Men:25± 3, and women:24.97± 4.12). 26% of male diabetics were in normal weight category, 29% were noted to be overweight, 30% were obese and 15% of males were very obese applying the Asian Indian criteria. 31% of women had normal weight, 21% were overweight, 22% in obese category and 26% were very obese.

Table 1: Basal characteristics

Parameters	Total	Male	Female	P-value
BMI(kg/m^2)	24.98 ± 3.6	25±3	24.97±4.12	0.946
AGE	52.44±3.69	54.92±5.83	50.64±6.25	.01
FBS	155.75±76.65	140.7±56.81	166.7±86.87	.003
Cholesterol	182.57±43.85	173.48± 40.8	189.18±44.92	0.0037
LDL	51.37±33.58	107.3±29.72	111.5±31.06	0.281
HDL	39.97±8.95	40.26±9.01	39.77±8.94	0.685
TRI	178.90±78.72	162.1± 69.04	191.1±83.18	0.002
MetS(%)	41	8	33	

Table 2: Anthropometrric and Biochemical status

| parameters	Total	male	female
Normal	73(28.19%)	28(25.68%)	45(30%)
Overwt	62(23.94%)	32(26.6%)	30(14%)
Obese	118(45.73%)	49(44.95%)	69(46%)
Centralobesity	219(84.55%)	96(88.07%)	123(82%)
Normalwaist	39(15.05%)	13(11.92%)	26(17.33%)
Controlled sugar	97(37.45%)	55(50.45%)	42(28%)
Uncontrolled sugar	138(31.43%)	51(46.78%)	87(58%)
VerylowHDL-C	27.13%	15(13.76%)	55(36.66%)
LowHDL-C	89(34.36%)	40(36.69%)	49(32.66%)
NormalHDL-C	71(27.41%)	53(48.62%)	18(12%)
Normal Triglyceride	73(28.18%	36(33.07%)	37(24.66%)
HighTri	133(51.35%)	49(44.95%)	84(56%)
Very highTri	12(0.046%	02(1.8%)	10(6:6%)
NormalLDL-C	93(35.9)%	38(34.86%)	55(36.66%)
HighLDL-C	145(55.98%)	60(55.1%)	85(56.66%)

Percentage Distribution Of Weight In Diabetics(Figure-1)
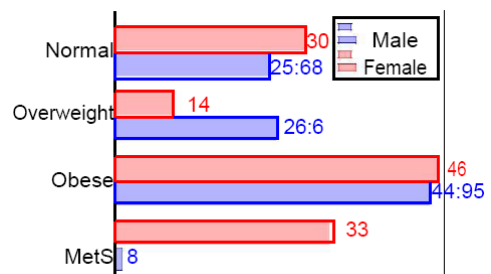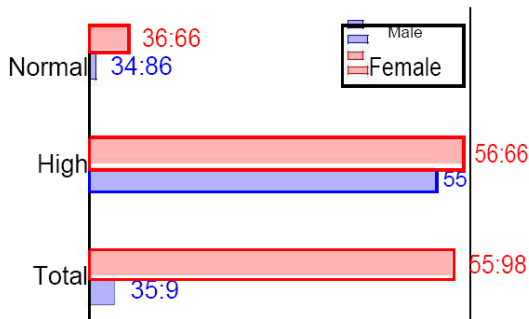
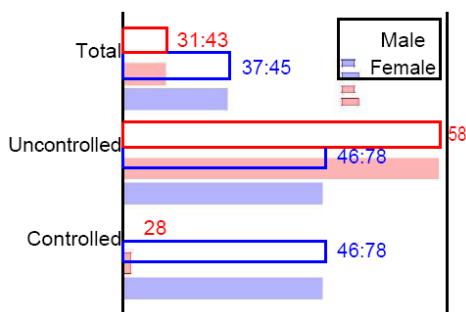**Percentage Distribution Of Triglycerides In Diabetics(Figure-2)**
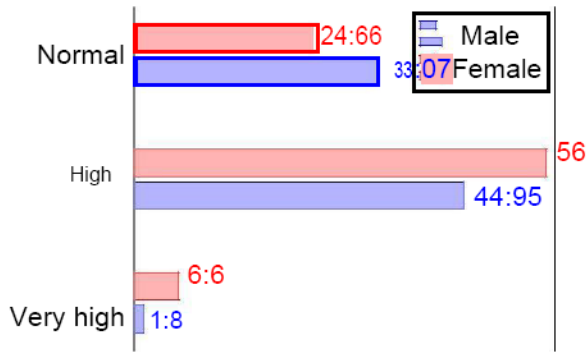
Percentage Distribution Of HDL-C In Diabetics(Figure-3)
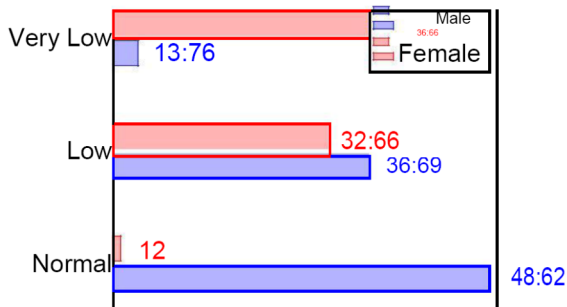
Status Of LDL-C In percent(Figure-4)

Status Of Blood Sugar Control In percent(Figure-5)

Central obesity was present in 88.07% (n=96) and absent in11.92%(n=13) of males. In women abdominal obesity was found in 82%(n=123), it was absent in 17.33%(n=26). Applying NCEP-ATP III panel criteria, Metabolic syndrome was present 33% of females, but only in 8% of males. Estimation of mean Fasting plasma sugar showed 155.75±76.65(male:140.7 ±56.81, female:166.7±86.87). serum lipids revealed mean cholesterol 182.57± 43.85 (males:173.48 ±40.8, females:189.18±44.92). Mean triglycerids was 178.9±78.72 (males:162.1±69.04, females:191.1 ±83.18). Mean serum LDL-C was 51.37± 33.58 (males:107.3±29.72, females :111.5± 31.06). Mean HDL-C was found to be 39.97± 8.95 (males:40.26±9.01, females:39.77±8.94). Refer Table (1) and Table (2) and figures (1,2,3,4,5).

4.Discussion

Microvascular complications are caused by chronic hyperglycaemia, whereas, macrovascular complications are caused by both chronic hyperglycaemia and the consequences of insulin resistance. Diabetes substantially increases risk of coronary disease, early and late post myocardial fatality rate and risk of congestive heart failure. Optimal treatment includes intensive lowering of LDL-Cholesterol and hypertension.

As regards Diabetes, majority of patients in developing countries are in age range of 45-64 years where as, in developed countries most of the people with diabetes are 65 years and above[4]. Our study showed mean age of diabetics in both male and females to be (male:54.92±5.83, female:50.64±6.25 years). According to a study conducted in south India in 2006 [1] showed average age of diabetics was found to be 45.2 ±11.3 years. One third of diabetics (35.7%)being under 44 years. Our study revealed majority (89.18%) between 40-60 years emphasizing younger age development of diabetes in Industrial population, probably due to better and uniform economic status, with all the perks, bonus, good salary, plethora of food available to population, ability to afford, leading to over nutrition, obesity and early development of diabetes [5]. Diab-Asia study showed mean age of diabetics to be 53.5± 13,which is in consonance with our study. Mohan et al(2007) attributed fast food and sedentary habits were the contributing factors leading to diabetesl.

National Health& Nutrition Examination Survey III revealed two third of men and women in USA with BMI of 27kg/m^{2} or greater. According to Indian Council of Medical Research 24.6% of diabetics were obese in Tamil-nadu,16.6% were in the obese category in the state of Maharashtra whereas, it was much lower (11.8%) in Jharkhand. We showed 28.19% of our patients being of normal weight, (male:26%, females:20.69%), 23.94 of our diabetics to be overweight (male:29%, female:14%),25.1%, were observed to be in the category of obesity (male:45%, female:32%). It is quite different from the findings of ICMR. This seems to be due to hundred percent employment, sound economic status and people of Industrial township being able to afford high calorie food, shift duty, irregular working hours, not much work for females when their spouses are away with no dearth of food.

Jennifer et al[6] reported 26% of total diabetic patients in their study had Metabolic syndrome, who were under 55 years of age. Our study revealed 41.31% of diabetic patients had Metabolic syndrome in the age range of 20-70 years (male:8%, female:33%)with females outnumbering males by about four times.

As regards control of blood sugar, DEDICAM survey[7] showed 42% of diabetics had uncontrolled blood sugar (HbA1c 9%). In various studies comprising 67,726 diabetics, 20,554 diabetics were found to be having uncontrolled blood sugar(HbA1c 9.2%) which comes to 30.8% of patients. In our study 33.59% that is one third of all diabetics (male:49.79%,female:58%) had uncontrolled i,e. who failed to meet ADA targets. Only 16.22%(male:37.61, female:28%) of patients showed good control of blood sugar.

Pandya et al found 19.3% of diabetics had their diabetes in control and 80.7% showed their blood sugar to be uncontrolled. They observed 87.7% of uncontrolled diabetics having dyslipidaemia which has been found by Shashank et al as well–2. Obesity in diabetics was reported by them to be 68.4% which is almost similar to other reports[8,9]. Mishra et al observed the prevalence of obesity more in urban than in rural population and women affected by obesity more than males[10]. They attributed the underlying cause to be excess food and sedentary lifestyle, which is corroborated by others[11]. Strong genetic association in Asian Indian phenotype and urban life style is also responsible for this modern scourge[12].

Nazia et al[13] reported mean cholesterol 181.43, mean triglyceride 161±112:5, Applying NCEP ATP III criteria they observed 59.7% of their patients had high level of LDL-Cholesterol (mean 109.37) and only 18% of the diabetics had desirable HDL-C (mean 41.79). In their comparative metabolic profile of men and women, they found men had triglyceride (185.98±179.56), HDL-C (35.8±6.3) and females had triglyceride (151.63±72.16), HDL-C(42.9±7.5). In essence their study revealed dyslipidaemia and low HDL-C among their type 2 diabetic patients.

In another study conducted in Pakistan[14] ,54% of diabetics were having

high LDL-C, and only 16% were in the category of low LDL-C .76% of their patients fell in high risk category and only 9% were in low risk category. Triglyceride was high risk in 16%, borderline in 34%, and half of their patients were in low risk category. As regards cholesterol, 18% were in borderline risk group and only 9% were in low risk category. Our study revealed that 28.19% of our diabetics i.e. about one third of all patients had achieved ADA triglyceride target of 150/dl. (male:33.03%, female:24.67%). High (>151mg/dl) triglyceride was noted in only 9.65% of our patients (male:46.79%, female:62.67%). Around two third of our females had triglyceride in high risk category. About half of our diabetics had (46.33%) had normal HDL-C. (male:85.32%, female:44.67%). Males faired better than females with respect to HDL cholesterol. This seems to be because of their better life style, hard physical work inside plant, regular medications with treatment and counseling facilities inside the plant and awareness programs which are frequently conducted. Low HDL-C was observed in 36.68% of patients (males:13.76%, females 36.68%). Normal low density lipoprotein was found in 35.91% of cases high LDL-C was noted in more than half of patients. (males: LDL-C normal 34.86%,high 55.05%;female: LDL-C normal 36.67%,high 56.67%).Both the parameters were comparatively equal in men as well as women.

5.Conclusion

Our study conducted in one of two Industrial cities in the state of Jharkhand throws light upon the prevalence of obesity and deplorably high rate of metabolic syndrome requiring a well conducted population study to reaffirm our findings and concerted effort to curb this menace. Dyslipidaemia with high triglyceride, low HDL-C, and high LDL-C especially in females urgently requires attention directed at fair sex who play a pivotal role in educating children to tide over this Indian as well as global scourge.

REFERENCES

1. Ramachandran A, Snehalatha C. Current scenario of diabetes in India. Journal of Diabetes. 1(1):18-28, Mar 2009.
2. Shashank, R Joshi and Das, AK and Vijay, VJ and Mohan V, Challenges in diabetes care in India: sheer numbers, lack of awareness and inadequate control, Journal of Association of Physicians of India, 56, (6) 443-450, 2008,
3. Mohan, Viswanathan and Shah, Siddharth, Saboo, Banshi, Current glycemic status and diabetes related complications among type 2 diabetes patients in India: data from the A1chieve study., The Journal of the Association of Physicians of India, 61,12(5), 2013.
4. Venkataraman, Kavita and Kannan, A and Mohan, Viswanathan, Challenges in diabetes management with particular reference to India, International journal of diabetes in developing countries, 29, (3) 103, 2009.
5. Mohan, V., Sandeep, S., Deepa, R., Shah, B. & Varghese, C. Epidemiology of type 2 diabetes: Indian scenario. Indian J. Med. Res. 125, 217 ,2007.
6. Jennifer L. Kuk, Diabetes Care, 33(11): 2457-2461, Nov 2010.
7. Nagpal, Jitender, Bhartia, Abhishek, Quality of Diabetes Care in the Middle-and High-Income Group Populace The Delhi Diabetes Community (DEDICOM) survey, volume 29, 2341-2348, 2006.
8. Nayak, S. B. et al. Prevalence of Diabetes, Obesity and Dyslipidaemia in Persons within High and Low Income Groups Living in North and South Trinidad. Journal of clinical diagnosis and research ,10, IC08-IC13 (2016).
9. Pandya, H., Lakhani JD, Dadhania, J. & Trivedi, A. The Prevalence and Pattern of Dyslipidemia among Type 2 Diabetic Patients at Rural Based Hospital in Gujarat, India. Indian journal of clinical practice, volume(22), 12, 2012.
10. Misra, A., Luthra, K. & Vikram, N. K. Dyslipidemia in Asian Indians: determinants and significance. Journal of Association of Physicians of India. 52, 137–42 , 2004.
11. Ramachandran, A., Snehalatha, C. & Viswanathan, V. Burden of type 2 diabetes and its complications–The Indian scenario. Current science,1471–1476, 2002.
12. Mohan, V. Why are Indians more prone to diabetes? J. Assoc. Physicians India 52, 468–74, 2004.
13. Nazia Elham, Meerjadi Sabrina Flora. Pattern of Lipid Pro le among Type 2 Diabetic Patients. Ibrahim Medical College Journal, 6 (1),12-17, 2012.
14. Bhatti SM and Dhakam S and Khan MA. Trends of lipid abnormalities in Pakistani Type-2 Diabetes Mellitus patients: A tertiary care centre data. Pakistan Journal Medical Science 2009;25(6):883-88