



## RESEARCH ARTICLE

## Impact of Hypertension and Hyperlipidemia Screening with Intervention during the Utilization of Antihypertensive and Anti-Hyperlipidemic Drugs

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### Abstract

The aim of the present study is to estimate the impact of intervention provided on screening programme to the participants and physicians and also proposed to study the factors influencing the physicians during prescribing antihypertensive and/ or antilipidemic agents. The study design was a cohort intervention study done at community pharmacies at Tamil Nadu, India. This was carried out for two years and data were collected from the patient record and interview. A screening programme was arranged to measure blood pressure and total cholesterol levels. The primary outcome of measures was the percentage of patients prescribed antihypertensive and/ or antihyperlipidemic agents for 6 months before and after the intervention. Data were collected from 946 (75.68%) of patients visited the identified community pharmacies. 90.6% and 9.4% of patients were allotted to the control and intervention groups to initiate antihypertensive and/ or antihyperlipidemic agents. After the intervention, the prevalence of antihypertensive agents prescribed was observed high among the intervention group when compared with the control group as the prevalence of antihyperlipidemic prescription. The similar results for the incidence were also observed for the antihypertensive agents and antihyperlipidemic agent prescription, during the study period after the intervention. This present study showed that the intervention was effective for improving the prescription containing antihypertensive and antihyperlipidemic agents as a primary outcome among patients with high blood pressure and lipid levels.

**Keywords:** Prevalence, Incidence, Antihypertensive Drugs, Antihyperlipidemic Drugs, Pharmacoepidemiology.

### Introduction

Cardiovascular disease (CVD) is one of major the causes of death worldwide and leading reasons in India [1]. As per WHO, 80% of CVD deaths occur in developing and in under developed countries more when compared with the developed countries. Around 236 lakhs of population may die due to CVDs by 2030 mainly because of heart diseases and strokes.

In India still it is neglected by the low and middle income class population, they undergo for the treatment whenever met with major health issues [2]. Hypertension and hyperlipidemia prevalence is comparatively higher and causes greater risk reasons for

cardiovascular deaths and health related problems and pose a huge threat to health and economic also [3]. The above said risk issues may be identified at preliminary stages and can be treated in effectively. [4]. The timely detection and treatment can decrease cardiovascular and cerebrovascular consequence [5].

But still hypertension is under diagnosed and treated at late stages of hypertension [6]. A proper pharmaceutical care plan (PCP) has to be developed in order decrease the CV risks of hypertension, PCP should address the good diagnostics method and to improve the therapeutic effectiveness [7].

In the present scenario, there are many effective methods are available to diagnose the CV risk issues through social programmes. The patients have to be motivated to report the early signs and symptoms of hypertension to their family physician's to start the treatment at the earliest to avoid the complications of the hypertension and hyperlipidemia. The physician's by utilizing their experience and evidence based medicine will lead to achieve the therapeutic goals [8, 9].

The interventions are aimed to the patients and or the physicians. The drug utilization reports will always improve the prescribing pattern [10]. The aim of present study is to assess the impact of intervention which was provided to the patients in the community screening and to their physician. Also, the present study is focused to identify the factors influence the physicians to prescribe antihypertension or antihyperlipidemic agents.

## Methods [11]

### Study Design and Population

The present study is an intervention cohort study design. In the present study, the effect of micro albuminuria on cardiovascular as well as morbidity and death among the hypertension patients were studied. The inclusion criteria to select the study participants were age between above 21 and 60 years and those are willing and provided the inform consent by oral and written. The exclusion criterion to select the study participants were pregnant and diabetic patients using insulin.

### Measurements

Apart from the anthropometric parameters like body weight, height as well as blood pressure, micro albuminuria (twice urine samples were collected at an interval of 24 hours), total cholesterol level and fasting serum blood glucose level were measured among the study participants. From all the study participants demographic parameters like past family details on cardiovascular diseases, cerebrovascular diseases as well as myocardial infarctions, smoking status, prescribed antihypertensive, antihyperlipidemic and oral hypoglycemic agents. Using, a standard balance and scale the body weight and height were measured and body mass index (BMI) was computed as

weight (in kilogram) over the square of height (in meters). Blood pressure was measured at two different intervals in sitting position at the right arm three times to get concurrent values by using sphygmomanometer. Blood total cholesterol and glucose levels were measured using a standardized device. The micro albuminuria levels were measured by nephelometry method. The collection of was started after obtaining independent human ethic committee and consent from the study participants. The data like prescribing drugs were collected before and after the intervention.

### Definitions

Hypertension is defined as the patients have  $\geq 145$  mmHg of systolic blood pressure or  $\geq 90$  mmHg for diastolic blood pressure. Hypercholesterolemia is defined as total cholesterol level is  $\geq 250$ mg/dL or two values of serum troponin I  $>2.50$   $\mu\text{g/l}$  had suffered during previous myocardial infarction [12, 13]. In the present study the subjects were divided as smokers, who are currently smoking and/ or ceased smoking prior to  $\leq 6$  months and rest of them were belong to nonsmokers.

During the data collection if subject was answered "yes" for the family history of cardiovascular disease, cerebrovascular diseases and myocardial infarction for positively then it is the definition for the presence of respective diseases.

### Control Group

For this group, screen programme was not done and just observed their prescription for the drugs prescribed to the group of patients. This group was designated as control group (group I).

### Intervention Group

During the screening programme for higher blood pressure or blood cholesterol among the study participants and had recorded on the data collection form no to be prescribed with antihypertensive and/ or antihyperlipidemic agents was intervened. The results were informed to the study population and physicians to start the therapy and these populations were designated as intervention group (group II). The intervention decisions were left to the discrete of the physicians.

## Statistical Analysis

Statistical analysis was carried out using SPSS11 and CI (Confidence Interval) with Wilson Score Methods. For the continuous variables the data are presented in mean with standard deviation and for categorical variables the data presented in percentage for column total. Chi-square or Fischer's exact test was employed for the differences among the proportions. Pvalue<0.05 was considered as statistically significant. Dichotomous variables were performed to estimate the risk of the odds ratio and 95% confidence interval.

## Results

In the present study initially 1250 participants were selected for the study. Out of 1250, 304 patients were excluded due to the reason of missing of data. Totally eligible 946 patients were successfully completed the study. Among them 9.4% and 90.6% of patients had received no intervention and intervention in their treatment. They are divided into two groups as control group (group I) and intervention group (group II).

Group I (N = 89) consists of 50.56% of male and 49.44% of female subjects were participated in the present study. The average age of this group was observed as 41.7± 12.5 years with a mean body mass index of 26.9±3.9 kg/m<sup>2</sup>. The mean systolic blood pressure and diastolic blood pressure

was observed as 151.5± 11.8 mmHg and 92.9±9.3 mmHg among the study patients respectively. Mean total cholesterol level and serum blood glucose was observed as 253.66 ± 33.67 mg/dL and 140.54 ± 22.04 mg/dL respectively. Mean micro albuminuria was observed as 31.9 µg/ml and its range was found to be between 15.9 and 61.4 µg/ml.

The percentage of patients with history of smoking, family history of cardiovascular disease, cerebrovascular accident and myocardial infarction was observed as 44.94%, 33.71%, 4.44% and 11.24% respectively. While in the group II (N = 857) consists of 46.67% of male and 53.33% of female. The average age of patients in group II was found to be 40.3 ± 14.9 years with a mean body mass index of 28.1 ± 5.0 kg/m<sup>2</sup>. The mean systolic blood pressure and diastolic blood pressure was measured as 168.1± 13.6 mmHg and 92.6±9.5 mmHg respectively.

Mean total cholesterol level and serum blood glucose was measured as 271.04 ± 39.91 mg/dL and 152.76±34.89 mg/dL respectively. Mean microalbuminuria was measured as 34.1 µg/ ml and its range was found to be between 18.1 and 66.6 µg/ ml. The percentage of patients with history of smoking, family history of cardiovascular disease, cerebrovascular accident and myocardial infarction was observed as 54.61%, 41.31%, 1.98% and 7.24% respectively. The data are provided in the Table 1.

**Table 1: Characteristics of the study population (N = 946)**

Parameter	Group I N = 89 (9.4)	Group II N = 857 (90.6)
Male (%)	50.56	46.67
Female (%)	49.44	53.33
Age (years)	41.7 ± 12.5	40.3 ± 14.9
SBP (mmHg)	151.5 ± 11.8	168.1 ± 13.6
DBP (mmHg)	92.9 ± 9.3	92.6 ± 9.5
TClevel(mg/dL)	253.66 ± 33.67	271.04 ± 39.91
SBG(mg/dL)	140.54 ± 22.04	152.76 ± 34.89
BMI (kg/m <sup>2</sup> )	26.9 ± 3.9	28.1 ± 5.0
Microalbuminuria (µg/ ml)	31.9(15.9 – 61.4)	34.1(18.1 – 66.6)
Smoking (%)	44.94	54.61
CVD familyhistory(%)	33.71	41.31
CV accident (%)	4.44	1.98
MI (%)	11.24	7.24

In the control group, prevalence before and after intervention for antihypertensive drugs were 17.4 and 18.1 respectively and its mean difference is 0.7. Incidence for antihypertensive drugs was 4.75. In the intervention group (CI 95%), a mean prevalence before and after intervention for antihypertensive drugs were estimated at

17.85(range between 16.9 and 18.8) and 21.75(range between 20.6 and 22.9) respectively and its difference is 3.9. Incidences for antihypertensive drugs were computed as 4.875 (range between 4.25 and 5.50). In the control group (CI 95%), prevalence before and after intervention for antihyperlipidemic drugs were found to be

5.75 and 7.8 respectively. Their difference is 2.05. Incidences of antihyperlipidemic drugs were 2.5. In the intervention group (CI 95%), prevalence before and after intervention for antihyperlipidemic drugs were 6.125 (range between 5.5 and 6.75) and 11.00 (range

between 10.25 and 11.75) respectively and their difference was 4.875. Incidence for antihyperlipidemic drugs was 1.8 (range between 2.9 and 4.7). The data are provided in the Table 2.

**Table 2: Prevalence and incidence of antihypertensive and antihyperlipidemic drugs prescribed to the intervention and control groups before and after the intervention**

	Control Group	Intervention Group (95%CI)
<b>Antihypertensive Drugs</b>		
Prevalence before intervention	17.4	17.85(16.9 – 18.8)
Prevalence after intervention	18.1	21.75(20.6 – 22.9)
Difference	0.7	3.9
Incidence	4.75	4.875(4.25 – 5.50)
<b>Antihyperlipidemic Drugs</b>		
Prevalence before intervention	5.75	6.125(5.5 – 6.75)
Prevalence after intervention	7.8	11.00 (10.25 – 11.75)
Difference	2.05	4.875
Incidence	2.5	1.8(2.9 – 4.7)

Univariate analysis of control group showed a mean value of 1.52 (range between 0.56 and 2.98) for males and 1.43 (range between 0.66 and 2.25) for females while computing age it showed a mean value of 1.01 (range between 0.92 and 1.57). The body mass index showed a mean value of 0.96 (range between 0.91 and 1.13) whereas mean SBP and DBP showed as mean value of 1.00 (0.95-1.05) and 0.97 (range between 0.93 and 1.11) respectively. Univariate and multivariate analysis among control group showed a mean value of total cholesterol level as 1.29 (range between 1.13 and 1.58) and 1.34 (range between 0.98 and

1.67) respectively. Univariate analysis of among the control group showed a mean value of SBG, microalbuminuria, smoking, family history of cardiovascular disease, cerebrovascular accident and myocardial infraction was 0.94 (range between 0.66 and 1.10), 1.05 (range between 1.05 and 1.09), 1.47 (range between 0.77 and 2.44), 1.02 (range between 0.70 and 2.03), 0.46 (range between 0.11 and 5.03) and 0.67 (range between 0.35 and 1.34) respectively. The data are provided in the Table 3.

**Table 3: Univariate and multivariate analysis relation among variables and utilization of antihypertensive or antihyperlipidemic drugs after the intervention**

Parameter	Odds Ratio(95%ConfidenceInterval)			
	Control Group		Intervention Group	
	Univariate	Multivariate	Univariate	Multivariate
Male (%)	1.52(0.56 – 2.98)	-	1.68(0.61 – 2.67)	-
Female (%)	1.43 (0.66 – 2.25)	-	1.33 (0.79 – 2.91)	-
Age (years)	1.01(0.92 – 1.57)	-	1.02(0.93 – 1.41)	-
SBP (mmHg)	1.00(0.95 – 1.05)	-	1.10(0.98 – 1.14)	1.12(0.96 – 1.15)
DBP (mmHg)	0.97(0.93 – 1.11)	-	1.01(0.98 – 1.16)	0.99(0.96 – 1.34)
TClevel(mg/dL)	1.29(1.13 – 1.58)*	1.34(0.98 – 1.67)	0.91(0.71 – 1.13)	-
SBG(mg/dL)	0.94(0.66 – 1.10)	-	1.04(0.86 – 1.07)	-
BMI (kg/m <sup>2</sup> )	0.96(0.91 – 1.13)	-	1.02(0.94 – 0.99)	-
Microalbuminuria (µg/ ml) (≤ 30)	1.05(1.05 – 1.09)	-	1.00(0.99 – 1.03)	-
Smoking (%)	1.47(0.77 – 2.44)	-	0.74(0.43 – 1.18)	-
CVD family history (%)	1.02(0.70 – 2.03)	-	1.41(0.67 – 2.45)	-
CV accident(%)	0.46(0.11 – 5.03)	-	5.42(0.78 – 6.01)	-
MI (%)	0.67(0.35 – 1.34)	-	1.58(0.45 – 6.57)	-

Univariate analysis of Intervention group showed mean value of 1.68 (range between 0.61 and 2.67) for males and 1.33 (range between 0.79 and 2.91) for females while computing age it showed a mean value of 1.02 (0.93-1.41). The body mass index showed a mean value of 1.02 (range between 0.94 and 0.99) whereas mean SBP and DBP showed as mean value of 1.10 (range between 0.98 and 1.14) and 1.01 (range between 0.98 and 1.16) respectively. Multivariate analysis of SBP and DBP showed a mean value of 1.12 (range between 0.96 and 1.15) and 0.99 (range between 0.96 and 1.34) respectively. Univariate analysis among the intervention group for total cholesterol level was 0.91 (range between 0.71 and 1.13).

Univariate analysis of among the intervention group showed a mean value of SBG, microalbuminuria, smoking, family history of cardiovascular disease, cerebrovascular accident and myocardial infraction was 1.04 (range between 0.86 and 1.07), 1.00 (range between 0.99 and 1.03), 0.74 (range between 0.43 and 1.18), 1.41 (range between 0.67 and 2.45), 5.42 (range between 0.78 and 6.01) and 1.58 (range between 0.45 and 6.57) respectively. The data are provided in the Table 3.

## Discussion

It has been observed from the findings of the present study that the screening followed by intervention to subjects and the doctors has led to reduce in the percentage of unattended hypertension and hyperlipidemia when compared with the control group. But, the present study therapeutic recommendations were considered only in about one of the third subjects with hypertension and hyperlipidemia.

The doctors were influenced due the risk causes itself rather than the due to other cardiovascular risk causes during the decision to follow our recommendations. During the baseline recording, occurrence of patients who were using antihypertensive and antihyperlipidemic agents before the intervention was not significantly different between the intervention and control group. This shows that the present study, while enhanced values of microalbuminuria shows an approximately overall range of the entire population.

The data shows about 17% for the use of antihyperlipidemic and 6% for the use of antihyperlipidemic agents marginally greater when compared to other reports in the India (1.84% for antihyperlipidemic and 1.10% for antihypertensive). It has been found that there was an increase in the number of new prescriptions for antihypertensive after the screening in addition to the intervention letter than in the control group. It displays that more subjects have started using antihypertensive in the study group than in the control population. The data which are obtained was in agreement with the literature.

Collins et al also proved that a letter intervention is effective to increase the number of prescriptions for dipyridamole similarly; Shashank R. Joshi et al observed that an intervention letter to the physician is effective to have an impact on the prescribing behavior [14]. The present study evaluated the effectiveness of intervention and population screening.

Both the participants and doctors were informed regarding the starting of treatment to reduce the hypertension and hyperlipidemia. Later, the patients were instructed to visit physician and to check risks and beneficial factors related to the individual study subjects. In spite of that, in a small portion of the study subjects we have informed to initiate treatment after obtaining the physicians advice to start drug therapy among asymptomatic subjects.

The treatment was started by following a criteria based JNC VII guidelines, which was less flexible when compared with internationally accepted criteria (systolic pressure > 140 mm Hg and diastolic pressure > 90 mm Hg). In view of this, the percentage of drug prescribed was not meeting guidelines criteria.

The subject with CV diseases along co morbid conditions like diabetes, smoking or family history of CVD the treatment have to be initiated immediately. But, few of the above mentioned causes were considered while taking decision to initiate the treatment among the study subjects. The data obtained are free from error, due to it was able to compare the effects of screening with successive intervention between the

prescriptions pattern of intervention groups and the study reported by Janifa Nachiya RAM et al, 2011 [10]. This seems to be comparable method as the prescription pattern of pre-intervention and the interventions are comparable in both studies. The data collected were not influenced by hypotheses from the doctors, since the data was collected from the doctors, pharmacies and not from the patients. The present study was aimed to help the patients and the doctors regarding the use of antihypertension drugs and antihyperlipidemic drug(s) in appropriate time to avoid risks and create awareness among the patients for visiting the clinics at regular periodic.

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## Conclusion

Based on the findings of the present study it has been concluded, conducting of a screening programme at community lead to avoid cardiovascular complications with intervention in drug treatment for hypertension and/ or hyperlipidemia had impact in prescribing pattern. The elevated blood pressure and cholesterol levels impact the physician to prescribe an antihypertensive and/ or antihyperlipidemic agents, however the presence of cardiovascular risk factors have to be established.