

## ASSOCIATION OF TYPE 2 DIABETES WITH STRESS AND HYPERTENSION AMONG MUSLIM WOMEN: A CASE-CONTROL STUDY

NILUPHER, MEENAL DHALL, SATWANTI KAPOOR

**Abstract:** Type 2 diabetes has become a major vulnerable disease in the world which is frequently associated with hypertension. The aim of this study was to determine the association in the distribution of stress and hypertension between diabetic and non-diabetic Muslim women. Cross sectional method was used to collect data for case-control study. The data was collected from Muslim population of Manipur where 200 participants were recruited with their voluntary written consent. Various anthropometric and physiological measurements were taken using standardised protocol. The present study found that higher percentages of Muslim diabetic women were having considerably above level of stress as well as hypertension as compared to the non-diabetic women. Hence, the present study concluded that diabetes is closely associated with hypertension and stress among Muslim women in Manipur.

**Keywords:** Diabetes, hypertension, Muslim, Manipur

**Introduction:** High blood pressure is reported in over two-third of patients with type 2 diabetes mellitus, and its manifestation coincides with the development of hyperglycaemia (WHO, 2004). 98.8% of the total diabetic population in this region is contributed by India, Bangladesh and Sri Lanka (IDF, 2013). Hypertension is also a primary contributing factor to kidney failure and eye disease in people with diabetes (Brenner et al., 2001 & Lewis et al., 2001). Detecting and managing hypertension in people with diabetes is one of the most effective measures to prevent adverse events (Campbell, 2011). In the National Population Health Survey in Canada, low income and education remained significantly associated with self-reported diabetes after controlling for Body Mass Index (BMI) and physical activity in women (Tang et al., 2003). More than 2-fold increase in age-adjusted cardiovascular death rates is associated with any given value of systolic blood pressure in diabetic patients. Not only patients with diabetes are more likely to have coexistent with hypertension but also others. (Stamler et al., 1993).

It has been suggested that the higher risk of type 2 diabetes was among individuals who expose to stress (Agardh et al., 2003). Higher the levels of stress hormones may harm insulin secretion (Delaunay et al., 1997). The present study aims to find out whether stress affects the diabetic patient or not.

**Materials and methods:** A cross sectional method was used for the present study. 200 female participants were recruited from two Muslim inhabited districts of Manipur in which 100 were patients with diabetes confirmed by clinicians and 100 were non-diabetic. Both the purpose of the study and techniques to be used were explained to each participant. Only those subjects who gave written consent were included in the study. Ethical permission was taken from institutional ethical committee prior to the fieldwork. Detailed

information of the participants was collected using standardized proforma and questionnaires. Systolic and diastolic blood pressure was taken using standardized procedure (Shavers, 1988) and were categorised given by Joint National committee (JNC, 2003). Stress level of the participants was assessed by using standardized questionnaires given by Canadian Mental Health Association (Bickford, 2005). Total stress level was classified according to its range points (14-22= considerably above average, 10-13= above average, 9-0= average). Statistical analysis of all the data collected were made by using 17.0 versions of SPSS. Cross tabulations were carried out to find out the frequencies, percentages and chi-square values.

**Results:** Table 1 shows the distribution of participants at different categories of systolic blood pressure. It was revealed in this study that maximum percentages of diabetic participants were pre hypertensive (40%) and hypertensive (15%) in systolic blood pressure as compared to non-diabetic participants i.e. (10%) and (2%) respectively. Chi-square values showed statistical significance at  $p < 0.001$ . Distribution of participants at different categories of diastolic blood pressure is figured in table 2. It was again found that 8% pre hypertensive and 37% hypertensive as per systolic blood pressure were diabetic patient as compared to non-diabetic participants in which 7% pre hypertensive and 12% hypertensive and statistically significant at  $p < 0.001$ .

Table 3 indicates the distribution of participants at different level of stress. In this study, it was found that higher percentages of diabetic participants (41%) were having considerably above average level of stress as compared to the non-diabetic participants (18%). It was followed by above average level of stress i.e. 19% among diabetic and 17% among non-diabetic participants. However, maximum numbers of non-diabetic participants (31%) were having average level of stress as compared to diabetic participants

**Table 1: Distribution of participants according to different categories of systolic blood pressure**

Systolic blood pressure	Diabetic	Non-diabetic	$\chi^2$
Normal blood pressure	45	88	41.84***
Pre hypertension	40	10	
Hypertension	15	2	
Total	100	100	

\*\*\*p&lt;0.001

**Table 2: Distribution of participants according to different categories of diastolic blood pressure**

Diastolic blood pressure	Diabetic	Non-diabetic	$\chi^2$
Normal blood pressure	55	81	17.79***
Pre hypertension	8	7	
Hypertension	37	12	
Total	100	100	

\*\*\*p&lt;0.001

**Table 3: Distribution of participants according to different level of stress**

Stress level	Diabetic	Non-diabetic	$\chi^2$
Considerably above average	41	18	18.76***
Above average	19	17	
Average	27	31	
Below average	10	27	
Considerably below average	3	7	
Total	100	100	

\*\*\*p&lt;0.001

**Discussion:** The present study revealed that diabetic Muslim women in Manipur had higher percentage of pre hypertensive and hypertensive systolic and diastolic blood pressure as compared to those who were not diabetic. The possible reason for this might be due to concerns about their health issues, food habits, stress, quality of life which greatly influenced the disease. One study at California also reflected a strong association between diabetes and hypertension (Connor et al., 1981). In a prospective cohort study in United States found that the risk of developing type 2 diabetes mellitus was almost 2.5 times in subjects with hypertension as compared to the subjects with normal blood pressure (Gress et al, 2000). The UK Prospective Diabetes Study Group 46% of the women patients were hypertensive out of the total 3648 diabetic patients (HDSG, 1993).

In the present study, maximum numbers of diabetic women were found to have considerably above level of stress as compared to the non-diabetic women. This might be the result of family issues, influence of bad health, work load and so on. Some studies (Cox and Gonder-Frederick, 1992; Peyrot et al., 1999) suggested that direct or indirect negative impact of

stress on blood glucose level was through the release of stress hormones or by disrupting self-care practices. In the study conducted by Mendenhall et al (2012), it was found the relationship of diabetes with various factors such as social, cultural, psychological, etc. It further identified that social stress like childrens' future financial security, family dynamics, etc. to be a major cause of diabetes (Mendenhall et al, 2012). Another finding revealed family problems to be a major contributor of mental distress which in turn affect the health of the individuals (Chokkanathan, 2009) which may coincide with the present study

**Conclusion:** Good health is very important for every individual. The present study concluded that diabetes might be affected by stress as well as hypertension. Hence, there is an immense need for improving the health of the diabetic patients with proper management and care.

**Acknowledgements:** The authors are grateful to the participants of the two districts of Manipur for their full support in the study. N is thankful to University Grant Commission for financial assistance and SK & MD to R&D 2016 and DU DST PURSE 2015.

**Conflict of interest:** None declared

**References :**

1. Agadh EE, Grill V, Ahlbom A, Hallqvist J et al. Work stress and low sense of coherence is associated with Type 2 diabetes in middle-aged Swedish Women. *Diabetes care*. Vol: 26. (2003). pp. 719.
2. Bickford M. 2005 Stress in workplace: A General overview of the causes, the effects, and the Solutions. Canadian Mental Health Association. (2005)
3. Brenner BM, Cooper ME, de Zeeuw D, Keane WF, Mitch WE, Parving HH, et al. Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. *N Engl J Med*. Vol: 345: 12. (2001). pp. 861-869.
4. Campbell NR, Gilbert RE, Leiter LA, Larochelle P, Tobe S, Chockalingam A, et al. Hypertension in people with type 2 diabetes. Update on pharmacologic management. *Can Fam Physician*. Vol: 57: 12. (2011). pp. 997-1002.
5. Chokkanathan S. 2009. Resources, stressors and psychological distress among older adults in Chennai, India. *Social Science and Medicine*. Vol: 68. (2009). pp. 243-250.
6. Connor EB, Criqui MH, Klauber MR, Holdbrook. Diabetes and hypertension in a community of older adults. *Am J Epidemiol*. Vol: 113 : 3. (1981). pp. 276-284.
7. Cox DJ, Gonder-Frederick L. Major Developments in Diabetes Research. *Journal of Consulting and Clinical Psychology*. Vol: 60: 4. (1992). pp. 628-638.
8. Delaunay F, Khan A, Cintra A, Davani B, Ling ZC, Anderson A, Ostenson CG, Gustaffson JA, Efendics S, Okret S. Pancreatic  $\beta$  cells are important targets for the diabetogenic effects of glucocorticoids. *J Clin Invest*. Vol: 100. (1997). pp. 2094-2098.
9. Gress TW, Nieto FJ, Shahar E, Wofford MR, Branchati FL. Hypertension and antihypertensive therapy as risk factors for type 2 diabetes mellitus: Atherosclerosis risk in communities study. *N Eng J Med*. Vol: 342. (2000). pp. 905-912.
10. Hypertension in Diabetes Study Group. HDS2: Increased risk of cardio-vascular complications in hypertensive type 2 diabetic patients. *J Hypertens*. Vol: 11. (1993). pp. 319-325.
11. International Diabetes Federation. *IDF Diabetes Atlas 6th edn*. IDF: Brussels. (2013)
12. JNC. The seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure. *Journal of the American Medical Association*. Vol.289. (2003). pp. 2560-2571.
13. Lewis EJ, Hunsicker LG, Clarke WR, Berl T, Pohl MA, Lewis JB, et al. Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes. *N Engl J Med*. Vol : 345: 12.(2001). pp. 851-860.
14. Mendenhall E, Shivashankar R, Tandon N, Ali MK, Narayan K MV, Prabhakaran D. Stress and diabetes in socio-economic context: A qualitative study of urban Indians. *Social Science and Medicine*. Vol: 75. (2012). pp. 2522-2529.
15. Peyrot M, McMurry JF, Kruger DF. A Biopsychosocial Model of Glycemic Control in Diabetes Stress, Coping, and Regimen Adherence. *Journal of Health and Social Behavior*. Vol: 40: 2. (1999). pp. 141-158.
16. Shavers LG. *Essentials of exercise physiology*. Surjeet publications. (1982).
17. Stamler J, Vaccaro O, Neaton JD, Wentworth D. Diabetes, other risk factors, and 12-yr cardiovascular mortality for men screened in the Multiple Risk Factor Intervention Trial. *Diabetes Care*. Vol: 16:2. (1993). pp. 434-444.
18. Tang M, Chen Y, Krewski D. Gender-related differences in the association between socioeconomic status and self-reported diabetes. *Int J Epidemiol*. Vol: 32. (2003). pp. 381-385.
19. World Health Organization. *Obesity and overweight facts*. Geneva: World Health Organization. (2004).

\*\*\*

Nilupher  
M Phil, Meenal Dhall, PhD, Satwanti Kapoor  
Department of Anthropology  
University of Delhi  
Delhi- 110007