

Prevalence and Determinants of Blood Pressure Control among known Hypertensives in an Urban Population of Kerala State, India

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ABSTRACT

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Introduction: Hypertension is a major risk factor for Cardiovascular Diseases. Even though easily detectable and treatable, effective control achieved is often poor. This study aimed to find out the prevalence of effective control of blood pressure among known hypertensives in an urban setting (Thiruvananthapuram Corporation area) and to determine the factors that influence effective control.

Methods: This was a Cross Sectional Study done among 500 known hypertensive patients of age 30 years and above. Cluster Sampling Technique was used. Methods of Data Collection included Personal Interview and Measurement of Physical Parameters. JNC VII criteria was used for the classification of hypertension. Univariate and Bivariate Analysis were done.

Results: The prevalence of Blood Pressure Control among hypertensives was found to be 40.4%. Increased Physical activity was found to be the most important factor that favours Blood Pressure Control. Blood pressure control is poor among overweight and obese individuals. Advanced age (> 60 yrs) was found to unfavourably affect Blood Pressure Control. Hypertensives with a Family History of Hypertension among first degree relatives have better control of Blood Pressure. Blood pressure control is better achieved through Combination Drug therapy than Mono therapy.

Conclusions: Frequent Measurement and monitoring of Blood Pressure is very important in the early detection and control of Hypertension. Doctors should make it a point to strictly adhere to the treatment guidelines. Choice of drugs and dosages should be rational, based on the patients age, blood pressure levels and co morbid conditions among other factors. Combination therapy should be advised whenever necessary. Physical activity and lifestyle modifications are of paramount importance

Keywords: Hypertension, Blood Pressure Monitoring, Blood Pressure Control, Antihypertensives, JNC 7, Kerala

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INTRODUCTION

Globally, non-communicable diseases are increasingly recognized as a major cause of morbidity and mortality. In 1998 alone, non-communicable diseases are estimated to have contributed to almost 60% of deaths in the world and accounted for 43% of the global burden of disease. Based on current trends, by 2020, these diseases are expected to account for 73% of deaths and 60% of the disease burden.¹ Over 33 million people a year die from non-communicable diseases (59% of the 56.5 million deaths which occur globally every year).²

Cardiovascular diseases make the biggest contribution to non-communicable disease burden.³ The

World Health Organization (WHO) estimates that 60 per cent of the world's cardiac patients will be Indian by 2010.⁴ Among all the major risk factors for cardiovascular diseases, for many reasons, hypertension stands out to be the most important one. Firstly it is the most prevalent risk factor world over. In most countries up to 30% of the adult population are hypertensives⁴. Secondly, among all risk factors, it makes the largest contribution towards occurrence of cardiovascular morbidities. About 62% of cerebrovascular disease and 49% of ischaemic heart disease are attributable to suboptimal blood pressure (systolic > 115 mmHg)⁵. Thirdly, it is almost always asymptomatic until complications develop. So there is a tendency that it goes undetected very often. This brings us to the

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fourth reason, that it is one of the easiest risk factor to detect. A simple, non-invasive, universally available, inexpensive technique that can be performed even by ordinary people after proper training can detect hypertension. Fifthly, in most cases it is very amenable to treatment. A simple regulation of lifestyle by modifying diet, exercise and personal habits is usually sufficient to control milder forms of hypertension. Anti-hypertensive medicines are added in such cases only when lifestyle modifications alone are found to be insufficient. And finally, there are tremendous benefits in lowering blood pressure effectively. For every 20 mm reduction of systolic BP and 10 mm reduction of diastolic BP, the cardiovascular risk is halved.^{6,7}

Many studies have been conducted on the prevalence and the determinants of Hypertension in different settings. But there seems to be a paucity of information on the prevalence of control of blood pressure among known hypertensives in our setting. Furthermore, the factors that determine whether a person will go in for effective control, once he or she is diagnosed to have hypertension is also less known. Taking into account the above described nature of hypertension, it shall be a matter of paramount interest to know the determinants of blood pressure control in our setting because, then the factors that favour effective control can be promoted and those factors that do not favour effective control can be demoted.

It is in this light that this study attempted to find out the prevalence of effective control of blood pressure among known hypertensives in an urban setting (Thiruvananthapuram Corporation area) and to determine the factors that influence effective control.

OBJECTIVES

- To estimate the Prevalence of Blood Pressure Control among known Hypertensives of Thiruvananthapuram Corporation Area.
- To study the Determinants of Blood Pressure Control among known Hypertensives.

MATERIALS AND METHODS

This was a Cross Sectional Study done in the Thiruvananthapuram City Corporation Area, Kerala State during a period of 6 months from 1st January 2006 onwards. The study population included known Hypertensives of age 30 years and above who were prescribed some form of intervention (Pharmacologic or Non-pharmacologic) at some point of time. Those Hyper-

tensives with documented evidence of Secondary Hypertension were excluded from the Study. Also those individuals not willing to give consent were excluded.

Cluster Sampling Technique was used. 20 Clusters were selected from the 81 Wards of Thiruvananthapuram Corporation. Households were taken as Primary Sampling Units. The Wards were listed according to the 2001 census. The sampling interval was arrived at by dividing the total number of households by 20. 25 houses with one or more known hypertensives were selected from each cluster. If more than one hypertensives were present in one house, drawing of lots was done.

Sample size was fixed using the formula $4 PQ / L^2$ where P is the Prevalence, Q is 1-P and L is the Allowable Error (20%). The Prevalence for sample size fixation was chosen as 30% from the study conducted by Zachariah MG et al in Thiruvananthapuram City.⁸⁵ The figure 233 that was obtained from the formula was multiplied by 2 to compromise for the design effect to get 466 as sample size. This was rounded off to 500 to compromise for redundancy. A total of 1,562 households were visited to obtain a sample of 500 Hypertensives.

Methods of Data Collection included Personal Interview and Measurement of Physical Parameters. A questionnaire which was pre-tested by doing a Pilot Study among 30 Subjects was used for data collection. Informed consent was obtained from every participant. Measurement of Blood Pressure was done at the beginning of the interview as well as at the end.

The questionnaire contained around 65 items to explore the variables that included Socio-demographic details, History of Hypertension including Treatment, Awareness and Attitude, Assessment of Physical Activity, Personal Habits, Measurement of Physical Parameters and Assessment of Expenditure.

Blood Pressure Measurement

Establishment of Hypertension Control status was done by measurement of Blood Pressure using a calibrated and standardized electronic blood pressure measurement equipment – the Omron MX3 Plus. This is an equipment widely used world over, the accuracy of which has been validated according to the European Society of Hypertension International Protocol in a study published in 2005.⁸

A minimum of two blood pressure measurements were done on every participant. Criteria for blood pressure

control was chosen as systolic blood pressure <140 mm Hg and diastolic blood pressure <90 mm Hg, as per the Joint National Committee VII recommendations.

After establishing rapport, the participant was made to sit in a relaxed position and the first blood pressure reading obtained. The second reading was obtained after the completion of the interview, which took roughly half an hour. If both the values were above the JNC VII criteria a third reading was taken after helping the participant to further relax. The lowest of all the readings was recorded as the blood pressure value for the participant.

Classification of Hypertension

This study used the JNC VII criteria for the classification of hypertension. Because of the new data on lifetime risk of hypertension and the impressive increase in the risk of cardiovascular complications associated with levels of BP previously considered to be normal, The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure⁹ has introduced a new classification (**Table 1**) that includes the term “pre hypertension” for those with BPs ranging from 120–139 mmHg systolic and/or 80–89 mmHg diastolic. This new designation is intended to identify those individuals in whom early intervention by adoption of healthy lifestyles could reduce BP, decrease the rate of progression of BP to hypertensive levels with age, or prevent hypertension entirely.

Analysis and Interpretation

The collected data was analysed and interpreted using the following methods.

Univariate Analysis

- Continuous variables were summarized as means and standard deviations.
- Categorical variables were summarized as proportions with 95% confidence intervals.
- The Prevalence of Hypertension Control was estimated as the proportion of subjects who met the JNC VII condition for blood pressure control.

Blood Pressure Classification	SBP mmHg	DBP mmHg
Normal	<120	and <80
Prehypertension	120–139	or 80–89
Stage 1 Hypertension	140–159	or 90–99
Stage 2 Hypertension	≥160	or ≥100

- Appropriate charts, figures and tables were used to visually describe each variable.

Bivariate Analysis

- Chi-Square test was done for categorical variables to establish association with blood pressure control. Crude Odds Ratios with 95% confidence interval were calculated wherever possible.
- Continuous variables were converted to categorical variables by re-coding into groups, before doing the Chi-Square test.
- Tables were used to display the results.

Ethical Considerations

Ethical Clearance was obtained from the Institution Ethical Committee of Medical College, Thiruvananthapuram. Informed consent was obtained from all participants. Advises regarding treatment and lifestyle modification were given to all participants whose blood pressures were not under control. Those participants requiring emergency medical attention were referred to appropriate centres.

RESULTS

The age of the study population ranged from 30 to 90 years with a mean of 60.18 (SD.11.75). Nearly one third (31.6%) of the subjects belonged to 56 to 65 years category (95% CI - 27.6% to 35.9%). 64.8% of the subject were females (95% CI - 60.4% to 69.0%). The apparent skew in the Gender Distribution may be attributed to the fact that Hypertension is more often undetected among men in comparison to women.¹⁰ Studies show that up to 63% of newly detected hypertensives are men.¹¹ 80.4% of the study subjects were Hindus (95% CI – 76.6% to 83.7%), 17.2% were Christians and 2.4% were Muslims. A Socio-economic Status Score was calculated using a modified version of the Kuppaswamy Scale. Accordingly 52.8% of the study population belonged to the middle Socio-economic class (**Figure 1**).

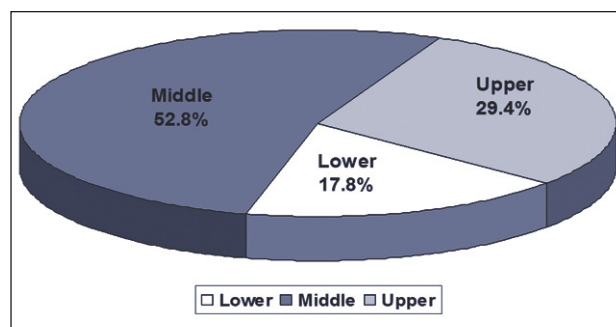


Figure 1. Distribution of Study Population by Socio-Economic Status

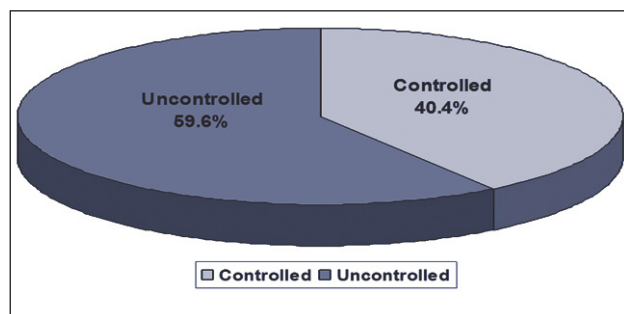


Figure 2. Prevalence of Blood Pressure Control

Prevalence of Blood Pressure Control

The Systolic Blood Pressure of the study group ranged from 99mm Hg to 201mm Hg with a Mean of 149.2 (SD: 22). The Diastolic Blood Pressure ranged from 54mm Hg to 131mm of Hg with a Mean of 87.5mms (SD: 11.3). 22.8% of the subjects had Uncontrolled (Isolated) Systolic Hypertension.

202 participants out of 500 had their Blood Pressure below 140/90mm Hg. Thus the prevalence of hypertension control as per the JNC VII Criteria was 40.4% (Figure 2).

The results of bivariate analysis are presented in Table 2. There was a significant difference in the mean age of the groups with controlled and uncontrolled hypertension, by independent sample T test. Chi Square test done with categorised age also gave a significant P-value. Bivariate analysis shows a significant association between the advancing age and control of hypertension.

Cross-tabulating Gender with hypertension control status does not give a significant association in terms of P-value or Crude Odds Ratio. No significant association could be found between the religious beliefs of a person and hypertension control. Education, Occupation and Per capita income were separately associated with hypertension control. The higher the education, the better the chance of control. Similarly, the possibility of control is seen to increase with occupation and income. The overall Socio economic status score also shows a significant association. This emphasizes the fact that a person's socio economic status has a significant bearing on his/her health seeking behaviour and health status. It can be seen that hypertensive individuals belonging to nuclear families have a significantly better chance of control. This may be because of the fact that individuals residing in nuclear families will be younger in comparison to those in extended and joint families. As we have seen, younger hypertensives stand a better chance for control.

Table 2. Results of Bivariate Analysis comparing Hypertension control status with study variables

SN	Study Variable	Criteria	Chi Square Value	P Value	Odds Ratio (if available)	95 % Confidence Interval of Odds Ratio
1	Age	Younger	13.39	0.009	-	-
2	Gender	Male	2.882	0.090	1.380	0.951 - 2.002
3	Education Status	Higher	30.740	0.000	-	-
4	Occupation	Higher	28.153	0.000	-	-
5	Percapita Income	Higher	14.986	0.005	-	-
6	Socio Economic Status	Higher	15.591	0.000	-	-
7	Family Type	Nuclear	8.269	0.004	1.697	1.182 - 2.436
8	Marital Status	Married	8.636	0.003	1.845	1.223 - 2.784
9	Family History of Hypertension	Present	11.117	0.001	1.876	1.293 - 2.720
10	Frequency of BP Measurement	More Frequent	5.996	0.014	1.583	1.095 - 2.289
11	Combination therapy	Yes	24.113	0.000	2.718	1.812 - 4.079
12	Thiazide Use	Yes	15.465	0.000	3.538	1.825 - 6.860
13	Drug Compliance	Yes	6.858	0.009	1.688	1.139 - 2.502
14	Co-existing Diabetes	Yes	6.099	0.014	0.610	0.411 - 0.904
15	Co-existing Hypercholesterolemia	Yes	17.245	0.000	2.203	1.513 - 3.208
16	Cerebrovascular Event	Yes	17.245	0.000	2.203	1.513 - 3.208
17	Awareness	Higher	16.628	0.000	-	-
18	Attitude	Positive	5.468	0.065	-	-
19	Physical Activity	More Active	116.120	0.000	8.765	5.771 - 13.313
20	Alcohol Use	Yes	5.160	0.023	0.370	0.152 - 0.900
22	BMI	Higher	4.878	0.027	1.507	1.046 - 2.170
23	Waist Circumference	Larger	15.772	0.000	2.133	1.463 - 3.108

Those hypertensive individuals who lived with their spouses had a better chance for control. This can be attributed to the increased attention and care on health and medications that one receives from the spouse. 58.4% of the participants had a positive family history of Hypertension. A significant association is noted between family history and hypertension control; individuals with a positive family history showing better control.

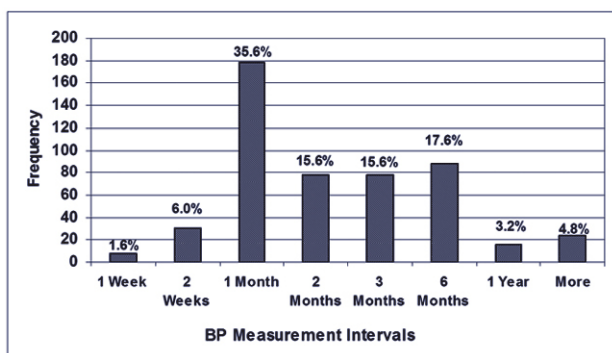


Figure 3. Frequency of BP Measurement

Frequencies at which the participants consulted their doctors or had their blood pressure measured varied from once in a week to not even once in a year. This variation is depicted in **Figure 3**. Whereas no significant association was noted between hypertension control and frequency of consultation (P-value 0.199), frequency of BP measurement showed a significant association.

65.2% of participants followed Mono Therapy, whereas 26.8% used two drugs or more. 8% were on non pharmacological therapy alone (**Figure 4**). 17.2% of participants missed taking their medicine at least once a week, whereas 15.2% had already stopped taking medicine. Amlodipine was the most commonly used drug (39.6%) followed by Beta Blockers (36.8%) and AR Antagonists (19.2%). A very significant association was noticed between the use of Combination Drug therapy and Hypertension Control.

Among the individual drugs categories, Diuretics, and specifically Thiazides, when used alone or in combination, were found to be most significantly associated with hypertension control. Among other drugs a combination of Amlodipine with a Beta Blocker showed better control. The frequency of drug dosing did not seem to have any effect on blood pressure control (P-value 0.769)

32% of the participants had Diabetes and 34.8% had Hypercholesterolemia as Co-morbid conditions. More

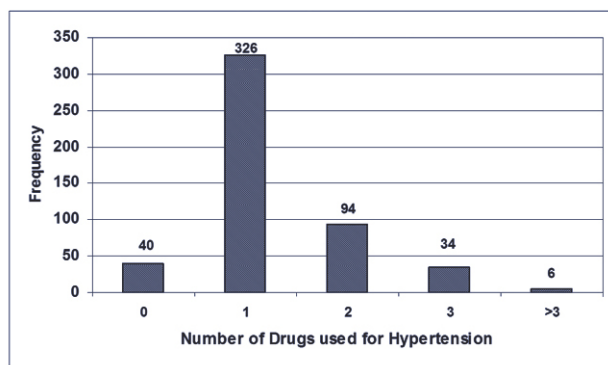


Figure 4. Distribution of Study Population by Number of Drugs Taken

than 20% had developed Coronary Artery Disease or Cerebrovascular Disease as complications. A co existing Diabetes Mellitus was found to adversely affect blood pressure control. It is a known fact that in individuals with both diabetes and hypertension control is difficult to attain.

A co-existing hypercholesterolemia was found to favour the control of hypertension. This may be attributed to the fact that statins, which are the drugs widely used for treating hypercholesterolemia, has a significant Blood Pressure lowering effect¹². Another important finding is that those hypertensives who have already had a cerebrovascular event showed significantly better control of hypertension. Reduced sympathetic activity, complete bed rest and continuous monitoring of treatment by someone else might be the reasons for this. Occurrence of a coronary event did not seem to have any effect on Blood Pressure Control (P-value 0.594).

Whereas, 68% of the participants had Good Awareness regarding the Treatment, Control and Complications of Hypertension, only 14.8% had a Good Attitude. 72% of the Participants belonged to the Intermediate Attitude Score Category. Better awareness was significantly associated with better blood pressure control. Association between attitude and blood pressure control showed borderline significance only.

The Physical Activity Score of the participants ranged from 24 – 32.4 with a Mean of 28.69 (SD: 2.45). One of the factors that show highest association in terms of Crude OR with better blood pressure control was increased physical activity. This highlights the fact that the role of increased physical activity for the control of blood pressure can never be over emphasized.

22% of men and 1.5% of women were Smokers. 4.4% of men used Alcohol. 47.6% of participants reported to experience more stress in comparison to other people belonging to their age and sex groups. It was seen that blood pressure control was better among those who reported use of alcohol. This finding here can not be fully relied upon as the number of people consuming alcohol in the sample was very less. No significant association could be found between blood pressure control and smoking (P-value 0.162) or perceived mental stress (P-value 0.07).

The study population had an Average Height of 155.16 cm (SD: 9.3, Range 133 to 190) and an Average Weight of 63.6 kg (SD: 22). The Waist Circumference of the population averaged at 92.36 cm (SD: 9.28). The Mean Body Mass Index of the study population was found

to be 26.4. The Body Mass Indices of 60.4% of the population were in the overweight or above categories. Height, Body Mass Index and Waist Circumference showed a significant association with Blood Pressure control. Weight did not show a significant association (P-value 0.194).

DISCUSSION

Effective treatment that reduces BP dramatically changes the natural history of hypertension-related end points, especially for cerebrovascular events and, somewhat less so, for coronary events. Hypertension carries a high population-attributable risk for subsequent CHF, accounting for 39% of cases in men and 59% in women. The overall Relative Risk of CHF in 12 randomized controlled trials between 1967 and 1991 was reduced to 0.48 [95% confidence interval (CI), 0.38–0.59] among treated versus control subjects.¹³ As in most situations, preventing the end organ damage is more effective than trying to reverse the changes once they are established. It has been estimated that a 5 mmHg reduction of SBP in the population would result in a 14 percent overall reduction in mortality due to stroke, a 9 percent reduction in mortality due to CHD, and a 7 percent decrease in all-cause mortality.¹⁴

The total level of cardiovascular risk is the main indication for intervention, but lower or higher blood pressure values are also more or less stringent indicators for blood-pressure-lowering intervention. Recent studies suggest that control measures need to be initiated in the high normal stage (ESH Classification) itself. Consideration of subjects with systolic blood pressure 130–139 mmHg and diastolic blood pressure 85–89 mmHg for possible initiation of anti-hypertensive treatment is based on the following recent evidence:

The PROGRESS study¹⁵ has shown that patients with previous stroke or transient ischaemic attack and blood pressures, 140/90 mmHg, if left untreated, have an incidence of cardiovascular events of about 17% in 4 years (very high risk according to the guidelines), and their risk is decreased by 24% by blood pressure lowering.

Similar observations have been made in the HOPE study¹⁶ for 'normotensive' patients with high coronary risk.

The ABCD-Normotensive trial¹⁷ has shown that type 2 diabetic patients with blood pressures 140/90 mmHg may also benefit by more aggressive blood pressure

lowering, at least for stroke prevention and progression of proteinuria.

The Framingham Heart Study¹⁸ has shown that male subjects with high normal blood pressure have a 10-year cardiovascular disease incidence of 10%, i.e. in the range that these guidelines classify as low added risk.

The proportions of hypertensives in the United States who are aware of their condition and who are treated for it have increased dramatically in the last two decades, but the percentage of patients consistently controlled with their medications remains low. The most comprehensive information concerning the prevalence of uncontrolled hypertension in the US derives from population-based surveys conducted by the National Center for Health Statistics¹⁹. Based on data collected in the 1999 to 2000 National Health and Nutrition Examination Survey (NHANES), the estimated overall prevalence of hypertension in 2000 was 28.7%.²⁰ Among 1565 participants with hypertension, 68.9% were aware of the problem, and 58.4% were under pharmacological treatment. Overall, only 31.0% of individuals had hypertension controlled to a blood pressure of <140 mm Hg systolic and 90 mm Hg diastolic. In the predominantly white Framingham Heart Study cohort between 1990 and 1995, 29% of hypertensive participants were controlled.²¹ Higher rates of control were observed in 2 multiethnic epidemiological cohorts, the Cardiovascular Health Study and the Atherosclerosis Risk in Communities Study, although approximately half were still suboptimally treated.²²

The Three City study,²³ a population-based study among 9693 individuals aged 65 years and over in France, published in 2006, found that in the final working sample, 62% were hypertensive. More than two-thirds were aware of their hypertension and 81% were treated with antihypertensive drugs. Among 4573 treated hypertensive participants, 35% had a blood pressure over 160/95 mmHg and 69% over 140/90 mmHg.

In a study conducted among 4910 adults in Turkey²⁴ published in the year 2003, the overall age-adjusted and sex-adjusted prevalence of hypertension was 31.8%, and it was higher in women than in men (36.1 versus 27.5%, $P < 0.001$). In the whole group, 32.2% had never had their BP measured. Overall, 40.7% of those with hypertension were aware of their diagnosis, only 31.1% were receiving pharmacologic treatment and only 8.1% had their BP under control. The subjects who were aware and treated had a control ratio of 20.7%.

In a study in Iceland published in 2005,²⁵ of the hypertensive men 24.8% were treated, and of those 38.3% were controlled, and of the hypertensive women 45.3% were treated, and of those 52.7% were controlled.

In an intervention trial done among diabetic patients in Israel in 2005 to reduce hypertension it was seen that tight monitoring and follow up did help to reduce the blood pressure to 130/80 mmHg in 53 % of the subjects.²⁶

In a study done in 2006 in Ghana, West Africa, it was found that the overall prevalence of hypertension was 29.4%. Of these, 34% were aware of their condition, 28% were receiving treatment, and 6.2% were controlled below SBP/DBP < 140/90 mmHg.²⁷

In a study done in middle aged subjects of Tunisia in 2005, the prevalence of hypertension was higher among women (48.2% versus 38.7% on men) and it increases in both genders with age. Only 41% of the hypertensives were aware of having hypertension, among them, 74.1% were treated but only 13.2% were controlled.²⁸

A Canadian study in 2005 showed that uncontrolled hypertension is frequently associated with poor control of other risk factors.²⁹

In a Caribbean study in 2005, a high proportion of treated patients were found among women (44.9%). Only 30.4% of hypertensive men were treated, and the overall control rate was lower (13.3%).³⁰

A study done by Mayo clinic in 2002 among people with both diabetes and hypertension shows that predictors of poor BP control were: 1) isolated systolic hypertension at inception; 2) uncontrolled BP at inception; 3) use of oral hypoglycemic drugs versus diet and exercise alone or insulin use; 4) use of three or more antihypertensive drugs; and 5) older age. Predictors of better control were 1) use of nitrates; 2) history of coronary heart disease; and 3) at least one annual visit to sub-specialist physician.³¹

Limited data is available on the blood pressure control rates in India. Available data suggest that control rates attained in India are rather poor.

A Chennai study published in 2003 says that of the 279 individuals with hypertension, only 37.3% (104/279) were known hypertensives. Of the 104 known hypertensives, only 52 subjects (50%) were under any kind of antihypertensive therapy. Of these 52 individuals, only 21 (40%) had blood pressure under control.¹⁰

A study published in 2003 which was done among the Parsi community of Mumbai, the overall prevalence of hypertension in the community was 36.4%, of whom 48.5% were unaware of their hypertensive status. Of those aware of having hypertension, 36.4% were non-compliant with their anti-hypertensive drugs and only 13.6% had optimally controlled hypertension.³²

In a study published in 1999 which was done among hypertensive women of Chandigarh, it was found that only 16.7% who were on treatment had achieved control of blood pressure (<140/90 mm Hg). Main reasons for discontinuing the treatment were ignorance about the need of regular treatment (33.3%), high cost of medicines (19.44%) and non-availability of a family member who can go with the patient to hospital (9.72%). Twenty-six (36.1%) hypertensive women did not know the importance of weight reduction for controlling high blood pressure.³³

A study in Nagpur and published in 1996 indicates poor patient compliance as the reason for uncontrolled blood pressure.³⁴

Only a couple of published studies from Kerala say anything about control rates of hypertension. A study done in the middle aged population of Thiruvananthapuram city published in 2003 says that 39% of the hypertensives were aware of the condition, while 29% were treated with blood pressure-lowering medications. Adequate control of elevated blood pressure was achieved in only 30.6% of treated hypertensives.

Another study among elderly hypertensives of Thiruvananthapuram city published in 2000 says that fewer than half of the hypertensive subjects were aware of their condition or were on treatment, and only a quarter of the treated hypertensives achieved adequate control of blood pressure. Rural elderly subjects were especially less likely to be aware of, and on treatment for hypertension.

CONCLUSIONS

Hypertension is one of the leading causes of morbidity and mortality worldwide. It is the most important risk factor for cardiovascular and cerebrovascular diseases. It is a preventable, easily detectable and more or less easily treatable condition. Effectively controlling hypertension to recommended levels markedly reduces the chances of adverse outcomes. But the fact remains that in excess of 40% of the known hypertensives in most population go uncontrolled.

Timely detection and effective control of hypertension should be promoted as an important part of a comprehensive strategy for the prevention and control of non communicable diseases. Individuals need to be sensitised regarding the importance of detection, treatment and control of hypertension. Frequent Measurement and monitoring of Blood Pressure is very important in the early detection and control of Hypertension. The role of increased physical activity can not be overemphasized. Hypertensives should be advised to do at least half an hour of brisk walking everyday. Doctors should make it a point to strictly adhere to the treatment guidelines. Choice of drugs and dosages should be rational, based on the patients age, blood pressure levels and co morbid conditions among other factors. Combination therapy should be advised whenever necessary. Lifestyle modification has to be given due importance in the treatment of hypertension. Diet control, salt restriction, smoking cessation and weight reduction should be incorporated in to the treatment regimen.

Limitations of the Study

Since the study did not do a complete Diet Survey Analysis, quantifications in terms of calories, fat and salt consumed and the probable associations could not be assessed. The study did not go into the details of physician related factors.

END NOTE

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