A STUDY TO IDENTIFY SOCIO-DEMOGRAPHIC AND LIFESTYLE RISK FACTORS ASSOCIATED WITH TYPE 2 DIABETES MELLITUS AND HYPERTENSION

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ABSTRACT

Introduction: Hypertension and diabetes mellitus are chronic non-communicable diseases of increasing importance. Estimating risk factors of hypertension and diabetes is very crucial as this forms the basis for planning of prevention of these disorders.

Objective: conducted to identify socio-demographic and lifestyle risk factors associated with Type 2 Diabetes Mellitus and Hypertension.

Material and method: An OPD based case-control study was conducted in RNT Medical College & attached hospitals, Udaipur from July 2014 to December 2014. Cases and controls were selected, examined and interviewed using semi- structured, pre-tested questionnaire containing questions regarding the socio demographic data and lifestyle risk factors.

Results: Maximum hypertensive cases (43.3%) were in age group 50-59 years. The prevalence of hypertension and diabetes were observed more in SES class I, individuals with positive family history and sedentary life style. Observed proportion of smokers was 34.3% in HTN cases and 38.8% in type 2 diabetes cases. Observed proportion of HTN cases was 62.5% among high salt users.

Conclusion: Continuous efforts need to be made for identifying and developing simple tools to forecast the risk of developing HTN and DM II among different age group, gender and ethnic groups.

Key Words: Hypertension, risk factors, case - control study, Diabetes Mellitus, family history

INTRODUCTION

India is experiencing a rapid health transition with a rising burden of NCDs causing significant morbidity and mortality, with considerable loss in potentially productive years (35-64) years of life.[1] Most epidemiologists accept that a set of risk factors are responsible for a major share of adult non-communicable diseases morbidity and premature mortality. A large percentage of NCDs are preventable through the changes in these factors. The influences of these risk factors and other underlying metabolic/physiological are responsible for the non-communicable diseases epidemic.[2]

There are various risk factors associated with hypertension and diabetes. Some of the known risk factors for primary hypertension and diabetes type 2 like age, heredity, and gender are non-modifiable. However, the majority of the other risk factors like tobacco use, alcohol use, unhealthy diet, physical inactivity, overweight and obesity are modifiable and can be effectively prevented.[2]

The latest WHO Statistics report 2012 reveals that world prevalence of hypertension is 29.2 % for males and 24.8 % for females.[3] Currently the number of cases of diabetes is estimated to be around 347 million worldwide; of these more than 90 per cent are type 2 Diabetes.[4]

Prevention and control of hypertension and diabetes will require modification of its risk factors and hence necessitates identifying the various risk factors associated with hypertension and diabetes in the urban and rural population of India.

Assessment of risk factors associated with hypertension and diabetes in both the urban and rural populations is very crucial as this forms the basis for planning of primary and secondary prevention of hypertension and diabetes.

Having this background, the present study was conducted to identify socio-demographic and lifestyle risk factors associated with Type 2 Diabetes Mellitus and Hypertension.

MATERIAL AND METHOD

An OPD based case-control study was conducted in RNT Medical College & attached hospitals, Udaipur from July 2014 to December 2014. Patients attending Outdoors of Endocrinology and Cardiology department of MB hospital and Urban Health Training Centre of PSM department of RNT Medical College during the study period were included as study participants. Sample sizes were calculated on the basis of a previous study by **Praso S et al (2012)**[5] for Hypertension and study conducted by **Shah et al (2009)**[6] for DM-II. A minimum sample size of 67 subjects in each group (cases and controls) was selected at a power of 80% and confidence Interval of 99% and Odds ratio 4.53 to identify risk factors for hypertension while 103 subjects in each group (cases and controls) were selected for Diabetes at the power of 80%, Confidence Interval 99% and Odds ratio 2.89.

Patients attending the OPD of Urban field practice area of RNT Medical College, Udaipur who were free from Hypertension and DM-II were included as controls. Study participants were fully explained about the purpose of the study and informed consent was taken. Selected individuals were examined and interviewed using semi- structured, pretested questionnaire containig questions regarding the socio demographic data and lifestyle risk factors like age, sex, education, occupation, income, marital status, salt intake, smoking, alcohol, regular exercise, diabetes and family history of hypertension.

Two readings of blood pressure were recorded using standard mercury sphygmomanometer in a sitting position and mean of two readings was considered for analysis. According to Seventh Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure guidelines (Chobanian et al 2003)[7] ; those with the BP of more than 140/90 mmHg or who reported to be on antihypertensive medications were classified

as hypertensive. Random Blood sugar was measured by using standardized Glucometer (Accucheck). The current WHO diagnostic criteria for diabetes[8] – fasting plasma glucose ≥ 7.0mmol/l (126mg/dl) or 2 hour plasma glucose ≥ 11.1mmol/l (200mg/dl) was used for diagnosis of Diabetes Mellitus. Modified B.G. Prasad's socio-economic status classification was adopted and modified as per All India Consumer Price Index (AICPI) for the year 2014[9].

Extra Salt intake was assessed by enquiring whether they had the habit of adding extra table salt frequently or consuming pickle, papad. Smoker was defined as 'A person who has been smoking at least a bidi or cigarette or any other form for at least six months from study period.' A non-smoker is someone who at the time survey does not smoke at all[10,11]. Physical activity was assessed based on the occupation[12] of subjects, and leisure time activity. Data were analyzed using MS Excel and epi-info7 software. Odds ratios were derived for quantitative analysis.

RESULTS

In present study, 67 cases and 67 controls were assessed for hypertension. Maximum hypertensive cases (43.3%) were in age group 50-59 years followed by 26.9% in 40-49 years age group (Table 1). For type 2 diabetes mellitus, 103 cases and 103 controls were assessed. Maximum type 2 diabetes cases (39.8%) were in age group 40-49 years followed by 21.4% in 50 years and above (Table 1).

Observed proportion of males was 52.2% in hypertension case while 54.4% in type 2 diabetes cases. Maximum (35.8%) of hypertensive cases were graduate and above, followed by 16.4% from higher secondary education. Majority (21.4%) of type 2 diabetes cases were graduate and above followed by 17.5% each from illiterate, primary and secondary education. Observed proportion of positive family history was 61.2% in hypertensive cases, whereas it was 38.8% in controls. An OR 2.487 is suggestive of a strong association of family history and hypertension. Similarly Observed proportion of positive family history was 62.1% in type 2 diabetes cases and 30.1% in controls. An OR of 3.81 is suggestive of a strong association of positive family history and type 2 diabetes (Table 2).

Maximum (31.3%) hypertensive cases were business men followed by house wives (26.9%) while maximum (21.4%) Diabetes Mellitus type 2 cases were service men followed by 20.4% House wives. The proportion of hypertension was observed more in SES class I (31.3%), followed by SES class II (26.9%), whereas in SES class III, the proportion was 22.4% (Table 3).

Table 1 - Age group wise distribution of cases and controls

Age group	Hypertension		Diabetes Mellitus	
	Cases (n=67)(%)	Control (n=67) (%)	Cases (n=103) (%)	Control (n=103) (%)
20-29 yrs.	3 (4.5)	3 (4.5)	2 (1.9)	4 (3.9)
30-39 yrs.	7 (10.4)	10 (14.9)	16 (15.5)	18 (17.5)
40-49 yrs.	18 (26.9)	19 (28.4)	41 (39.8)	34 (33.0)
50-59 yrs.	29 (43.3)	23 (34.3)	22 (21.4)	20 (19.4)
> 59 yrs.	10 (14.9)	12 (17.9)	22 (21.4)	20 (19.4)
Mean ± SD (years)	49.43 ± 10.18	38.74±11.03	48.57±10.84	40.48±10.84

Table 2: Family history in cases and controls

Family History	Hypertension		Odds Ratio (95% CI)	Diabetes Mellitus		Odds Ratio (95% CI)
	Cases (n=67)(%)	Control (n=67) (%)		Cases (n=103) (%)	Control (n=103) (%)	
Yes	41 (61.2)	26 (38.8)	2.49	64 (62.1)	31 (30.1)	3.81
No	26 (38.8)	41 (61.2)	(1.24–4.98)	39 (37.9)	72 (69.9)	(2.14 -6.80)

Table 3: Distribution of cases and controls by their socio economic status

SES Class*	Hypertension		Diabetes Mellitus	
	Cases (n=67)(%)	Control (n=67) (%)	Cases (n=103) (%)	Control (n=103) (%)
I-Upper Class	21 (31.3)	15 (22.4)	41 (39.8)	27 (26.2)
II-Upper Middle	18 (26.9)	26 (38.8)	33 (32.1)	38 (36.9)
III-Lower Middle	15 (22.4)	13 (19.4)	13 (12.6)	14 (13.6)
IV-Upper Lower	9 (13.4)	6 (9.0)	10 (9.7)	15 (14.6)
V-Lower class	4 (6.0)	7 (10.4)	6 (5.8)	9 (8.7)

*Prasad's socio-economic status classification [9]

Table 4: Dietary pattern and Physical activity wise distribution of cases and controls

Variables	Hypertension		OR (95% CI)	Diabetes Mellitus		OR (95% CI)
	Cases (n=67)(%)	Control (n=67) (%)		Cases (n=103) (%)	Control (n=103) (%)	
Physical Activity						
Sedentary	51 (76.1)	43 (64.1)	1.8 (0.8-3.8)	79 (73.8)	60 (58.2)	2.4 (1.3-4.3)
Active	16 (23.9)	24 (35.9)		24 (26.2)	43 (41.8)	
Type of Diet						
Non-vegetarian	53 (56.9)	40 (43.0)	2.5 (1.2-5.5)	47 (52.2)	43 (47.8)	1.2 (0.7-2.0)
Vegetarian	14 (34.1)	27 (65.9)		56 (48.3)	60 (51.7)	

Table 5: Smoking habit and alcohol consumption in cases and controls

Variables	Hypertension		OR (95% CI)	Diabetes Mellitus		OR (95% CI)
	Cases (n=67)(%)	Control (n=67) (%)		Cases (n=103) (%)	Control (n=103) (%)	
Smoking						
Yes	23 (34.3)	12 (17.9)	2.4 (1.1-5.4)	40 (38.8)	21 (22.3)	2.5 (1.3-4.6)
No	44 (65.7)	55 (82.1)		63 (61.2)	82 (77.7)	
Alcohol use						
Yes	17 (60.7)	11 (39.3)	1.7 (0.7-4.1)	28 (63.6)	16 (36.4)	2.0 (1.0-4.0)
No	50 (47.2)	56 (52.8)		75 (46.3)	87 (53.7)	

The proportion of DM II was observed more in SES class I (39.8%), followed by SES class II (32.1%), whereas it was 12.6% in SES class III (Table 3). 56.9% HTN cases were non-vegetarian. An OR of 2.55, (95% CI, 1.189-5.491) shows positive association of non-vegetarian with hypertension. Observed proportion of non-vegetarians was 52.2% in type2 diabetes cases, An OR of 1.171, (95% CI, 0.675 - 2.032) shows a positive association of non-vegetarians with type 2 diabetes (Table 4). Majority of the hypertensive patients (76.1%) and diabetic patients (73.8%) followed a sedentary life style. Odds ratios of 1.799 and 2.359 were suggestive of

positive association of sedentary life style with hypertension and type 2 Diabetes respectively (Table 4).

Observed proportion of smokeless tobacco users was 19.4% in HTN cases and 43.6% in type 2 diabetes cases. Observed proportion of smokers was 34.3% in HTN cases. An OR of 2.396 shows positive association of smoking with hypertension (Table 5). Observed proportion of smokers was 38.8% in type 2 diabetes cases. An OR 2.479 was suggestive of positive association of smoking with type 2 diabetes (Table 5).

Observed proportion of alcohol users were 25.4% in HTN cases. An OR 1.731, (95% CI, 0.741-4.045) was suggestive of positive association of alcohol consumption with hypertension. Observed proportion of alcohol users was 27.2% in type2 diabetes. An OR of 2.030, (95% CI, 1.021-4.037) was suggestive of a positive association of alcohol consumption with type 2 diabetes (Table 5). Observed proportion of HTN cases was 62.5% among high salt users. An OR = 1.720, (95% CI, 0.394-7.508) was suggestive of positive association of high salt intake with hypertension.

DISCUSSION

In present study, we found increasing age to be an important non-modifiable risk factor for the development of hypertension. 43.3% cases were from 50-59 years age group. A sharp increase in hypertension proportion was observed in the fourth decade. A national survey conducted by SAEED A et al (2011) among Saudi adult population found age to be significant risk factor for hypertension[13]. The proportion of hypertension was 12.9% for the age group 25 – 39 yrs which increased to 57.5% for the age group 55 – 64years. Similar results were obtained in a study conducted by Dong GH et al (2008) in rural Liaoning province, china[14].

In present study 1.9% of type 2 diabetes cases were from the 20-29 yr. age group and 39.8% cases were from 40-49 yr. age group. This finding is comparable with B. Valliyot et al (2013)[15] where age was found to be a significant contributor. In comparison with the 20-29 age group, the 40-49 age group had a 4.7-fold and 50-55 age group 5.5-fold likelihood of developing type 2 diabetes.

In our study majority of hypertension cases were from occupation such as (business, service man and housewives). All these occupations carry sedentary type of job and higher mental stress as a common factor which may be a contributory factor in the development of hypertension. Similar to our study Ghosh et al (1983)[16] at Shimla the proportion of Hypertension was found to be more among professionals, executives and traders as compared to the low occupation such as semi-skilled and un-skilled persons. Contrary to our study Malhotra SL et al (1971)[17] in a study among railway workers have not found any significant association between occupational status and hypertension.

The higher proportion of hypertension in upper class is because of their lifestyle which usually involves a sedentary type of job, higher mental stress, lack of physical activity and high proportion of obesity. Our study was comparable with a study done by Ericus C et al (1994)[18] which showed that the proportion of hypertension in highest socioeconomic group (22.5%) was more than twice that in the lowest socioeconomic group (8.8%). However a study in Mumbai done by Dalai PM et al (1980)[19] found no such difference between high and low Socio-economic groups

In present study, an OR 2.487 was suggestive of positive association of family history with hypertension. In congruence to our study Sabarinath M et al (2014)[20] found odds ratio 2.614 for family history of hypertension as a significant risk factor in comparison to candidates without family history. In our study odds 3.811 (95% CI, 2.135 -6.804) was shows that positive family history had 3.81 times more chance of getting type 2 diabetes. Our study is comparable with B.Valliyot et al (2013)[15] who found family history to be an important risk factor.

In present study, Increased risk of developing HTN was found to be associated with high salt intake with OR=1.7. In congruence to our findings Todkar SS et al (2009)[21] also found high salt intake to be a risk factor for the development of hypertension.

In present study, an OR of 1.799 is suggestive of that people living with sedentary life style have 1.8 times more chance to develop hypertension. In Study done by Blair SN et al (1984)[22] found that sedentary individuals have 20-50% increased risk of developing hypertension. In present study, an OR 2.359 shows positive association of sedentary life style with getting type 2 diabetes. In congruence to our study B. Valliyot et al (2013)[23] found that those involved in doing hard activity, the chance of getting diabetic was 89% less when compared to those doing minimal activity, which was statistically significant.

In present study, an OR =2.184 was suggestive of positive association of smokeless tobacco with getting type 2 diabetes. Our study is comparable with B.Valliyot et al (2013)[15] tobacco use appeared as a significant risk factor for the occurrence of DM. The adjusted OR was 2.49, which was statistically significant independent risk factors for the occurrence of DM.

In present study, an OR 2.479 (95% CI, 1.331-4.618) shows positive association of smoking with developing type 2 diabetes. Our study is comparable with, Kawakami et al (1997)[23] who have reported a 3.27 times higher risk of development of type 2 diabetes in those who use 16-26 cigarette per day compared to non-smokers.

In present study, An OR 1.731, indicating that alcohol users have 1.73 times more chance of developing hypertension than non-alcoholics. Our results were comparable with Sunil M Sagare et al (2011)[24] study conducted at Tasgon, Maharashtra. Which showed significant association between hy-

pertension and alcohol, Odds ratio of 1.74 revealed that there is 1.74 times more risk of developing Hypertension among alcoholics than non- alcoholics.

CONCLUSION AND RECOMMENDATIONS

Present study found smoking and alcohol consumption, physical inactivity, and positive family history as risk factors for essential hypertension and type 2 diabetes mellitus. Advocacy and Behavior Change Communication (BCC) of life style measures using mass-media should be promoted, health education should focus on restriction of smoking, alcohol intake, and restriction of dietary extra salt intake, increased physical activity. Continuous efforts need to be made for identifying and developing simple tools to forecast the risk of developing HTN and DMII among different age group, gender and ethnic groups so as to give a timely alert to individuals having known risk factor in such life style disorders.

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