Prevalence of diabetes and Hypertension affecting life of elderly in India

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Introduction

As in many areas of the World, non-insulin dependent diabetes mellitus and hypertension have become major problems in India. In the 21st century diabetes mellitus is one of the main threats to human health and rapidly rising all over globe at an alarming rate. Diabetes, today, has become prevalent than ever before. It alters the lives of all age groups, the age group most affected being between 40-59 years. In 2010, recent estimates have shown that 285 million people live with diabetes, around the world. This corresponds to an alarming 6.4% of the world's adult population and this number is only expected to grow to 438 million by 2030. Worldwide 3.2 million diabetes-related deaths are reported annually, a number equivalent to that of HIV/AIDS-related deaths. Recent studies from the World Health Organization (WHO) show that a considerable number of diabetics originate from low and middle income countries. One in every 20 deaths is attributed to diabetes equating to 8,700 deaths per day, or 6 deaths every minute. In the age group of 35-64 years, 1 out of 10 deaths are attributed to diabetes, a ratio that increases to 1 out of 4 in certain vulnerable populations. Diabetes contributes significantly to premature adult mortality – out of all deaths of diabetic people under the age of 35, three-fourths are attributable directly to the disease.

Literature Review

Persons with diabetes who are able to manage the disease decrease the risk of complications (e.g., hypoglycemia, foot ulcers, and hypertension; U.S. Department of Health and Human Services [USDHHS], 2000). Exposure to increased levels of outdoor particulate air pollution has been consistently linked to cardiovascular morbidity and mortality, and to changes in subclinical indicators of cardiovascular function (R. D. Brook et al. 2004). Obesity is prevalent among people with diabetes and involves an increased inflammatory burden, thus lending plausibility to the idea that inflammation is involved in sensitivity to the cardiovascular effects of particles (J. Schwartz et al. 2005; S D Dubowsky 2006). Edward F. Tazeen H. Jafar (2006) et al. using National Health Survey of Pakistan (1990–1994) data and found that one in four people in Pakistan over the age of 15 years is overweight or obese. Owing to the better association of hypertension and diabetes with an even lower BMI cutoff value (less than 23 kg/meter square)

Hypertension is the most frequent cardiovascular disease and is assuming epidemic proportions in developing countries as well. It affects nearly 26.4% of the population worldwide. Prevalence of hypertension in India, for the last three decades has increased by about 30 times among urban residents and by about 10 times among rural residents. In this regard a study was conducted in an urban area namely Rishikesh of Dehradun district in between Dec. 2008 to May 2009. The purpose of this study was to know the prevalence of hypertension in Rishikesh and also to find out the associated risk factors with hypertension in this area. Hypertension (HTN) is one of the important risk factors (bad companions) for cardiovascular morbidity and mortality in diabetic subjects.

There is a strong familial predisposition to type 2 diabetes, hypertension, and cardiovascular disease.Diabetes mellitus and hypertension are common diseases that coexist at a greater frequency than chance alone would predict Hypertension in the diabetic individual markedly increases the risk and accelerates the course of cardiac disease, peripheral vascular disease, stroke, retinopathy, and nephropathy our understanding of the factors that markedly increase the frequency of hypertension in the diabetic Individual remains incomplete. Diabetic nephropathy is an important factor involved in the development of hypertension in diabetics, particularly type I patients. However, the etiology of hypertension in the majority of diabetic patients cannot be explained by underlying renal disease and remains "essential" in nature. The hallmark of hypertension in type I and type II diabetics appears to be increased peripheral vascular resistance.Diabetes and hypertension are the two faces of the same coin and they co-exist to the tune of 20–60% depending upon obesity, ethnicity and age of the person.

We continue to grapple with this apparently insurmountable barrier even to this day. Hypertension is twice as prevalent in a diabetic as compared to a non-diabetic. In type 2 diabetes, hypertension may be present at the time of diagnosis or even before the development of hyperglycaemia. While, in type 1 diabetes, hypertension develops after several years of the disease and usually reflects the development of diabetic nephropathy and ultimately affects~30% of individuals with type 1 diabetes. Hypertension in diabetic patients is associated with accelerated progression of both micro vascular (retinopathy and nephropathy) and macro vascular (atherosclerotic) complications.

Need of study

For any country the health status of the population in an important precondition that determines economics as well as social development both from the point of view of the individuals and the nation, there is a necessity for raising the health status of the population improvement of the health status of the different population groups is an important segment of the government's plans and programs. Knowledge of regional areas population groups, ages, diseases and disabilities status contribution in population health differentials can provide potential inputs for realistic policies and programms (Marry et. al, 1999). WHO predicts that developing countries will bear the brunt of this epidemic. Currently, more than 70% of people with diabetes live in low- and middle income countries. With an estimated 50.8 million people living with diabetes, India has the world's largest diabetes population, followed by China with 43.2 million. The largest age group currently affected by diabetes is between 40-59 years. By 2030 this "record" is expected to move to the 60-79 age group with some 196 million cases. Diabetes is one of the major causes of premature illness and death worldwide. Non-communicable diseases including diabetes account for 60% of all deaths worldwide.

In developing countries, less than half of people with diabetes and Hypertension are diagnosed. Without timely diagnoses and adequate treatment, complications and morbidity from diabetes rise exponentially and type 2 diabetes can remain undetected for many years and the diagnosis is

often made from associated complications or incidentally through an abnormal blood or urine glucose test. Type 2 diabetes is responsible for 85-95% of all diabetes in high-income countries and may account for an even higher percentage in low- and middle-income countries. 80% of type 2 diabetes is preventable by changing diet, increasing physical activity and improving the living environment. Yet, without effective prevention and control programmes, the incidence of diabetes is likely to continue rising globally. The financial burden borne by people with diabetes and their families as a result of their disease depends on their economic status and the social insurance policies of their countries. In the poorest countries, people with diabetes and their families bear almost the whole cost of the medical care they can afford. Besides excess healthcare expenditure, diabetes also imposes large economic burdens in the form of lost productivity and foregone economic growth. The largest economic burden is the monetary value associated with disability and loss of life as a result of the disease itself and its related complications. (IDF, Diabetes Atlas, 4th edition)

Hypertension is the most frequent cardiovascular disease and is assuming epidemic proportions in developing countries as well. The World Health Organization estimates that mortality from diabetes and heart disease cost India about $210 billion every year and is expected to increase to $335 billion in the next ten years. These estimates are based on lost productivity, resulting primarily from premature death.

Modification in lifestyle and proper medication can delay and prevent diabetes and Hypertension in high-risk groups. Eating whole grain carbohydrate exercise and avoiding excessive weight gain could eliminate over eighty per cent of Type-2 diabetes and Hypertension. (Hindustan Times New Delhi, September 03, 2007)

"In India, the poorest people with diabetes and Hypertension spend an average of 25% of their income on private care. Most of this money is used to stay alive by avoiding fatally high blood sugar levels while India spends about $2.8 billion or 1% of the total diabetes with Hypertension spending worldwide," says the atlas.

Objectives

1) To examine the trends and differentials in Diabetes and Hypertension by age, sex and socio-economic characteristic in India
2) To estimate the Diabetes and Hypertension by socio-economic and demographic factors

Data Source and Methodology:

For the present study multiple data source used. The data had been taken from the World Health Organization sponsored "Study on Global Ageing and Adult Health (SAGE-INDIA)" of 2007 used on Ageing, morbidity and health care broadly covered

Multivariate analysis in terms of logistic regression has been used in analysis.

Binary logistic regression analysis is used to find out the effect of independent variables on diabetes and treatment seeking behavior.

Logistic regression for multiple predictor variables is

$Logit(Y)=(P/(1-P))= a+b1x1+b2x2+e$

Variable used:

Diabetes will be used as dependent variables for the study

Treatment: treatment refers to respondents who received medication/treatment in the previous two weeks.

Chronic therapy: refers to respondents who received medication/treatment over the previous 12 months.

Unmet need: refers to the percentage of respondents who had not received medication/treatment in the previous 12 months, despite being diagnosed with the condition.

Independent variable:

Age: age is classified into two groups 18-49 and 50+.

Sex: male, female

Education: divided into four groups

Illiterate, primary education, secondary education and higher secondary education

Religion: Three groups, Hindu, Muslims and others

Caste: caste is divided in two groups

SC, ST and Others

Wealth quintile: five groups

Poorest, poor, middle, higher and highest

Risk factors:

Body mass Index: (WHO)

Underweight <18.4

Normal 18.4 - 24.9

Overweight 25.0 – 29.9

Obese >=30.0

Body Mass Index=Weight $(Kg)/Height^2$ (m^2)

Source: WHO, 2004

Waiste Circumference: is a key indicator of abdominal fat, waiste circumference calculated in centimeter. WHO standard to measure waiste circumference group into two parts low risk and high risk based on metabolic complications and critical limit are >= 102cm for male and >=88cm for female.

Waiste Hip Ratio (WHR): Central body obesity measured by waiste hip ratio (WHR) is calculated by dividing an individual's waiste circumference (in cm).

Waiste Hip Ratio= Waiste circumference (in cm)/Hip circumference (in cm)
Source: WHO, 2004
WHR is categories into three types's low risk, moderate risk and high risk
WHO standard waiste-hip ratios chart

Male	female	Risk level
0.95	<=0.80	Low
0.96 – 1.0	0.81 – 0.85	Moderate
1.0	0.85+	High

Co-morbidities:

Hypertension: The prevalence of hypertension is based only on self-reported diagnosis and direct measurement of blood pressure with the help of an automated recording device, and then its group into two type low risk and high risk based on WHO standard as

Systolic blood pressure >= 140 mmHg
And/or
Diastolic blood pressure >=90 mmHg

Source: WHO 2004

Sroke: prevalence of stroke is based on only on self reported diagnosis.
Chronic lung diseases: The prevalence of chronic lung diseases is based on only on self-reported diagnosis.
Angina pectoris: the prevalence of angina pectoris diseases is based only on self-reported diagnosis.
Cataracts: Self-reported diagnosis

Statistical analysis

The collected data were analyzed on STATA software version 13, The prevalence of hypertension was presented as percentage.

Result

Diabetes and Hypertension

Unlike other diseases the prevalence of hypertension is estimated only based on self-reporting, and not based on symptom. However, in SAGE blood pressure of each respondent was measured with the help of an automated recording device described in Chapter 2 on methodology. Table 1 presents state-level prevalence of hypertension, both, self-reported as well as based on direct measurement of blood pressure. A comparative assessment of self reported vs. measured hypertension is given chapter-8. The prevalence of self reported hypertension among respondents age 18-49 and 50 and above was 7

percent and 17 percent respectively. However based on the measurement of blood pressure, a much larger proportion (12 percent) of young adults age 18-49 and 26 percent of older adults age 50 and above had hypertension.

Among younger adults age 18-49, the prevalence of self-reported hypertension ranged from the lowest of 4 percent in Rajasthan to the highest of 9 percent in Uttar Pradesh. However, based on the measurement of blood pressure it was observed that the prevalence of hypertension is the lowest in Uttar Pradesh (9 percent). Except Uttar Pradesh, in remaining 5 states, at least in case of 16 percent of the respondent's age 18-49, measured blood pressure exceeded normal level. Based on the measured blood pressure, the highest level of hypertension was recorded in Maharashtra (28 percent). Among the elderly respondents age 50 and above also, the lowest prevalence of self reported hypertension was reported in Rajasthan (12 percent). The highest prevalence of self reported blood pressure was reported as 21 percent in three states of Assam, Karnataka and West Bengal. In each state among the persons age 50 and above, the measured prevalence of hypertension was much higher than the self-reported prevalence. Except in Uttar Pradesh where the measured hypertension prevalence was 22 percent, in every other state, one-thirds and more of the older adults age 50 and above had blood pressure level higher than the normal.

About two-thirds of young adults age 18-49 and three-fourths of persons age 50 and above having hypertension sought treatment in the last 12 months. However, only 6 percent and 2 percent of them respectively sought treatment currently.

Table 1 Prevalence of diabetes and Hypertension

Self-reported prevalence of diabetes, percentage on current therapy[1] and recent therapy[2] by selected background characteristics of the respondents, India (Pooled), 2007

| Background characteristic | Age 18-49 | | | | | |
	Diabetes self reported	Number	Hypertension Self Reported	Number	Diabetes with Hypertension	Number
Age group						
18-29	0.7	1,604	2.8	1,603	0.29	1,451
30-39	0.8	1,655	5.9	1,655	0.68	1,264
40-49	4.2	1,406	11.8	1,406	3.44	875
Sex						
Male	2.9	1,043	5.2	1,043	1.95	831
Female	1	3,622	8.7	3,621	0.72	2,759
Marital status						
Never married	1.6	556	2.3	555	0.43	514
Currently married	2	3,850	7.4	3,850	1.54	2,903

Widowed	0.9	222	12.3	222	1.1	145
Other[3]	0	37	2.4	37	0	28
Residence						
Urban	1.8	1,168	8.3	1,168	1	913
Rural	2	3,497	6.5	3,496	1.48	2,677
Caste						
Schedule tribe	1.8	373	6.7	373	1.91	292
Schedule caste	0.8	893	4.6	893	0.37	692
Other religion	2.3	3,399	7.6	3,398	1.6	2,578
Religion						
Hindu	1.8	3,902	6.8	3,902	1.19	3,014
Muslim	3	593	8.3	592	2.42	444
Other religion	1.5	170	4.7	170	1.68	132
Education						
No formal education	1.5	1,714	7.1	1,714	0.72	1,240
Less than primary	1	430	5.3	430	0.7	308
Primary school	2	788	6	788	1.51	620
Secondary school	2.2	741	6.4	741	1.31	578
High school	2.6	654	8.4	653	2.42	550
College and above	2.4	338	7.9	338	1.73	294
Work Status						
Working	2.42	2,093	5.55	2,091	1.49	1,598
Not working	2.2	583	8.96	583	2.6	419
Economic Status						
Lowest	1.5	959	4.5	959	1.19	728
Second	0.7	932	5.4	931	0.35	713
Middle	2.9	934	7.9	934	1.79	699
Fourth	2.9	933	7.3	933	1.93	732
Highest	1.9	907	10.2	907	1.72	718
BMI						
Underweight	1.76	1,555	5.43	1,554	1.13	1,258
Normal	1.59	2,403	5.95	2,402	1.11	1,839
Overweight	5.49	452	15.43	452	4.79	305
Obese	1.12	132	21.01	132	1.09	81
Waist Circumference						
Low risk	1.96	3,862	6.02	3,860	1.36	3,042
High risk	1.71	805	13.44	804	1.36	548
Waist Hip Ratio						
Low risk	2.38	1,188	5.24	1,188	1.5	964
Moderate risk	2.8	611	7.69	611	2.31	480
High risk	1.14	2,746	8.66	2,744	0.86	2,042
State						
Assam	0.72	517	6.8	517	0.17	390
Karnataka	1.56	630	5.8	630	1.45	461
Maharashtra	1.44	882	6.4	882	0.65	715
Rajasthan	1.1	847	4.3	846	1.05	717
Uttar Pradesh	2.67	890	8.8	890	1.58	682
West Bengal	2.4	901	6.8	899	2.48	625
Total	1.9	4,665	6.93	4,664	1.36	3,590

Note: - Prevalence of diabetes is the proportion of population affected by diabetes at a specific time.

[1]*Current therapy or currently treated refers to the persons who have taken medication in the last 2 weeks.*

[2]*Recent therapy or recently treated refers to the persons who have taken treatment in the last 12 months.*

[3] *Other includes separated/divorced/cohabiting.*

Table 2 presents the prevalence of hypertension by selected background characteristics. Prevalence of hypertension, both, self reported as well as measurement based, increases with age. The self-reported prevalence of hypertension increases from 3 percent in the age-group 18-29 to 12 percent in 40-49 and further to 23 percent in the age group 70-79. In both the age-groups of 18-49 and 50 and above, a higher proportion of females than males have reported having hypertension, though based on direct measurement of blood pressure, it was observed that males age 18-49 are more likely to have hypertension than females of the same age 18-49. The prevalence of hypertension, both, self reported as well as measurement based, was higher in urban areas than rural areas. One-fourth of urban respondents age 50 and above was diagnosed of hypertension compared to one in seven of the rural respondents. Prevalence of self-reported hypertension, especially among population age 50 and above, bears positive relationship with both education and wealth quintile. More than a fourth of the persons age 50 and above, either with college education (28 percent) or from the highest wealth quintile (28 percent) is diagnosed with hypertension. However, after measurement of blood pressure it was observed that persons from every educational category and wealth quintile are almost equally likely to be hypertensive.

At least two-thirds diagnosed with hypertension sought treatment in the past 12 months but less than 10 percent sought treatment currently. Especially among older population very small proportion sought treatment currently.

Table 2 Prevalence of diabetes and Hypertension					
Self-reported prevalence of diabetes, percentage on current therapy[1] and recent therapy[2] by selected background characteristics of the respondents, India (Pooled), 2007					
	Age 50 and above				
Background characteristic	Diabetes self reported	Number	Hypertension Self Reported	Number	Diabetes with Hypertension	Number
Age group						
50-59	7.3	2,939	15.7	2,938	9.42	1,600
60-69	6.1	2,234	16.2	2,234	12.07	964
70-79	8	1,057	22.6	1,057	19.86	369
80+	5	328	15.6	328	16.87	89
Sex						
Male	8.2	3,310	14	3,310	12	1,597
Female	5.6	3,248	20.1	3,247	11.36	1,425
Marital status						
Never married	0.5	64	10.8	64	1	32
Currently married	7.3	4,861	16.4	4,861	11.28	2,363
Widowed	6	1,591	19.3	1,590	14.61	610

Other[3]	2.1	42	13.2	42	4.35	17
Residence						
Urban	11.6	1,676	24.7	1,676	18.66	817
Rural	5	4,882	13.8	4,881	8.71	2,205
Caste						
Schedule tribe	3.3	400	11.8	400	6.46	215
Schedule caste	2	1,085	11.3	1,085	3.97	472
Other religion	8.2	5,073	18.5	5,072	13.29	2,320
Religion						
Hindu	6.9	5,530	16.8	5,530	11.94	2,561
Muslim	7.4	791	18.2	790	10.68	335
Other religion	5.4	237	17.4	237	9.79	126
Education						
No formal education	4.2	3,364	14.6	3,363	7.6	1,474
Less than primary	5.3	745	14.8	745	10.16	320
Primary school	6.8	929	15.2	929	12.87	430
Secondary school	10.6	654	20.8	654	13.43	320
High school	14	541	25.3	541	21.33	295
College and above	18.9	325	28.4	325	26.6	183
Work Status						
Working	6.74	2,650	12.16	2,649	8.18	1,439
Not working	7.54	2,064	19.45	2,064	16.59	827
Economic Status						
Lowest	2.5	1,337	7.6	1,336	4.4	586
Second	5.4	1,322	15.6	1,322	11.28	587
Middle	5.7	1,304	16.3	1,304	10.14	596
Fourth	8.9	1,307	19.3	1,307	13.11	609
Highest	13.4	1,288	28.1	1288	20.19	644
BMI						
Underweight	2.73	2,240	9.08	2,240	5.51	980
Normal	7.38	3,206	18.08	3,205	11.01	1,539
Overweight	16.63	722	35.67	722	30.22	337
Obese	16.61	204	36.24	204	33.09	99
Waist Circumference						
Low risk	5.67	5,394	13.78	5,393	9.03	2,526
High risk	12.7	1,165	31.87	1,164	25.07	496
Waist Hip Ratio						
Low risk	5.34	2,143	12.08	2,143	7.53	1,047
Moderate risk	8.97	1,338	15.94	1,338	14.92	632
High risk	6.88	2,913	20.9	2,912	13.02	1,282
State						
Assam	4.4	677	21	677	6.81	345
Karnataka	13.3	923	20.9	923	23.04	382
Maharashtra	9.3	1097	19.4	1097	11.98	636
Rajasthan	4	1377	12.2	1377	6.49	685
Uttar Pradesh	4.4	1311	13	1311	8.24	570
West Bengal	6.9	1173	20.7	1172	16.54	404
Total	6.9	6,558	16.98	6,557	11.72	3,022

Conclusion

As in many areas of the India, non-insulin dependent diabetes mellitus and hypertension have become major problems. Estimates for diabetes and Hypertension prevalence show that higher in male in comparison to female. The prevalence of diabetes and Hypertension among older population is much higher than in younger population. Education of respondent has been found a significant characteristics, further respondent occupation, caste/tribe and life style has substantial impact on diabetes and Hypertension in six states of India. Finally these findings specified that an increase education, improve health care services and improve socioeconomic conditions of households which should in turn raise diabetes and Hypertension patients survival and should decrease comorbidities due to diabetes and Hypertension in India.

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