An observational study to evaluate risk factors for development of type II Diabetes mellitus

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Abstract: Aim: To assess risk factors for development of type II diabetes. **Materials & Methods:** 80 patients of type 2 diabetes mellitus >40 years of age were put in group 1 group 2 were healthy subjects irrespective of gender. Factors such as family history, physical activity, blood pressure, alcohol consumption and BMI was recorded. **Results:** Alcohol consumption was present in 45 in group 1 and 20 un group 2, family history was positive in 65 group 1 and 12 in group 2, sedentary life was seen in 52 group 1 and 25 in group 2, BMI was underweight seen in 14 in group 1 and 5 in group 2, normal 12 in group 1 and 46 in group 2, overweight 30 BMI was underweight seen in 14 in group 1 and 5 in group 2, normal12 in group 1 and 14 in group 2 and obese 22 and 15 46 in group 2. Blood pressure was normal seen 16 in group 1 and 42 in group 2, pre-hypertension 24 in group 1 and 26 in group 2, hypertension stage 1 in 30 in group 1 and 10 in group 2 and hypertension stage 2 seen in 10 in group 1 and 2 in group 2. A significant difference was observed (P< 0.05). **Conclusion:** Common risk factors in diabetes was overweight, hypertension, lack of physical activity and alcohol consumption.

Keywords: Alcohol consumption; Hypertension; Physical activity; Diabetes.

1. Introduction

Diabetes mellitus type 2 (DM2) is a metabolic disorder of multiple etiologies due to disturbances of carbohydrate, fat, and protein metabolism [1]. It is characterized by chronic hyperglycemia, and it is associated with cardiovascular and renal complications. These complications result in diminished quality of life and reduced life expectancy [2]. In addition, the disease places a considerable economic burden on worldwide healthcare resources [3]. The estimated number of deaths due to diabetes is similar to the combined number of deaths from several infectious diseases such as human immunodeficiency virus (HIV)/AIDS, malaria, and tuberculosis [4].

The estimated diabetes prevalence worldwide for 2010 was 285 million people corresponding to 6.4% of the world's adult population [5]. By 2030, 438 million (7.8%) people of the adult population is expected to have diabetes similarly; for India, this increase is estimated to be 87 million in 2030 [6]. Insulin helps sugar get into cells to maintain normal blood sugar (glucose) levels. It often begins after the age of 40 years, but age range can start from 20+ years [7] The prevalence of type 2 diabetes is increasing globally and represents a heavy burden on public health and socioeconomic development of all nations. Type 2 diabetes is a multifactorial disease and due to a combination of environmental and genetic risk factors (many environmental risk factors contribute to the pathogenesis of type 2 diabetes, including lifestyles such as sedentary behavior, diet, smoking and alcohol consumption, internal environmental factors such as inflammatory factors, adipocytokines and hepatocyte factors, external environmental factors such as environmental endocrine disruptors) [8].

Genetic base in type 2 DM is complex and incompletely defined. So no isolated known defect predominates, as is the case with HLA connection with type 1 DM. Type 2 DM is more common in certain ethnic and racial groups [9]. Considering this, the present study aimed at assessing risk factors for development of type II diabetes.

2. Methodology

This cross- sectional case control prospective study was conducted after obtaining permission from Ethical review and clearance committee. Inclusion criteria was 80 patients of type 2 diabetes mellitus >40 years of age and those who gave their permission to participate in this study. Exclusion criteria was type I diabetes patients and those who had not given written consent.

Patients were randomized into two groups. Group 1 were type 2 diabetes mellitus patients and group 2 were healthy subjects irrespective of gender. A 5ml venous blood was drawn and collected in a test tube for assessment of fasting blood glucose level. A value more than 126 mg/dl considered diabetics. Glycosylated blood glucose level above 6.4% was designated as diabetes. Factors such as family history, physical activity, blood pressure, alcohol consumption and BMI was recorded. Results of the present study after recording all relevant data were subjected for statistical inferences using chi- square test. The level of significance was significant if p value is below 0.05 and highly significant if it is less than 0.01.

3. Results

Group 1 had 50 males and 30 females and group 2 had 40 males and 40 females (Table 1).

Table 1. Patients distribution

Groups	Group1	Group 2
Status	Diabetes	Healthy
M:F	50:30	40:40

From Table 2 and Figure 1, we can observe that the alcohol consumption was present in 45 in group 1 and 20 un group 2, family history was positive in 65 group 1 and 12 in group 2, sedentary life was seen in 52 group 1 and 25 in group 2, BMI was underweight seen in 14 in group 1 and 5 in group 2, normal12 in group 1 and 46 in group 2, overweight 30 BMI was underweight seen in 14 in group 1 and 5 in group 2, normal12 in group 1 and 14 in group 2 and obese 22 and 15 46 in group 2. Blood pressure was normal seen 16 in group 1 and 42 in group 2, pre- hypertension 24 in group 1 and 26 in group 2, hypertension stage 1 in 30 in group 1 and 10 in group 2 and hypertension stage 2 seen in 10 in group 1 and 2 in group 2. A significant difference was observed (P< 0.05).

Table 2. Patient parameters

| Parameters	Characteristics	Group 1	Group 2	P value
Family history	Yes	65	12	<0.05
	No	15	68	
Physical activity	Sedentary life	52	25	<0.02
	Yes	28	55	
Alcohol consumption	Present	45	20	<0.03
	Absent	35	69	
BMI (Kg/m2)	Underweight	14	5	<0.01
	Normal	12	46	
	Overweight	30	14	
	Obese	22	15	
Blood pressure	Normal	16	42	<0.05
	Pre- hypertension	24	26	
	Hypertension stage 1	30	10	
	Hypertension stage 2	10	2	
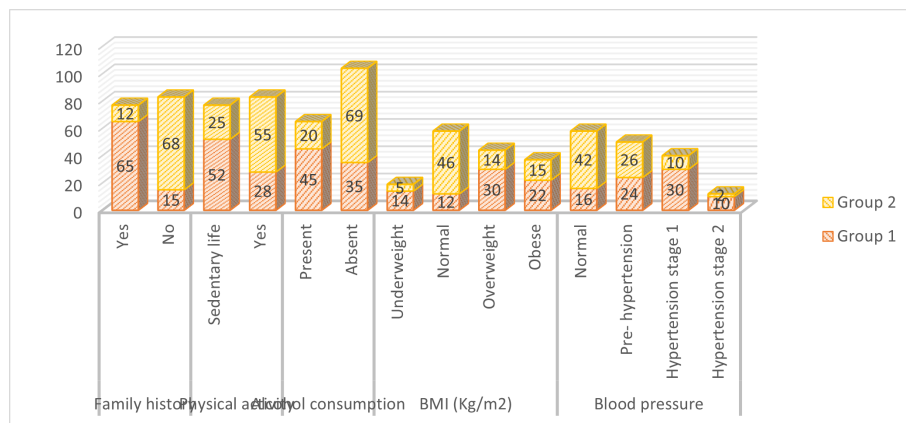
Figure 1. Patient parameters

4. Discussion

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both [10,11]. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially of eyes, kidneys, nerves, heart, and blood vessels [12]. The main forms of diabetes are divided into those caused by lack of insulin secretion, due to damage of SS-cells of the pancreas (type 1 DM), and those that are a consequence of insulin resistance that occurs at the level of skeletal muscles, liver and adipose tissue, with varying degrees of SS-cells damage (type 2 DM) [13,14]. Type II DM patients generally carry a number of risk factors for CVD, including hyperglycemia, abnormal lipid profiles, alterations in inflammatory mediators and coagulation/thrombolytic parameters, as well as other 'non-traditional' risk factors, many of which may be closely associated with insulin resistance. Therefore, successful management of CVD associated with diabetes represents a major challenge to the clinicians [15].

In present study we assessed risk factors for development of type II diabetes. Nandimath *et al.,* [16] determined the prevalent risk factors of type 2 diabetes mellitus and to estimate strength of association of these risk factors and occurrence of the disease. A total of 300 type 2 diabetes mellitus cases and 600 control subjects were included in this study. About 54.33% of cases were observed in the age group of >40-50 years. About 69.66% were male and 30.34% female cases. There was significant association between modifiable risk factors and type 2 diabetes mellitus, while nonmodifiable risk factors (age, gender) were not significantly associated.

Our study demonstrated that alcohol consumption was present in 45 in group 1 and 20 un group 2, family history was positive in 65 group 1 and 12 in group 2, sedentary life was seen in 52 group 1 and 25 in group 2, BMI was underweight seen in 14 in group 1 and 5 in group 2, normal12 in group 1 and 46 in group 2, overweight 30 BMI was underweight seen in 14 in group 1 and 5 in group 2, normal12 in group 1 and 14 in group 2 and obese 22 and 15 46 in group 2. Begic *et al.,* [17] evaluated questionnaires on the assessment of risk factors for Diabetes Mellitus type 2.

Analyzed questionnaires showed relatively low risk of getting diabetes in the next ten years in the majority of the population. These results are rather encouraging but may in some way be in confrontation with the statistics which show a rapid outburst of diabetes. Murad *et al.,* [18] determined the common risk factors of diabetes mellitus type 2 (DM2) and the demographic background of adult Saudi patients with DM2. Known diabetic patients were recruited as cases, while nondiabetic attendants were selected as controls. A pretested designed questionnaire was used to collect data from 159 cases and 128 controls. Cases were more likely than controls to be men (P < 0.0001), less educated (P < 0.0001), natives of eastern Saudi Arabia (P < 0.0001), retired (P < 0.0001), lower-salaried (P < 0.0001), or married or divorced (P < 0.0001). By univariate analysis cases were likely to be current smokers (P < 0.0001), hypertensive (P < 0.0001), or overweight/obese (P < 0.0001). Cases were also more likely to have a history of DM in a first-degree relative (P = 0.020). By multivariate analysis, cases were more likely to be older than 40 years (P < 0.0001), less educated (P = 0.05), married or divorced (P = 0.04), jobless/housewives (P < 0.0001), or current smokers (P = 0.002). They were also more likely to have salaries.

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We observed that Blood pressure was normal seen 16 in group 1 and 42 in group 2, pre- hypertension 24 in group 1 and 26 in group 2, hypertension stage 1 in 30 in group 1 and 10 in group 2 and hypertension stage 2 seen in 10 in group 1 and 2 in group 2. Rehman *et al.,* [19] estimated the proportion of people with diabesity and assess the sociodemographic, dietary, and morbidity related factors associated with diabesity. The mean (standard deviation) age of 151 study participants was 58.2 (11.8) years with 66% (n = 100), 77% (n = 116) and 40% (n = 60) being females, sedentary workers and belonging to lower socioeconomic status, respectively. Of total, 71% (n = 107) had hypertension, 66% (n = 99) had uncontrolled fasting blood sugar (FBS) level and 74% (n = 111) did not consume fruits daily. The proportion of diabesity was found to be 66.9%. After adjusting for other factors, obesity was significantly high among T2DM patients aged 50 years and less 1.4; compared to >60 years. Having uncontrolled FBS values deficient in calorie intake deficient in fruits intake and high fat consumption had significant association with diabesity.

5. Conclusion

Common risk factors in diabetes was overweight, hypertension, lack of physical activity and alcohol consumption.

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Conflicts of Interest: "The authors declare no conflict of interest."

References

[1] American Diabetes Association. (2014). Diagnosis and classification of diabetes mellitus. *Diabetes Care, 37*(Supplement 1), S81-S90.

[2] Bi, Y., Wang, T., Xu, M., Xu, Y., Li, M., Lu, J., ... & Ning, G. (2012). Advanced research on risk factors of type 2 diabetes. *Diabetes/Metabolism Research and Reviews, 28*, 32-39.

[3] Haffner, S. M. (1998). Epidemiology of type 2 diabetes: risk factors. *Diabetes Care, 21*(Supplement 3), C3-C6.

[4] Kalofoutis, C., Piperi, C., Kalofoutis, A., Harris, F., Phoenix, D., & Singh, J. (2007). Type II diabetes mellitus and cardiovascular risk factors: current therapeutic approaches. *Experimental & Clinical Cardiology, 12*(1), 17-28.

[5] Tuomilehto, J. (2009). Nonpharmacologic therapy and exercise in the prevention of type 2 diabetes. *Diabetes Care, 32*(suppl 2), S189-S193.

[6] Kumar, V., Tripathi, M. K., Chauhan, P. K., & Singh, P. K. (2013). Different non-pharmacological approaches for management of type 2 diabetes. *Journal of Diabetology, 4*(1), 6–9.

[7] Unwin, N., Whiting, D., Gan, D., Jacqmain, O., & Ghyoot, G. (Eds.). (2009). *IDF Diabetes Atlas.* International Diabetes Federation.

[8] Bener, A., Zirie, M., Daghash, M. H., Al-Hamaq, A. O. A. A., Daradkeh, G., & Rikabi, A. (2007). Lipids, lipoprotein (a) profile and HbA1c among Arabian Type 2 diabetic patients. *Biomedical Research, 18*(2), 97-102.

[9] West, N. A., Hamman, R. F., Mayer-Davis, E. J., D'Agostino, R. B., Marcovina, S. M., Liese, A. D., ... & Dabelea, D. (2009). Cardiovascular risk factors among youth with and without type 2 diabetes: differences and possible mechanisms. *Diabetes Care, 32*(1), 175-180.

[10] Wang, L., Yamaguchi, T., Yoshimine, T., Katagiri, A., Shirogane, K., & Ohashi, Y. (2002). A case-control study of risk factors for development of type 2 diabetes: emphasis on physical activity. *Journal of Epidemiology, 12*(6), 424-430.

[11] Dutt, D., Roy, G., & Chatterjee, P. (2004). Risk factor assessment for type II diabetes mellitus in a tertiary Hospital in Kolkata. *Indian Journal of Community Medicine, 29*(4), 169-170.

[12] Belmokhtar, F., Belmokhtar, R., & Charef, M. (2011). Risk factors associated with type 2 diabetes mellitus in west region of Algeria, Maghnia. *Journal of Diabetes and Metabolism, 2*(148), 2-7.

[13] Kaul, K., Tarr, J. M., Ahmad, S. I., Kohner, E. M., & Chibber, R. (2013). Introduction to diabetes mellitus. *Diabetes, 2013*, 1-11.

[14] Ramachandran, A., Das, A. K., Joshi, S. R., Yajnik, C. S., Shah, S., & Kumar, K. P. (2010). Current status of diabetes in India and need for novel therapeutic agents. *J Assoc Physicians India, 58*, 7-9.

[15] Poulton, J., Luan, J. A., Macaulay, V., Hennings, S., Mitchell, J., & Wareham, N. J. (2002). Type 2 diabetes is associated with a common mitochondrial variant: evidence from a population-based caseŰcontrol study. *Human Molecular Genetics, 11*(13), 1581-1583.

[16] Nandimath, V. A., Swamy, C. S., Nandimath, S. A., Jatti, G., & Jadhav, S. (2016). Evaluation of certain risk factors of type 2 diabetes mellitus: a case-control study. *International Journal of Medical Science and Public Health, 5*(7), 1334-1340.

[17] Begic, E., Arnautovic, A., & Masic, I. (2016). Assessment of risk factors for diabetes mellitus type 2. *Materia Socio–Medica, 28*(3), 187.

[18] Murad, M. A., Abdulmageed, S. S., Iftikhar, R., & Sagga, B. K. (2014). Assessment of the common risk factors associated with type 2 diabetes mellitus in Jeddah. *International Journal of Endocrinology, 2014*, Article ID 616145, 9 pages. https://doi.org/10.1155/2014/616145.

[19] Rehman, T., Rajaa, S., Kumar, G., & Jayalakshmy, R. (2020). Prevalence and factors influencing diabesity among persons with type 2 diabetes mellitus in urban Puducherry: A cross-sectional analytical study. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine, 45*(3), 315-319.