MOST SIGNIFICANT RISK FACTORS OF HYPERTENSION: A CASE STUDY IN MUZAFFARABAD AZAD KASHMIR.

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Body

Abstract

Hypertension is considered to be significant threat for the mankind in the developing countries as well as in developed countries. The purpose of this study was to check the association among different physical risk factors of heart disease and hypertension and to find the main causes of hypertension in the patients of district Muzaffarabad a sample of156 hypertensive patients was analyzed. A close ended structured questionnaire was used to collect the information from the respondents. The questionnaires were distributed randomly to well trained staff nurses who collected the information from the respondents. The Pearson chi-square test and phi values were used to see the association of hypertension with different risk factors. Logistic regression model was performed to get the most significant risk factors of hypertension.

There were found that the existence of hypertension in the patients was due to eight major risk factors: age monthly income number of children patient's sugar level cholesterol level smoking marital status. The result showed that the only variable family history was not associated with hypertension. The data was analyzed using SPSS 13 version.

Key words: Logistic regression Odds ratios Hypertension

1. INTRODUCTION

Hypertension is the force of blood pushing against the inside walls of arteries. Blood pressure is the force of blood pushing up against the blood vessel walls. The higher the pressure the harder the heart has to pump. According to Medilexicon's medical dictionary hypertension means "High blood pressure; transitory or sustained elevation of systemic arterial blood pressure to a level likely to induce cardiovascular damage or other adverse consequences." Hypertension may be classified as essential or secondary. Essential hypertension is the high blood pressure with unknown cause genetic factors may involve in it whereas secondary hypertension is the term for high blood pressure with a known direct cause such as endocrine disorders oral contraceptives diabetes or kidney disease. It is sometimes called the silent killer because a person could have it for years without even knowing it.

It can be a very dangerous illness if not treated properly in right time in a right way. With proper diet exercise or medication hypertension is a easily manageable disease [1]. According to the report of the Seventh Joint National Committee on Hypertension it is now a major public health problem affecting 50 million individuals in the United States and and 1 billion individuals worldwide and the prevalence of HT will increase even more unless broad and effective preventive measures are implemented [2]. Epidemiological studies conducted over the past decades have shown consistent continuous and independent relations of HT to cardiovascular disease (CVD) [3-5]. Numerous cross-sectional and cohort studies have provided important and valuable information on HT prevalence and

incidence and their correlation for white black and other ethnic populations with fewer studies conducted in American Indians [6-15].

Even borderline hypertension (pre-hypertension) may cause significant rise in stroke and cardiovascular deaths. In a study comparisons of risks of HT among subgroups in each characterized group after adjusting for center age and sex. Pre-hypertensive American and Indians had 3.5 times higher risk of developing HT than normotensive subjects.

Similar assessments for BMI subgroups and other risk factors showed different risks as follows: obese versus normal 1.9 times; overweight versus normal weight 1.46; diabetic status (DM versus NFG 2.3; DM versus IFG 2.0) albuminuria (macroalbuminuria versus normal 5.0; microalbuminuria versus normal 2.1) and TGs [greater than 2.24 mmol/L versus =2.24 mmol/L (greater than 200 mg/dL versus =200 mg/dL) 1.35]. Insulin resistance [homeostasis model assessment insulin resistance=insulin(FPG0.05551)/22.5] as measured by the homeostasis model assessment also showed a significant increasing risk of HT of and1.5 times with each increasing quartile. Those with a history of current alcohol consumption a parental history of HT a parental history of DM or with higher insulin concentration had higher risk of HT than those without these factors [16].

Systemic blood pressure rises with age and the incidence of cardiovascular disease (particularly stroke and coronary artery disease) is closely related to average blood pressure at all ages [17].

The cardiovascular risks associated with a given blood pressure are depended upon the combination of risk factors in the specific individual. These include age family history weight physical inactivity gender smoking cholesterol diabetes and pre-existing vascular disease. The risk factors such as hypertension and diabetes in the South African population were the most important determinants of mortality [18].

Therefore the present study was conducted to highlight the most significant risk factors of hypertension through bivariate and multivariate statistical analysis of the data. This study may also raised the awareness among people of Azad Jammu and Kashmir Muzaffarabad about risk factors and gravity of hypertension.

2. MATERIAL AND METHODS

A cross sectional descriptive as well as inferential study was conducted. A sample of 156 hypertensive patients was collected on from the time period July 2010 to September

2010 from Abbas Institute of Medical Sciences (AIMS) and Combined Military Hospital Muzaffarabad (CMH). A close ended structured questionnaire was used to collect the information from the respondents. The questionnaires were distributed randomly to well trained staff nurses who collected the information from the respondents The data recorded for the variables: age of the patient monthly income number of children sugar level cholesterol level smoking marital status and family history.

Bivariate analysis of categorical variables was done by the Pearson chi-square test. The phi-values were calculated to determine the type of association i.e. positive or negative association. Through logistic regression analysis odds ratios and 95% CI was also calculated for categorical variables. The hypertension is taken as dichotomous dependent variable.. The Wald's test statistic was used to test the significance of the individual coefficient

of each risk factor. All statistical analysis was performed by using SPSS.

RESULTS

Table 1: Basic information about hypertension

Classification of blood pressure measurements according to JNC-7

Category	Systolic blood pressure	Diastolic blood pressure
Optimal	less than 120	less than 80
Normal	less than 130	less than 85

Pre-hypertension	130-139	85-89
Hypertension	140-159	90-99
Stage-I (mild)		
Stage-II (moderate)	160-179	100-109
Stage-III (severe)	greater than 180	greater than 110

Table 2: Characteristics of cases and controls

	Controls	Cases	Total
AGE OF THE RESPONDENT			
20-40 years	30	12	42
41-60 years	51	38	89
Greater than 60 years	11	14	25
Total	92	64	156
MONTHLY INCOME			
4900-20000	64	31	95
21000-35000	16	21	37
Greater than 35000	12	12	24
Total	92	64	156
NUMBER OF CHILDREN			
0-3	51	18	69
4-6	30	25	55
More than 6	11	21	32
Total	92	64	156
SUGAR LEVEL			
Greater than 10 mmol/l	65	48	113
Less than10 mmol/l	27	16	43
CHOLESTEROL LEVEL			
Greater than 6 mmol/l	69	36	105
Less than 6 mmol/l	23	28	51
Total	92	64	156
SMOKING			
Not smoking	51	41	92
Smoking	41	23	64
Total	92	64	156
MARITAL STATUS			
Unmarried	11	2	13
Married	81	62	143
Total	92	64	156
FAMILY HISTORY			
No	61	49	110
Yes	31	15	46
Total	92	64	156

The results showed that from table 3 the variables age monthly income number of children sugar level cholesterol smoking and marital status were statistically significant and have positive association with the presence of hypertension and the individual effect of eight risk factors have significant contribution and only family history was nonsignificant. It shows that as the above variable quantity increases the risk of hypertension increases.

From table 4 the result of wald test shows that all the variables mentioned above have significant contribution in the development of hypertension because each have a p value less than the level of significance (0.05)

The first factor is age. We coded age into three categories:

20-40 years 41-60 years and greater than 60 years. The coefficient of age has positive value 2.177 with 1 degree of freedom and it shows positive relation of age and hypertension. It is observed that the patients in the age group

41-60 years were 3.662 times more likely to have hypertension than the patients whose age group was 20-40 years Similarly the patients whose age group was greater than 60 years are 1.391 times more likely to have hypertension disease than the patients whose age group was

20-40 years and the 95% confidence interval for the odds ratios of the age group 41-60 years and greater than 60 years is also calculated and the limits for the age group 41-60 years are 0.864 to 5.092 and its p-value is 0.011 and the limits for the age group greater than 60 years are 0.384 to

5.042 and its p-value is 0.019 and the values of Wald's test for the age group 41-60 and greater than 60 years are also calculated which are 8.137 and 6.252 respectively their p-

values are less than level of significance (0.05) it also shows significant results.

The second factor is income. We coded income into three categories: 4900-20000 21000-35000 and greater than 35000.The coefficient of income has value 0.6692 with 1 d.f and it shows positive relation of income and hypertension. It is also observed that the patients whose monthly income was

21000-35000 are 3.149 times more chance to have hypertension than the patients whose monthly income was greater than 35000 Similarly the patients whose monthly income was 4900-20000 are 7.698 times more likely to have hypertension than the patients whose monthly income was greater than 35000 and the 95% CI for the odds ratios of income 21000-35000 and 4900-20000 is 0.606 to 4.955 and

1.318 to 8.413 respectively and the value of Wald's test for the patients whose income was 21000-35000 is 4.170 and the patients whose income was 4900-20000 is 10.005 and

their p-values are 0.041 and 0.001 which are less than level of significance (0.05and 0.01) it also shows significant results.

The third factor is number of children. The categories for number of children are 0-3 4-6 and more than 6. The children and hypertension. It is found that the patients having number of children 4-6 are 2.633 times more likely to have hypertension than the patients having number of children 0-3 Similarly the patients having more than 6 children are 7.139 times more likely to have hypertension than the patients having 0-3 children. The 95% CI for the odds ratios for 4-6 and more than 6 children is 0.095 to

4.899 and 2.327 to 8.900 respectively and the value of Wald's test for the patients whose children are 4-6 is 3.

and the patients whose children are more than 6 is 11.812 and their p-values are 0.049 and 0.001 which are less than level of significance (

0.05and 0.01) and this situation also shows significant results.

The fourth factor is sugar level. The categories of sugar level are greater than 10 mmol/l and less than 10 mmol/l. The coefficient of sugar is 1.538 and is positive with 1 d.f. and it

shows positive relation of sugar level and hypertension. It is noticed that the patients whose sugar level was greater than 10 mmol/l has 12.478 times more chances to have hypertension than the patients whose sugar level was less than 10 mmol/ and the 95% CI for the odds ratios for high sugar level is 4.247 to 16.417 and the value of Wald's test is

also calculated which is 12.385 and its p-value is very small which is less than level of significance (0.05 and 0.01) and this scenario shows significant result.

Wald's test is also calculated for married patients which is 10.941 and its p-value is very small and less than level of coefficient of number of children has positive value 0.887 with 1 d.f and it shows positive relation of number of significance (0.05 and 0.01) and it shows significant result.

The eighth factor is family history. The coefficient of family history is 2.494 with 1 d.f. and it shows positive relation of family history and hypertension. It is also noticed that the patients who had a patient of hypertension in their family has 1.554 times more chances of hypertension disease as compared to the patients who had no family

history of hypertension and the 95% CI for the patients who has family history of hypertension is 0.280 to 2.479 and the value of Wald's test is also calculated which is 9.079 and its p-value is 0.007 which is less than level of significance (0.05 and 0.01) and it also shows significant result The final fitted logistic model is as under: Equation

Where

Z = -3.588 + 2.177 (age) + 0.669 (income) + 0.887

(children) + 1.538 (sugar) + 0.475 (cholesterol) + 4.651 (smoking) + 0.759 (marital status) + 2.494 (history)

3. DISCUSSION

The main aim of this study was to evaluate and dig out the physical key risk factors of hypertension.

In 64 cases 38 (59.37%) were 41-60 years of age 12 (18.75%) were 20-40 years of age and 14 (21.87%) were greater than 60 years of age. The phi-value for age is 0.281

which shows positive association. It means that 41-60 years of age has more chances of hypertension than the 20-40 years and greater than 60 years. in developed countries it is considered that only 23% of deaths occur below the age of

70 years; however in South Asia 52% of CVD deaths occur among people under 70 years [19-22].

Out of 64 cases 21 (32.81%) had income 4900-20000 31 (48.44%) had income 4900-20000 and 12 (18.75%) had income greater than 35000. The phi-value for monthly

income is 0.217 which show positive association. It means that the low income increases the rates of hypertension patients than the high income. Low and middle-income countries bear a large burden of cardiovascular disease (CVD) accounting for 80% of the global CVD-related deaths and 87% of disability adjusted-life years lost. CVD rapidly has become a major cause of mortality and morbidity in low income South Asian countries as well [23-26]

The 21 (32.81%) cases had number of children more than 6 25 (39.06%) cases had number of children 4-6 and 18 (28.12%) had number of children 0-3. The phi-value for association. It means that as the number of children increases the rates of hypertension patient increases.

In these cases 16 (25%) had sugar level greater than 10 mmol/l and 48 (75%) had sugar level less than 10 mmol/l. The phi-value for sugar is 8.048 which show positive association. The value of odds ratio shows that there are

12.478 times more chances to be a hypertension patient with sugar level greater than 10 mmol/l than the sugar level less than 10 mmol/l. A significant proportion of the hypertensive patients were having uncontrolled hypertension. Nearly 1/5th of the population was suffering from RHT which was significantly associated with the presence of obesity and diabetes mellitus. Therapeutic inertia seems to contribute significantly towards the presence of uncontrolled BP [27]. Out of 64 cases 28 (43.75%) had cholesterol level greater than 6 mmol/l and 36 (56.25%) had cholesterol level less than 6 mmol/l. The phi-value for cholesterol level is 0.197 which show positive association. The coefficient 0.475 shows that the effect of high cholesterol is positive that is the cholesterol level greater than 6 mmol/ increases the chance of hypertension.

In a study conducted on hypertension in Women were classified according to the International Diabetes Federation's worldwide definition of the metabolic syndrome which includes a WC =80 cm

plus = 2 of the followings: 1) raised triglycerides: =1.7 mmol/L; 2) reduced HDL cholesterol: less than 1.03 mmol/L; 3) raised blood pressure: systolic BP =130 or diastolic BP =85 mm Hg; and 4) raised fasting plasma glucose: =5.6 mmol/L [28].

In these cases 41 (64.06%) were nonsmokers and 23 (35.93%) were smokers. The phi-value for smoking is 0.146 which show positive association. The odds ratio for smoking is 1.799 which shows that the chance of incidence of hypertension in smokers is 1.799 times more than in nonsmokers.

In these cases 62 (96.87%) were married and only 2 (3.12%) were unmarried out of 64 cases. The phi-value for marital status is 0.157 which show positive association. The p-value for marital status is 0.000 which shows positive association. The coefficient of marital status is also positive i.e. 0.759 and the odds ratio is 2.336; therefore by married risk factor of hypertension increases by 2 times.

In these cases 49 (76.56%) had no family history of hypertension and 15 (23.44%) had family history of hypertension. The phi-value for family history is 0.181 which show positive association. The odds ratio for the patients who had family history of hypertension is 1.554 which shows the chance of hypertension is 1.554 times more in the patients with the family history of hypertension as compared to the patients with no family history of hypertension.

4. CONCLUSION

The results suggested that the occurrence of hypertension is strongly related to the variables such as age monthly income number of children sugar level cholesterol level

smoking marital status and only the family history shows the no association with hypertension. Different cardiovascular risk factors including blood pressure tend to be strongly associated with each other. Identification of these risk factors at an early stage of life is an important opportunity for primary prevention of hypertension through lifestyle modification to prevent disease progression [29]. Health education of the public is needed to control the various risk factors of hypertension. Life style measures should be initiated especially in those with raised total cardiovascular risk as well as communities as a whole. The measures include weight reduction restriction of smoking alcohol intake increased physical activity proper treatment for diabetes mellitus restriction of saturated fats as well as dietary sodium [30].

Table 3: Results of Pearson Chi-Square Test

Risk factors	Pearson Chi-Square	d.f.	p-value	phi-value
Age	15.112	2	0.017	0.281
Income	7.350	2	0.025	0.217
No. of children	14.814	2	0.001	0.308
Sugar	8.357	1	0.013	8.048
Cholesterol	6.030	1	0.014	0.197
Smoking	6.161	1	0.018	0.146
Marital status	6.854	1	0.015	0.157
Family history	1.910	1	0.167	0.181

Table 4: Significant predictors of Hypertension

	B	d.f.	Wald's test	p-value
Age of respondent	2.177	1	9.305	0.006
Family income	0.669	1	6.522	0.011
No. of children	0.887	1	10.463	0.001
Sugar level	1.538	1	11.539	0.000
Cholesterol level	0.475	1	6.401	0.017
Smoking	4.651	1	12.799	0.000
Marital status	0.759	1	8.788	0.009
Family history	2.494	1	10.408	0.000
Constant	3.588	1	11.299	0.001

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Table 5: Odds Ratios and 95% Confidence Intervals

	B	d.f	Wald's test	P-value	Odds ratios	95% C.I Lower	Upper
Age of respondent							
(20-40) years(r)					1.000		
(41-60) years	1.298	1	8.317	0.011	3.662	0.864	5.092
Greater than 60	0.330	1	6.252	0.019	1.391	0.384	5.042
Family income							
4900-20000 (r)					1.000		
21000-35000	1.147	1	4.170	0.041	3.149	0.606	4.955
Greater than 35000	2.041	1	10.005	0.001	7.698	1.318	8.413
No. of children							
0-3(r)					1.000		
4-6	0.968	1	3.883	0.049	2.633	0.095	4.899
More than 6	1.966	1	11.812	0.001	7.139	2.327	8.900
Sugar level							
Less than 10 mmol/l(r)					1.000		
Greater than 10 mmol/l	2.524	1	12.385	0.000	12.478	4.247	16.417
Cholesterol level							
Less than 6 mmol/l(r)					1.000		
Greater than 6 mmol/l	0.493	1	5.429	0.021	1.637	0.730	3.673
Smoking							
No(r)					1.000		
Yes	0.587	1	12.195	0.000	1.799	0.856	4.209
Marital status							
Unmarried(r)					1.000		
Married	0.849	1	10.941	0.000	2.336	0.421	3.476
Family history							
Not in the family(r)					1.000		
Yes in the family	0.441	1	9.079	0.007	1.554	0.280	2.479

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