

Original Research Article

Prevalence and risk factor of diabetes and hypertension in northeastern and south Indian region in India: insights from large scale survey data

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ABSTRACT

Background: Hypertension and diabetes, two of the major global risks for mortality are on a rapid rise in developing nations and leading risk factors for atherosclerosis and its complications, including heart attacks and strokes. It is predicted that by 2030, India's diabetes burden will be almost 87 million people. This study aimed to estimate the prevalence and risk factor of diabetes and hypertension in northeastern and south Indian region in India.

Methods: This study utilised the fourth wave of the national family health survey (2015-16). Bivariate, multivariable logistic regression analyses were done to meet the aim of the paper.

Results: Analysis shows that the highest prevalence of prehypertension is higher in Sikkim state whereas the prevalence of hypertension men is higher in also Sikkim state. Prevalence of women is prehypertension in Sikkim state and hypertensive women is higher prevalence in Nagaland and Assam state.

Conclusions: Diabetes is developing with multi-morbidity like hypertension. Thus, there is need to provide the health education to diabetic people by public and private health care services and increase the health awareness in the society at grass root level. The main reason behind diabetes is heredity, less physical activity, higher body mass index, and increased cholesterol level in that group of south India and northeastern region. There is need that people should change their lifestyle and government should build the structure of city with health perspective.

Keywords: Diabetes, Hypertension, India, NFHS-4, Risk factors

INTRODUCTION

The global burden of non communicable disease this year there will be an estimated 56 million deaths globally, of which 60 Percent will be due to non-communicable diseases 16 million deaths will result from cardiovascular disease (CVD) especially coronary heart disease (CHD) and stroke 7 million from cancer 3.5 million from chronic respiratory disease and almost 1 million from diabetes.¹ India, non-communicable diseases

(NCDs) accounted for 40% of all hospital stays and 35% of all outpatient visits in during year 2004. Also, chronic diseases are estimated to account for 53% of all deaths and 44% of disability-adjusted life-years (DALYs) lost in 2005. The four leading chronic diseases in India, as measured by their prevalence, are in descending order: cardiovascular diseases (CVDs), diabetes mellitus, chronic obstructive pulmonary disease (COPD) and cancer.² The projected cumulative loss of national income for India due to non-communicable disease mortality for 2006–2015 is expected to be USD237 billion. By 2030,

this productivity loss is expected to double to 17.9 million years lost. In India, there is no regular system for collecting data on non-communicable diseases (NCDs)-which can be said to be of adequate coverage or quality.² Non-communicable disease continues to be an important public health problem in India, being responsible for a major proportion of mortality and morbidity.² The incidence and prevalence of type 2 diabetes are increasing it is projected that the total number of people with diabetes will rise from 171 million in 2000 to 366 million by 2030. The number of adults with hypertension is predicted to increase by 60% to a total of 1.56 billion people by 2025. Hypertension affects approximately 70% of patients with diabetes and is approximately twice as common in persons with diabetes as in those without. The prevalence of coexistent hypertension and diabetes varies across different ethnic, racial, and social groups. Importantly, hypertension in patients with diabetes causes a significant increase in the risk of vascular complications in this population, and together both conditions predispose to chronic kidney disease.

Hypertension and diabetes, two of the major global risks for mortality are on a rapid rise in developing nations. In India, as per the 2011 estimates reported by the Indian Council of Medical Research-India Diabetes study, 62.4 and 77.2 million people have diabetes and prediabetes, respectively. It is predicted that by 2030, India's diabetes burden will be almost 87 million people. Additionally, there is an increasing prevalence of hypertension in the Indian population.³ Patients with type 2 diabetes tend to develop hypertension, which is a major determinant of cardiovascular morbidity and mortality in this patient population. Many clinical studies, including the United Kingdom Prospective Diabetes Study (UKPDS), have shown that tight blood pressure control in diabetes patients significantly reduces the risks of macro vascular and micro vascular complications. Though the mechanisms underlying the intertwined relationship among diabetes, hypertension, and cardiovascular events remain to be defined, micro vascular insulin resistance and dysfunction have been implicated as a major culprit.⁴ More than 80% of patients with type 2 diabetes mellitus develop hypertension, and approx. 20% of patients with hypertension develop diabetes. This combination of cardiovascular risk factors will account for a large proportion of cardiovascular morbidity and mortality. Lowering elevated blood pressure in diabetic hypertensive individuals decreases cardiovascular events.⁵

Need of the study

High prevalence rates of diabetes, and especially hypertension, are being reported across India, where even among young adults, hypertension is common, according to the first nationally representative sample of 1.3 million adults. Hypertension and diabetes are two of the leading risk factors for atherosclerosis and its complications, including heart attacks and strokes. There is substantial overlap between diabetes and hypertension, reflecting substantial overlap in their

etiologic and disease mechanisms. India, the diabetes capital of the world with as many as 50 million people suffering from type-2 diabetes, has a challenge to face. However, medical experts feel that timely detection and right management can go a long way in helping patients to lead a normal life. Diabetes might be one of the most talked about diseases across the world and especially in India, but awareness about the same can well be estimated by the fact that India today has more people with type-2 diabetes (more than 50 million) than any other nation. With the country having the highest number of diabetic patients in the world, the sugar disease is posing an enormous health problem to our country today. According to a WHO fact sheet on diabetes, an estimated 3.4 million deaths are caused due to high blood sugar. The WHO also estimates that 80 per cent of diabetes deaths occur in low and middle-income countries and projects that such deaths will double between 2016 and 2030.⁶

METHODS

Data source

This study utilised data from the fourth round of the National Family Health Survey (2015-16), the Indian version of the Demographic and Health Survey (DHS).⁷ National Family Health Survey is a large-scale multi-round survey conducted in a nationally representative sample of households and it provides the data on Biomarker measurement such as blood pressure and blood glucose level for men and women.

Sampling design and sample size

NFHS-4 adapted a multistage stratified sampling design to select a representative sample. A stratified two stage sampling design has been adopted for the selection of the samples in rural area. In the first stage of sampling the villages (PSU) were selected using probability proportional to size (PPS) sampling while in the second stage 22 households were selected by using the systematic random sampling from selected villages (PSU). A stratified three stage sampling design has been adopted for the selection of urban samples. In the first stage of sampling the urban wards were selected using probability proportional to size (PPS) sampling while in the second stage of the sampling the census enumeration blocks (CEBs), were selected randomly from each selected ward which treats as a PSU in urban areas. In the third stage of sampling, the 22 households were selected using the systematic random sampling from selected census enumeration blocks (CEBs).

Outcome variables

Diabetes

WHO defines diabetes as follows: "Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot

effectively use the insulin it produces? Insulin is a hormone that regulates blood sugar. Hyper glycaemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels^{7,8}. Diabetes: blood glucose level >141 to 160 is considered as high blood sugar and >161 blood glucose level is considered as very high blood sugar level in NFHS 4.

Hypertension

Hypertension is defined as a systolic blood pressure (SBP) of 140 mm Hg or more, or a diastolic blood pressure (DBP) of 90 mm Hg or more or taking antihypertensive medication. Pre hypertension: Systolic 120-139 mm Hg, diastolic 80-89 mm Hg.⁹ It can lead to severe complications and increases the risk of heart disease, stroke, and death. Blood pressure is the force exerted by the blood against the walls of the blood vessels. Unmanaged hypertension can lead to a heart attack, stroke, and other problems. Hypertension: Hypertension variable is created based on systolic blood pressure (SBP >140 mm Hg) and Diastolic blood pressure (DBP >90 mm Hg) and those women taking the medicine for prevention of hypertension, that woman has considered as the hypertension.

Predictor variables

This study has used several predictor variables to understand the linkage with the outcome variables by diabetes and hypertension with background characteristics and with food and behavioural habit among both men and women that have been used as predictor variables were place of residence, religion caste, education, wealth index and in behavioural habit have included alcohol consumption, smoking cigarette tobacco shewing and in food habit eggs, fish, chicken or meat, fried food, government and private facility etc.

Statistical analysis

Data were analyzed by using latest version stata14 software. Frequencies and percentages were used for categorical data. Bivariate logistic regression and multinomial logistic regression analysis has been carried out to investigate the relationship between dependent and independent variables. Cross tabulation between diabetes and hypertension by background characteristics with food and behavioural habit. And binary logistic regression technique has been used to understand the relationship between prevalence of diabetes hypertension by background characteristics with food and behavioural habit among both men and women. And multinomial logistic regression has been used to see whether they used private or government facility for the treatment of diabetes and hypertension.

RESULTS

Prevalence of diabetes

It is observed that in North eastern region around 5.8 Percent in Mizoram state and in Southern region 6.8 percent in Kerala state has adult Diabetic Men who are suffering on High sugar in age group 15-49 respectively. In the context of very High sugar has shown around 4.7 percent in Tripura state in North eastern region and 6.2 percent in Kerala state in Southern region has suffering from very high sugar level in Men (Figure 1). It can be observed that the prevalence of diabetes is high sugar among the women age 15-49 residing in Mizoram 5 percent from the Northeast states whereas the prevalence is high sugar level among the women from Kerala 4 percent in Southern states. In the context of very high sugar has shown around 4 percent also in Tripura state in North eastern region and 5 percent in Andhra Pradesh state in Southern region has suffering from very high sugar level in women (Figure 2).

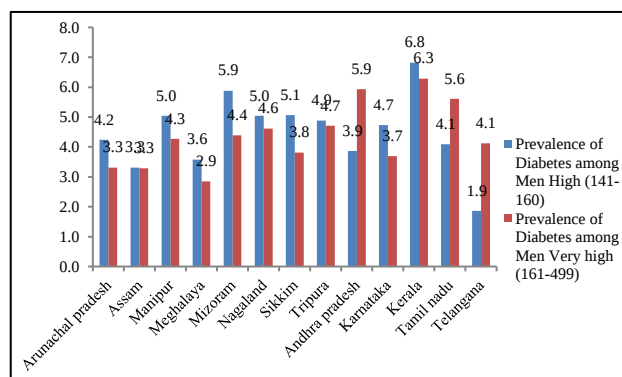


Figure 1: Prevalence of diabetes among men in northeastern and southern region aged 15-49, NFHS4 (2015-16).

Source: (NFHS-4, 2015-16) *blood glucose level, high (141-160 mg/dl) and very high (>160 mg/dl).

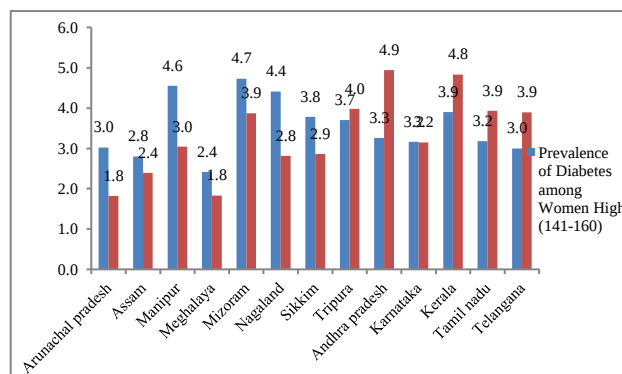


Figure 2: Prevalence of diabetes among women in northeastern and southern region aged 15-49, NFHS4 (2015-16).

Source: (NFHS-4, 2015-16) *blood glucose level, high (141-160 mg/dl) and very high (>160 mg/dl).

Table 1: Prevalence of diabetes among men and women by background characteristics in behavioural and food habit in north eastern and south Indian region, NFHS4, 2015-16.

Background characteristics	Men		Total number	Women		Total number
	High (141-160) %	Very high (161-499) %		High (141-160) %	Very high (161-499) %	
Place of residence						
Urban	4.4	5.3	8,375	3.7	4.2	56,418
Rural	4.3	3.9	16,714	3.2	2.7	1,21,305
Religion						
Hindu	4.3	4.7	15,158	3.2	3.3	1,03,263
Muslim	4.0	4.7	2,767	3.2	3.7	19,953
Christian	4.5	3.7	5,823	3.9	2.8	44,921
Others	4.8	3.9	1,341	3.6	2.3	9,586
Caste						
Schedule caste	3.8	4.7	3,522	9.9	3.2	25,166
Schedule tribe	4.4	3.3	7,830	3.7	3.4	58,081
OBC	4.4	4.8	8,883	3.3	3.8	59,729
Others	4.5	5.1	4,854	3.5	3.4	34,747
Education						
No education	4.9	4.7	2,680	4.1	3.7	35,127
Primary	4.9	4.7	3,155	3.8	3.0	22,579
Secondary	4.1	4.2	15,043	3.1	2.9	98,350
Higher	4.3	4.9	4,211	3.2	2.6	21,667
Wealth Index						
Poorest	4.9	3.1	2,680	2.8	1.7	16,565
Poorer	4.0	3.0	3,155	3.1	2.1	42,033
Middle	3.8	4.0	15,043	3.1	2.9	49,232
Richer	4.5	5.5	4,211	3.8	4.0	43,916
Richest	5.2	6.2		4.1	4.9	25,977
Behavioural habit						
Alcohol consumption						
No	4.0	4.1	14246	3.3	3.2	1,67,012
Yes	4.7	4.7	10,843	3.9	2.5	10,711
Smoking						
No	4.3	4.3	18,711	3.3	3.1	1,75,726
Yes	4.2	4.4	6,378	6.1	3.5	1,997
Tobacco chewing						
No	4.2	4.3	24,273	3.3	3.1	1,74,380
Yes	6.0	4.9	816	5.0	3.6	3,343
Food habit						
Eggs						
Never	4.2	5.1	857	3.8	4.3	11,103
Ever	4.3	4.3	24,232	3.3	3.0	1,66,620
Fish						
Never	3.5	4.0	1,342	3.2	3.5	15,724
Ever	4.3	4.4	23,747	3.4	3.1	1,61,999
Chicken or meat						
Never	3.9	5.5	1,006	3.7	4.0	12,377
Ever	4.3	4.3	24,083	3.3	3.1	1,65,346
Fried foods						
Never	5.2	5.4	2,329	3.4	3.9	10,152
Ever	4.2	4.2	22,760	3.3	3.1	1,67,571

Table 2. Prevalence of hypertension among men and women by background characteristics in behavioural and food habit in north eastern and south Indian region, NFHS 4, 2015-16.

Background characteristics	Men			Women		
	Pre-hypertension (SBP 120-139) DSP (80-89)	Hypertension (SBP 140- Max) DSP (90-Max)	Total number	Pre-hypertension (SBP 120-139) DSP (80-89)	Hypertension (SBP 140- Max) DSP (90-Max)	Total number
	%	%		%	%	
Place of residence						
Urban	45.4	20.50	7,916	32.1	12.8	53,495
Rural	46.35	17.8	15,473	34.3	12.6	1,13,189
Religion						
Hindu	45.7	19.8	14,363	32.9	12.2	97,995
Muslim	44.8	15.4	2,583	34.9	13.4	19,001
Christian	47.3	17.7	5,376	33.7	12.6	41,906
Others	48.2	26.3	1,067	39.5	17.1	7,782
Caste						
Schedule caste	42.8	19.8	3,339	30.7	11	23,859
Schedule tribe	48.2	15.4	7,090	35.5	13.9	52,974
OBC	43.9	17.7	8,420	31.9	11.5	57,050
Others	48.8	26.3	4,540	35.7	13.7	32,801
Education						
No education	44.9	21.6	2,455	38.3	18.1	32,455
Primary	48.1	20.2	2,960	37.4	15.6	21,349
Secondary	45.7	18	14,043	32.1	11	92,487
Higher	46.3	19.9	3,931	29.1	8.4	20,393
Wealth Index						
Poorest	46.9	17	1,936	37.1	13.6	15,145
Poorer	47.2	16	5,356	35.2	13.1	39,171
Middle	45.7	18	6,556	33.1	12.2	46,180
Richer	45.2	21	5,952	32.4	12.9	41,557
Richest	45.6	20	3,589	31.9	11.7	24,631
Behavioural habit						
Alcohol consumption						
No	45.1	15.7	13,274	33.2	12.2	1,57,467
Yes	47.1	22.6	10,115	41.2	20.1	9,217
Smoking						
No	45.3	18.4	17,426	33.6	12.7	1,64,736
Yes	48.1	19.5	5,963	33.4	11.7	1,948
Tobacco chewing						
No	46.07	18.5	22,669	33.6	12.7	1,63,465
Yes	45.5	23.4	720	32.9	12.3	3,219
Food habit						
Eggs						
Never	44.5	17.7	793	32.7	13.5	10,462
Ever	46.1	18.7	22,596	33.7	12.6	1,56,222
Fish						
Never	44.5	17.7	793	30.9	11	14,877
Ever	46.1	18.7	22,596	33.9	12.8	1,51,807
Chicken or meat						
Never	44.6	17.7	935	32.8	12.6	11,666
Ever	46.1	18.7	22,454	33.7	12.6	1,55,018
Fried foods						
Never	43.6	21.6	2,178	33.8	13.6	9,483
Ever	46.3	18.3	21,211	33.6	12.63	1,57,201

Source: (NFHS-4, 2015-16). Note: Pre hypertension systolic blood pressure (SBP 120-139) and diastolic blood pressure (80-89) Hypertension systolic blood pressure (SBP>140 mmHg) and diastolic blood pressure (DBP>90 mmHg).

Very high diabetes level in men has shown around 5.3 percent in Urban area and in rural 4 percent only. In the composition of education has shown that women with no education have 4.5 percent with high sugar level and in higher education level around 3.1 percent women suffering with high sugar level. And next we talk about wealth index which is shows around 3 percent in poorest and richest 4.1 percent women suffering with high sugar level and women with very high sugar level around 1.6 percent in poorest and in richest 5 percent women suffering with very high sugar level. And in other hand men with behavioural habit who have habit of drinking alcohol and smoking and chewing tobacco. The findings have shown that men with habit of tobacco chewing around 6 percent with high sugar level and men who never consume tobacco only 4 percent men suffering with high sugar level there is very less slightly difference in men with ever consume tobacco or with never consume tobacco. Next, we talk about food habit in women who ever eat eggs, fish chicken or meat and friend food and who never eat of this food so there is very slightly difference of both with high and very high sugar level (Table 1).

Prevalence of hypertension

It is observed that the prevalence of Pre hypertension among men in 15-49 age group residing in Sikkim 54 percent from the Northeast state whereas the prevalence is pre hypertension among men 46 percent in Karnataka from southern state. In Sikkim 30 percent from the northeast state have high prevalence to have hypertension whereas 19 percent in Telangana from southern state (Figure 3). It can be observed that the prevalence of pre hypertension is 47 percent in Sikkim from north eastern region whereas the prevalence is pre hypertension among women 33 percent in Karnataka from southern region. In the context of Hypertension have shown around 18 percent in Sikkim from north eastern region and 11 percent in Telangana from southern region (figure 4).

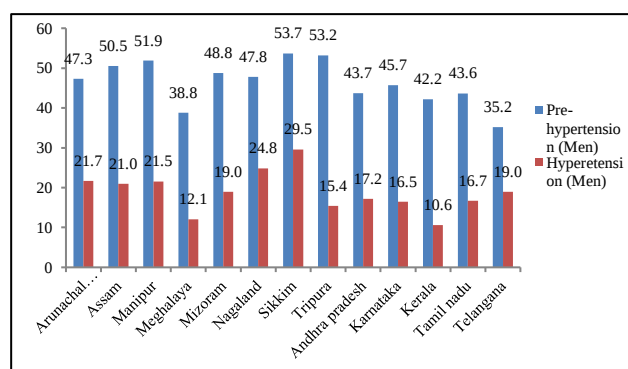


Figure 3: Prevalence of hypertension among men in northeastern and southern region aged 15-49, NFHS4 (2015-16).

Source: (NFHS-4, 2015-16). Note: Pre hypertension systolic blood pressure (SBP 120-139) and Diastolic blood pressure (80-89). Hypertension systolic blood pressure (SBP>140 mmHg) and diastolic blood pressure (DBP>90 mmHg).

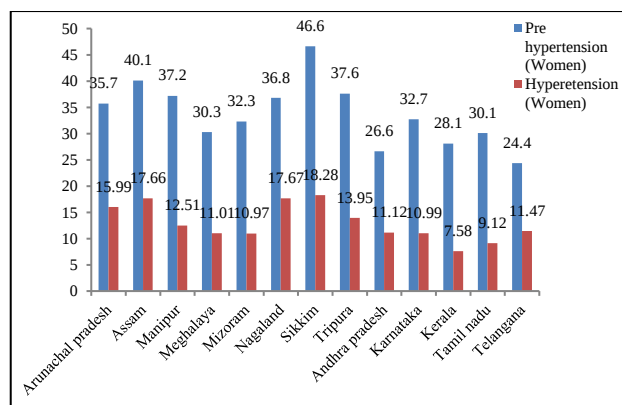


Figure 4: Prevalence of hypertension among women in northeastern and southern region aged 15-49, NFHS4 (2015-16).

Source: (NFHS-4, 2015-16). Note: Pre hypertension systolic blood pressure (SBP 120-139) and Diastolic blood pressure (80-89). Hypertension systolic blood pressure (SBP>140 mmHg) and diastolic blood pressure (DBP>90 mmHg).

It is observed that in place of residence prevalence of hypertension in men around 20.5 percent in urban area and 17.8 in rural area. The basis of wealth quintile around 16 percent hypertensive men is getting in poorer categories and 20 percent in richest categories. Next, we talk about behavioural habit among men by alcohol consumption smoking and tobacco chewing. In context of alcohol consumption men who ever consume alcohol those 23 percent men suffering with hypertension as compare those never consume alcohol have less percentage around 16 percent. In other hand in food habit there is also very slightly difference in food habit in women with eating habit like eggs, fish, chicken and meat and fried food in those women who never eat these things who have suffer with hypertension and those women who ever eat these things (Table 2).

Risk factor associated with diabetes

Table 3 shows the result of risks of diabetes among men and women in age group of 15-49 and 15-54 in India, the binary logistic regression model has been used to assess the likelihood of diabetes according to different socio-demographic and life style and eating behaviour factors. The wealth status and odds of diabetes are positively associated in both men and women, particularly higher status group have profound impact on the odds of diabetes, richer group 1.5 times more likely have diabetes than the poorer group, while 1.8 times for the richest category. Among the life style factors, smoking and use of tobacco significantly associated with diabetes prevalence, men and women using tobacco have 1.2 and 1.6 times more chances of having diabetes risks than no user group. Here, also we can see that eating fish significantly associated with diabetes than those men and women never eat fish. The result has shown that the risk of diabetes is significantly associated with cigarettes smoking among women in India (Table 3).

Table 3: Odds ratio for risk factors associated with diabetes by background characteristics among men and women aged 15-49.

Men			Women	
Risk factor variables	Odds ratio	95% CI	Odds ratio	95% CI
Place of residence				
Urban ®	1.00			
Rural	0.98	0.88-1.09	0.8***	0.84-0.92
Religion				
Hindu®	1.00			
Muslim	0.94	0.81-1.10	1.03	0.97-1.11
Christian	1.04	0.89-1.21	1.2***	1.15-1.32
Others	1.06	0.86-1.32	1	0.94-1.15
Caste				
Schedule caste®	1.00			
Schedule tribe	0.8*	0.71-1.02	0.8***	0.79-0.92
OBC	1.00	0.87-1.15	1	0.98-1.11
Others	1.11	0.94-1.30	1.10***	1.03-1.18
Education				
No education®	1.00			
Primary	0.98	0.82-1.17	0.9***	0.86-0.97
Secondary	0.7***	0.64-0.86	0.5***	0.54-0.59
Higher	0.6***	0.58-0.84	0.4***	0.39-0.45
Wealth index				
Poorest®	1.00			
Poorer	0.94	0.78-1.13	1.3***	1.22-1.45
Middle	1.13	0.94-1.36	1.6***	1.52-1.80
Richer	1.5***	1.25-1.84	2.3***	2.12-2.53
Richest	1.8***	1.46-2.24	2.9***	2.66-3.22
Behavioural habit				
Smoking				
No ®	1.00			
Yes	1.2***	1.11-1.34	1.3***	1.15-1.56
Alcohol				
No ®	1.00			
Yes	0.9***	0.84-1.05	1.0*	1.00-1.18
Tobacco				
No®	1.00			
Yes	1.3***	1.08-1.72	1.2***	1.13-1.45
Food habit				
Eat eggs				
Never eat®	1.00			
Ever used	0.90	0.68-1.21	0.7***	0.72-0.86
Eat fish				
Never eat®	1.00			
Ever used	1.5***	1.15-2.04	1.2***	1.15-1.38
Eat chicken				
Never eat®	1.00			
Ever used	0.7*	0.55-1.03	0.8***	0.77-0.94
Eat fried food				
Never eat®	1.00			
Ever used	0.7***	0.0-0.7	0.8***	0.83-0.97

® is the reference category.

Table 4: Odds ratio for risk factor associated with hypertension by background characteristics among men and women aged 15- 49 NFHS4.

Men			Women	
Hypertension	Odds Ratio	95% CI	Odds Ratio	95% CI
Place of residence				
Urban®				
Rural	0.9***	0.86-0.97	0.9**-0.95	0.95-1.00
Religion				
Hindu®				
Muslim	0.8***	0.74-0.90	1.0**	1.01-1.08
Christian	0.7***	0.71-0.86	0.9**	0.88-0.94
Others	1.2***	1.06-1.44	1.2***	1.18-1.31
Caste				
Schedule Caste®				
Schedule tribe	1.5***	1.41-1.75	1.4***	1.36-1.47
OBC	1.0**	1.00-1.19	1.0***	1.06-1.12
Others	1.4***	1.28-1.57	1.3***	1.33-1.43
Education				
No education®				
Primary	1.09	0.97-1.22	0.8***	0.83-0.89
Secondary	0.8***	0.78-0.94	0.5***	0.54-0.57
Higher	0.9	0.84-1.06	0.4***	0.41-0.45
Wealth index				
Poorest®				
Poorer	1.1	0.94-1.18	1.1***	1.06-1.15
Middle	1.1*	0.99-1.24	1.1***	1.06-1.15
Richer	1.2***	1.09-1.38	1.2***	1.17-1.27
Richest	1.2***	1.05-1.37	1.2***	1.20-1.32
Behavioural habit				
Smoking				
No®				
Yes	0.9	0.93-1.07	0.8***	0.74-0.89
Alcohol				
No®				
Yes	1.4***	1.35-1.52	1.6***	1.56-1.71
Tobacco				
No®				
Yes	1.11	0.94-1.31	0.8***	0.81-0.93
Food habit				
Eat eggs				
Never eat®				
Ever used	1.06	0.89-1.27	0.8***	0.85-0.95
Eat fish				
Never eat®				
Ever used	1.05	0.90-1.24	1.3***	1.28-1.41
Eat chicken				
Never eat®				
Ever used	0.98	0.81-1.20	0.8***	0.79-0.88
Eat fried food				
Never eat®				
Ever used	0.95	0.87-1.05	0.9**	0.91-0.99

Risk factor associated with hypertension

Table 4 shows the result of binary logistic regression on the risks of Hypertension among men and women in India. Among the different factors, social group or caste, religion, wealth index, and consumption of alcohol are significantly associated with odds of hypertension among men in 15-54 age groups in India. While looking the results according to social group, other group and schedule tribe are 1.4 and 1.5 times more likely to have hypertension than reference group that is schedule caste among men, similar results also found for women. Further, results show that wealthier quintiles groups also higher odds of 1.2 times hypertension in comparison with the poorer quintiles. The consumption of alcohol among men also positively associated with hypertension, with an odd of 1.4 among men and 1.6 among women in India. Further, among women, consumption of fish also positively associated with hypertension, having odds of 1.3 (Table 4).

DISCUSSION

The finding has been shows there is still high prevalence in north-eastern and south Indian region whereas the highest prevalence of Diabetic men and women in Andhra Pradesh and Kerala. And in other hand highest prevalence of Hypertension in Sikkim Nagaland. The reason is behind the reason is poor knowledge of causative factors for diabetes with people: highest obesity decreased physical, activity, family history of diabetes, consuming sweets and other high calorie or junk foods and mental stress. The result has exposed the Diabetes in men is higher in religion in Christian and OBC in social group and richest quintile and in women highest prevalence of Diabetes in urban, OBC, Muslim and illiterate and richest category. The overall prevalence of hypertensive in both men and women in northeast and southern region. High proportion of hypertension in men in urban and general category illiterate and richest quintile. Whereas in women in general, illiterate, poorest wealth quintile. In context of Illiterate women, the awareness of hypertension was higher among persons with higher educational status and for other the reason is the prevalence of hypertension increases with older age, high dietary salt intake and co-existent diabetes mellitus and poor socio economical background, less follow-up of blood pressure level, poor awareness about risk factor of co-morbidities and lack of accessibility of health care facilities. The awareness was low among the young men and women The popular belief that hypertension and diabetes mellitus are diseases of the elderly may be the reason for the low level of awareness among the adult men and women.¹⁰

The impact of lifestyle factor like smoking tobacco consumption and alcohol more in diabetes in both men and women than hypertension. Cigarette smoking and tobacco have more influence on the diabetes than alcohol consumption whereas alcohol consumption on

hypertension and in food habit consumption of fish strongly related with diabetes prevalence. The data on prevalence of diabetes and hypertension and treatment seeking behaviour in India is scared, therefore the present study is very important to know that treatment seeking behaviour among different background factors and kind of facility being used. The study result shows that the odds of diabetes and hypertension are not same across the different socio-demographic, lifestyle and food habits. Among the socio-demographic variables, education, wealth index is having higher impact, similarly, use of alcohol consumption and tobacco among lifestyle factors and fish consumption is profound impact on prevalence of diabetes and hypertension. The present study further provides information on the social group and religion though not the categories of social groups as well as religions have similar odds on the morbidity. The binary logistic result shows that different background factors have profound impact on women than men across the categories.

Similarly, there is also significant differential in treatment seeking behaviours men and women as well as government and private facility. Here too wealth index and education have higher impact on the treatment seeking behaviours than other factors. The higher wealth quintiles have more likely to go the private facility over government facility. The multinomial regression also shows that social groups also played an important role in choice of facility in treatment of diabetes and hypertension, in other words other group more like to go facility treat than any other groups. This study helps the policymakers in formulating the policy and programmes and will enrich the database on non-communicable diseases.

Limitation of the study

Although this study has used all the suitable factors including lifestyle and food habits factors to examine the risk factors, but it could not examine some of the factors like occupation status, expenditure on treatment and family history as information not available.

CONCLUSION

Diabetes is developing with multi-morbidity like hypertension. The reason behind this situation is that diabetic men and woman are not aware about good health care practices like consumption of food, less physical activity, irregular blood sugar examination, avoiding symptoms of co-morbidities. Less physical activity of woman due to socio-economic and religious restriction. Thus, there is need to provide the health education to diabetic people by public and private health care services and increase the health awareness in the society at grass root level. The coexistence of hypertension and diabetes increases the risk for cardiovascular disease (CVD), cerebrovascular accident (CVA), retinopathy and nephropathy. Increasing prevalence of obesity, associated

diabetes, hypertension and resulting health care costs are a serious public health concern. The main reason behind diabetes is heredity, less physical activity, higher body mass index, and increased cholesterol level in that particular group of South India and North-Eastern region. And for those people who have suffer from hypertension who have not actually aware of pre-condition of hypertension. So that is the main reason who have already reached the reached to have hypertension so those were not care about our health Thus, there is need that people should change their lifestyle and government should build the structure of city with health perspective. In South India more people are educated, it is highest in the country of India, and still there is need for health education. Health education will be useful to increase the health awareness in society and people will become more health conscious to prevent the diabetes ailments.

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