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A study on prevalence of maturity onset diabetes mellitus and its risk factors among urban adults of Darbhanga town, Bihar

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Abstract
Introduction: India, Diabetic capital of the world, is having the prevalence of Type 2 Diabetes Mellitus (DM2) of 2.4% in rural and - 11.6 % among urban population. As published studies of DM2 are few from Bihar and none from Darbhanga, mandating the endeavour to study the prevalence and to ascertain few risk factors of DM2 in urban population of Darbhanga.
Objectives: 1. To study the prevalence of diabetes mellitus among adults aged 20 years and above. 2. To know few risk factors associated with diabetes mellitus.
Methods: The present study was a community based cross sectional study in urban area of age group ≥ 20 yrs by Interview method using pre tested semi-structured Performa. Diabetes screening was done through blood glucose estimation in which random capillary blood glucose was determined using glucometer.
Results: The prevalence of Diabetes was 8.8 % (Males 8.46% & Female 9.10%). The prevalence of Pre- diabetes and Diabetes was highest in 61-70 yrs of age group. The association between pre- diabetes, diabetes and smoking, non vegetarian diet, positive family history was found to be statistically significant.
Conclusion: Prevalence of DM2 is on the increasing trend. National programme for prevention and control of diabetes must be implemented. BCC & IEC activities should be regularly conducted to lessen the complications. Media and NGOs should be involved to combat the problem.

Keywords: type 2 diabetes mellitus (DM2), risk factors, age, systems thinking approach

1. Introduction

India is currently experiencing a rapid epidemiological transition from communicable to non-communicable diseases viz. diabetes mellitus, hypertension and ischemic heart disease [1]. India leads the world with largest number of diabetic subjects earning the dubious distinction of being as "DIABETIC CAPITAL OF WORLD". Diabetes is leading cause of death, disability and economic loss throughout the World [2, 3]. Type 2 diabetes is the commonest form of diabetes constituting 90% of the diabetic population in any country. The global prevalence of diabetes is estimated to increase from 4% in 1995 to 5.4% by the year 2025 [4]. The countries with the largest number of diabetic subjects are, and will be, India, China and U.S. and in the former two countries diabetes occurs mostly in the age group of 45-64 yrs, in contrast with an age of >65 in the developed countries. Epidemiological studies conducted in India, showed that not only the prevalence was high in urban India but it was also increasing [5]. Rapid industrialisation and urbanisation with subsequent rise in standards of living, obesity, stress, sedentary life style, addictions etc. are posing a growing threat to the health of the nation. At present, the International Diabetes Federation (IDF) estimates that India is home to an estimated 50.8 million diabetics -- a number that will increase to 87 million -- 8.4% of the country's adult population -- by 2030. In India, a wide range of outcomes for different groups is buried within the average diabetes prevalence of 8%. Prevalence is only 0.7% for non-obese, physically active, rural Indians.

2. Aims and Objectives

1. To study the prevalence of diabetes mellitus among adults aged 20 years and above.
2. To estimate the prevalence of risk factors associated with diabetes mellitus.

3. Material and Methods

Darbhanga town has a population of 2,94,116 as per 2011 census. The town has a density of 153 persons per hectare and is divided into 48 administrative wards. Persons in age group 20 yrs and above residing in Darbhanga Municipal Corporation were the subjects of the study.

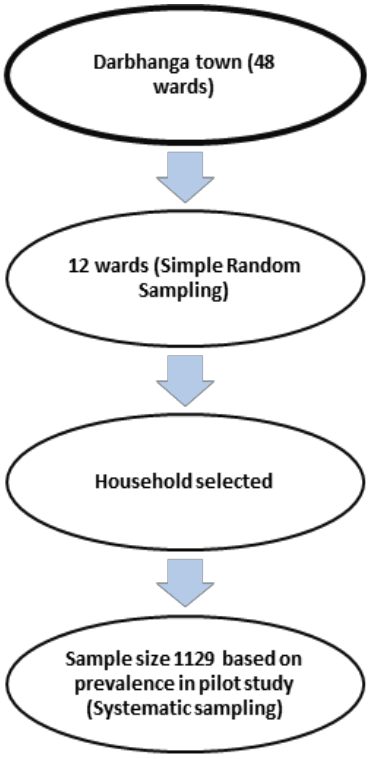

Fig 1: 2 Stage Sampling Method

Inclusion criteria

All individuals 20years of age and above irrespective of disease status were screened for diabetes mellitus.

Exclusion criteria

Pregnant women, not willing to give consent, Non co-operative subjects.

A pilot study was done in Darbhanga town, and it included 100 subjects aged 20 yrs and above, representative of all socio-economic strata. The study was conducted to obtain the proportion of adults having diabetes and pre-diabetes. It was observed that 9% & 17% of the adults in the pilot study were Diabetic & Pre-diabetic respectively. Considering the prevalence obtained in pilot study with allowable error of 20% the estimated sample size was 1011. A non-response rate of 20% required a sample size 1264. Due to lack of proper participation 145 (11.5%) subjects refrained from the study. Thus, studied Sample size was 1129.

There are 48 wards in Darbhanga town and all houses were numbered serially. In the first stage 12 wards were selected by simple random sampling. In second stage households were selected by Systematic random sampling technique. The household member in the age group of 20 yrs and above was included for the study.

The data was collected using a pretested semi structured questionnaire. Questionnaire included information regarding age, sex, education, occupation, income, diet, smoking, alcoholism, hypertension, family history. The anthropometric measurements were measured. Before collection of the data consent was taken from the study subjects after explaining the importance of the study in detail. A database was entered in M S Excel and, analysis was performed using SPSS version 18. Blood glucose estimation was based on WHO Criteria; Normal: < 140 mg/dl; Pre-diabetes- 140-199 mg/dl; Diabetes: Signs and symptoms of diabetes mellitus + RBS ≥200 mg/dl. (The results showing pre-diabetic and diabetic with Glucometer were further confirmed by performing OGTT test with post 2 hrs. collection of venous blood after intake of 75 gm of glucose. Tests were done through semi auto analyser machine).

4. Results

Of the 1129 study subjects 591 (52.3%) were males and 538(47.7%) were females. The mean ± S.D age of the male and female was 44±12.39 and 42.17±12.23 years respectively and mean ± S.D age of total study subjects was 43.12±12.35. The overall prevalence of Pre-diabetes and diabetes was found to be 17.2% and 8.8 % respectively among the total study populations. The prevalence of Pre- diabetes and Diabetes was highest in 61-70 yrs of age group i.e. 40.38% & 25% respectively and lowest in the age group 31-40 yrs for Pre-Diabetes i.e. 13.61% & 21-30 age group for Diabetes i.e.1.11%. The mean ± S.D. age of the pre-diabetic and diabetic was found to be 45.91 ± 28.83 and 45.39 ± 10.87 years respectively. The prevalence of Pre-diabetes and diabetes was 17.42% & 08.46% respectively in males and 16.91% & 09.10% in case of females.

Out of 1129 subjects maximum and minimum study subjects were from Lower middle class i.e. (40.8%) and Upper Class i.e., 29(2.6%). Pre-Diabetes and Diabetes distribution is maximum in Upper Lower i.e. 18.53% and Upper class i.e. 37.93% respectively. The present study showed that 10.6% of the study subjects are current smokers and 9.4% are ex smokers. The prevalence of diabetes mellitus and Pre-Diabetes were higher among current smokers i.e. 17.5% and 24.16%. The association between pre- diabetes, diabetes and smoking was found to be statistically significant.

70 % of study subjects were in the range of normal blood pressure, 19.1%, 8.9% & 1.4% were in the range of Pre-hypertension, Stage 1 & Stage 2. Pre-diabetes and Diabetes were more associated with hypertension stage 2 i.e. 31.25% & 37.5% respectively. Majority of the study subjects were light workers i.e.48.6%. Among heavy workers Pre-Diabetes and Diabetes were only 6.97% each whereas among light workers it was found to be 18.94% and 11.65% respectively. The present study showed that 19.3% of the total study subjects had family history of diabetes. Those with positive family history, 24.77% & 18.34 % were pre- diabetic and diabetic.

Majority of the study subjects were in the normal range of BMI i.e.56.2%. The distribution of Pre- diabetes and Diabetes was highest in obese class III group i.e. 31.57% & 36.84% respectively. Majority of the study subjects were in the normal range of WHR i.e. 82.8 %. The distribution of Pre-diabetes and Diabetes was more in Higher WHR group i.e. 25, 25% & 46.90 % respectively. The present study showed that 64 % of the total study subjects were non-vegetarian. Among Non-Vegetarian group 19.80% & 11.08% were pre- diabetic and diabetic respectively. The association of pre- diabetes & diabetes with non-vegetarian diet was found to be statistically significant.

5. Discussion

In the present study overall prevalence of pre-diabetes and

diabetes were found to be 17.2% and 8.8% respectively among the total study populations which is consistent with overall increasing trend of prevalence of pre-diabetes and diabetes both in India (Rural and Urban) and worldwide [6]. This could be attributed to increase in aging population, changing life style and change in diagnostic criteria over the years.

The proportion of Pre- diabetes and Diabetes was highest in 61-70 yrs of age group i.e. 40.38% & 25% respectively. And lowest in the age group 31-40 yrs for Pre-Diabetes i.e. 13.61 % & 21-30 age group for Diabetes i.e.1.11%. Similar to our finding a study conducted in Manipur found prevalence of diabetes in peri-urban population to be 4.0% [7].

With respect to gender the proportion of Pre-diabetics and diabetics were almost same in both sexes. Similar findings were reported by various studies in CURES study of Mohan V *et al.* [8]. The gender difference was found to be statistically not significant in the present study similar to the studies of Singh *et al*. whereas the study of Ramchandran *et al.* favours higher prevalence in woman population [4, 7].

Pre-Diabetics were maximum in Upper lower group of SES i.e. 18.53% and Diabetics were maximum in Upper class group i.e. 37.93%. The association of Pre-Diabetics & Diabetics with SES were found to be statistically significant in this study. Similar result was the found by Bhatti *et al.* and Ramachandran *et al*. but opposite was found in the study by V Connolly *et al*. [4, 9, 10].

The prevalence of diabetes mellitus and Pre-Diabetes are higher among group of current smokers i.e. 17.5% and 24.16% compared to 15.9% and 8.8% among the group of non smokers. The association between pre- diabetes & diabetes with smoking were found to be statistically significant. Similar findings were reported by Julie *et al.*, Sherman *et al*. and Solberg *et al.* [11].

Pre- diabetes and Diabetes were more associated with hypertension stage-2 i.e. 31.25% & 37.5% respectively as compared to only 14.8% and 8.9% in normotensive study group. The association of pre-diabetes, diabetes and hypertension is found to be statistically significant. In a cross-sectional study by UK Prospective Diabetes Study (UKPDS) the hypertensive patients had a higher fasting plasma triglyceride (1.94 versus 1.69 mmol/l, $P < 0.0001$) [12].

The association of pre- diabetes & diabetes with physical inactivity were found to be statistically significant in this study. Similarly in the study of Majgi *et al*. at Rural Puducherry prevalence of diabetes decreased significantly as the physical activity level increased. This significance (OR 1.4, CI 0.96-2.1) faded under multivariate analysis [13].

The distribution of Pre- diabetics and Diabetics were highest in obese class III group i.e. 31.57% & 36.84% respectively. Study showed the increasing trend of Diabetes with Obesity. Similar to this study, Pandya *et al*. showed that 68.8% of DM2 patients (78.8% of urban & 61.3% of rural) were obese by BMI parameter [14].

6. Conclusion

Prevalence of Diabetes is on the increasing trend. National programme for prevention and control of diabetes must be implemented. BCC & IEC activities should be regularly conducted to lessen the complications. Media and NGOs should be involved to combat the problem.

7. References

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