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Effect of lifestyle modifications among hypertensives in rural coastal Karnataka - a community-based intervention study

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Abstract

Uncontrolled hypertension greatly contributes to cardiovascular deaths and disability in India. Along with medications, different non-pharmacologic interventions can also help in reducing BP among hypertensives. The aim of this study was to investigate the effectiveness of a community-based health educational intervention in reducing BP among adult hypertensives in a rural community. An interventional study was conducted among adult hypertensives in two villages of coastal Karnataka, India. Sixty hypertensives were randomly selected from two villages and baseline data on diet, physical exercise and BP was recorded. Later participants in one village were provided health education on lifestyle modifications as an intervention and the other village acted as control group. The participants were followed up and assessed after a period of ten months and data on adherence to lifestyle modifications and BP was collected from both villages and compared. For statistical analysis unpaired Student's t-test was used to compare the difference between the two groups. There was a significant reduction in mean SBP and DBP in interventional village after providing health education and this reduction was 4.87 and 5.13 mm Hg respectively. In control group the mean SBP and DBP had increased as compared to baseline readings. This simple community-based health educational intervention along with regular BP monitoring and medications can help in reducing cardiovascular deaths and disability occurring due to uncontrolled hypertension. Further it can be scaled-up through peripheral level healthcare workers like ASHA's in rural parts of India, who share a close bond with community.

Keywords: Community based intervention, lifestyle modification, hypertension

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1. Introduction

Hypertension is the biggest modifiable risk factor contributing to the global incidence of cardiovascular deaths [1]. Evidence suggests that a 5 mm Hg reduction in systolic blood pressure (SBP) in the population can lead to a 14% overall reduction in mortality due to stroke, a 9% reduction in mortality due to coronary heart disease and a 7% reduction in all-cause mortality [2]. Even a small reduction in SBP at population level can have a substantial effect on cardiovascular death prevention [3]. This strategy for reducing the burden of premature cardiovascular morbidity and mortality is cost-effective, as it requires the use of only a few health resources [4]. The World Health Organisation (WHO) aims to achieve a 25 % relative reduction in the prevalence of hypertension by 2025. To achieve this objective, population-level interventions focusing on low-income and middle-income countries (LMICs) like India are needed. One study has reported that the prevalence of hypertension in India had risen by three times between 2004-05 and 2011-12, which was more than WHO Southeast Asia region's level of 25% [5]. The report of the fifth round of National Family Health Survey (NFHS 5) (2019-21) shows that prevalence of hypertension in India had risen to 24% and 21% in men and women, an increase from 19% and 17% respectively reported in the previous round of NHFS-4 (2015-16) [6]. Risk factors associated with hypertension are modifiable such as obesity, lifestyle and diet and non-modifiable like age, sex and genetic susceptibility [7]. Evidence shows that the Dietary Approaches to Stop Hypertension (DASH) dietary pattern, which recommends consuming fruits, vegetables, and low-fat dairy products, and a diet with low sodium intake, both together can significantly lower BP in persons with stage-1 hypertension [8-10]. Regular physical exercise can effectively lower BP and thereby forms an essential part of management of hypertension [11]. A meta-analysis performed to estimate the comparative effectiveness of different non-pharmacologic interventions for lowering BP, revealed that DASH diet might be the most effective intervention for lowering BP in

hypertensive adults [12]. The authors of this study further concluded that other non-pharmacologic interventions like aerobic exercise, low-sodium and high-potassium diet, salt restricted diet, breathing-control, meditation and low-calorie diet can also help in reducing BP [12]. Against this background, we conducted this study to investigate the effectiveness of a community based intervention of providing health education on DASH diet, salt restricted diet and physical exercise in lowering BP among the adult hypertensives in a rural community in India.

2. Materials and methods

A community-based field trial was conducted in two villages (Manjanady and Kuthar) situated in the coastal district of Dakshina Kannada in Karnataka state of India. These two villages were selected as they formed a part of the rural field practice area of a medical college. Manjanady village was assigned as interventional and Kuthar village as control group by random method. Further since these two villages are separated by a distance of about eight kilometres from each other, this can help in reducing interactions between the people of the two villages and thereby reduce the chances of any information bias. The two villages had a combined total population of about 600 people and based on a previous study which reported the prevalence of hypertension in rural areas as being 16%, [13] the total number of hypertensives in these two villages was estimated to be 96, with a confidence interval of 95%, power of study as 80% and considering that lifestyle modifications was already being followed by about 40% of hypertensives, [14] the sample size required was estimated to be 28 in each group using Statcal tool of Epi Info. We enrolled a total of 60 people, with 30 from each village. The study participants were selected by simple random sampling and those fulfilling the inclusion and exclusion criteria. The inclusion criteria were: i) clinically diagnosed hypertensive, between the ages of 30 to 60 years and on antihypertensive medications ii) having SBP between 130 to 179 mm of Hg iii) Diastolic BP (DBP) between 80 to 109 mm of Hg based on the average of two screening visits. Exclusion criteria were: i) history of any cardiovascular event such as congestive heart failure and angina pectoris ii) taking medication for diabetes in the past two years iii) pregnant or lactating women iv) diagnosed with cancer. Ethical clearance was obtained from the institutional ethics committee before undertaking the study. After obtaining written informed consent from participants, baseline data was collected by study investigator by visiting the participants houses in both villages. Data was collected by using a pre-tested and validated questionnaire. Data on demographic profile, DASH diet, regular physical exercise, consumption of salt in diet and dietary practices was collected over a period of two months. BP was measured by using a digital BP instrument. Three BP readings were taken in five minute intervals, and the mean of the last two readings was used for the study. If a participant was not available in their home during two consecutive visits, then they were excluded from the study and another person was enrolled using the same criteria. Later a health education module was prepared by consulting domain experts and considering the local food practices. It contained information on hypertension, DASH diet, reduced sodium intake in diet and regular physical exercise. Using this module, health education was imparted to participants in intervention village using posters, video and charts by a team of medical students over a period of two months. The students were trained by study investigators before providing health education. Then after a period of ten months, a follow-up of participants in both villages was done by investigators to collect data on adherence to DASH diet, performance of regular physical exercise and consumption of salted pickles during meals using a questionnaire and BP was also recorded. The primary outcome was mean SBP and DBP in participants at the end of study period. Data analysis was done using SPSS version 24 software and a P value of less than 0.05 was considered as statistically significant. Unpaired Student t-test was used to check difference of mean SBP and DBP between the two groups.

3. Results and Discussions

In this study we recruited a total of 60 hypertensives who were on treatment, among whom 24 were males and 36 females based on the study criteria. Their ages ranged from 33 to 60 years with a mean of 49.8 years. After the intervention, mean SBP decreased between baseline and follow-up by 4.87 mm Hg and mean DBP by 5.13 mm Hg in the intervention group (Table 1). This difference in mean DBP was statistically significant. In comparison, mean SBP increased between baseline and follow-up by 0.60 mm Hg and mean DBP by 1.73 mm Hg in the control group. Post-intervention, the number of participants performing regular physical exercise had decreased in both groups, but the differences was not significant (Table 2). In the context of adherence to DASH diet, it increased between baseline and follow-up from five (16.7%) to 21 (70%) persons in interventional village and this difference was significant (Table 3). Whereas in control village, it reduced between baseline and follow-up from six (20 %) to three persons (10 %). In terms of adherence to salt restricted diet, it had decrease between baseline and follow-up from 66.7% to 33.3% in interventional group and this difference was significant (Table 4). In comparison, it increased between baseline and follow-up from 26 % to 43 % in control group.

In the present study, after providing a community-based health education intervention there was a significant reduction in mean SBP and DBP among hypertensives in intervention group. In comparison the mean SBP and DBP of control group had increased from baseline to follow-up readings. These results are similar to the findings of Appel L J et al. [15] who reported that after providing a health education intervention to hypertensives about the benefits of following DASH diet and performing regular physical activity, there was a reduction in their mean BP readings. A study by Cappuccio et al. [16] who conducted a community-based cluster randomised trial of health promotion in 1,013 participants from 12 villages in Ghana, concluded that a reduction in the average salt intake in the whole community may lead to a small but significant reduction in population SBP. In this study after intervention, there was a significant increase in the number of people following DASH diet, but in control group it had reduced. Further we also found that, post-intervention the adherence to salt restricted diet had significantly increased in interventional group. These findings are in line with the study results of Spiteri et al. [17] who reported that after providing a health educational intervention, adherence to salt restricted diet had significantly increased in the study participants.

Table 1: Comparison of mean SBP and DBP between control and intervention group

Study group	BP (mm Hg)	Baseline (mean ± SD)	Post-intervention (mean ± SD)	P value
Control group	Systolic	139.73 ± 9.68	140.33 ± 8.20	0.823
	Diastolic	88.93 ± 9.10	90.66 ± 5.12	0.378
Intervention group	Systolic	140.20 ± 10.63	135.33 ± 5.44	0.033
	Diastolic	92.73 ± 3.91	87.60 ± 4.96	0.0004

Table 2: Adherence to regular physical exercise in control and intervention group

Study group	Regular physical exercise	Baseline (%)	Post-intervention (%)	P value
Control group	Not performing	20 (66.6)	24 (80)	0.238
	Performing	10 (33.3)	6 (20)	
Intervention group	Not performing	21 (70)	26 (86.7)	0.110
	Performing	9 (30)	4 (13.3)	

Table 3: Adherence to DASH diet in control and intervention group

Study group	Adherence to DASH diet	Baseline (%)	Post-intervention (%)	P value
Control group	No	24 (80)	27 (90)	0.273
	Yes	6 (20)	3 (10)	
Intervention group	No	25 (83.3)	9 (30)	0.0003
	Yes	5 (16.7)	21 (70)	

Table 4: Adherence to salt restricted diet in control and intervention group

Study group	Adherence to salt restricted diet	Baseline (%)	Post-intervention (%)	P value
Control group	Yes	22 (73.3)	17 (56.7)	0.169
	No	8 (26.7)	13 (43.3)	
Intervention group	Yes	10 (33.3)	20 (66.7)	0.006
	No	20 (66.7)	10 (33.3)	

4. Conclusions

In this study we confirmed that a community-based health educational intervention can help in effectively reducing the mean SBP and DBP among hypertensives. The hypertensives who received health education reported a significant increase in adherence to DASH diet and salt restricted diet. Providing health education on lifestyle modifications such as DASH diet, salt restricted diet and regular physical exercise along with medications, can help in reducing the burden of cardiovascular diseases, which is a public health problem in India. Further since this intervention is simple, grass root level healthcare workers such as Accredited Social Health Activist (ASHA) and multipurpose health workers can be trained in implementing this intervention in the local languages at the doorstep level in rural parts of India. Therefore this approach can be a cost-effective public health intervention as compared to the resource intensive secondary or tertiary level healthcare services which are needed to treat or rehabilitate people with complications arising due to uncontrolled hypertension. Limitations of this study are, since it was conducted over a period of 12 months, we could not determine if the changes in BP could be sustained over a longer period of time and as data collection was done by interview method, recall bias can be present.

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