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Original Research Article

Interventional study - effectiveness of information, education and communication (IEC) intervention among hypertensive patients in rural areas of Gadag, South India

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Abstract

Background: Hypertension demonstrates an iceberg phenomenon with an extent of unknown morbidity surpasses the known morbidity. Traditionally, hypertension has been perceived as asymptomatic, with even individuals deemed healthy reporting subjective symptoms. In Gadag district the prevalence of hypertension is 22.1% among females and 23.9% among males. Essential approaches to manage blood pressure encompass such as weight loss, healthy balanced diet with reduction of salt intake, limitation of alcohol consumption, and promotion of physical activity.
Objectives: 1) Assess the effectiveness of IEC intervention in controlling hypertension. 2) To identify the potential reasons for uncontrolled hypertension.
Materials and Methods: Interventional pre-test and post-tests were carried out at Kurthkoti, Nagavi and Hulkoti villages as identified in sampling. A two-stage sampling was used to recruit the participants. 150 participants were included in the study. A pre-tested interview schedule was used to obtain the data from the participants during December 2023-January 2024. Data were expressed in frequency and percentages: Paired T test was used to assess the effectiveness of the intervention. The intervention was disseminated through home visits and the distribution of pamphlets on hypertension control.
Results: In the current study 54% of participants were male and 46% were female, pre-test mean systolic blood pressure and standard deviation was 147.26mmhg (4.2), and post-test was 137.83 mmhg (5.6), the mean difference was 10. The pre-test mean diastolic blood pressure and standard deviation was 86.27 mmhg (6.37), and the post-test was 77.6 mmhg (4.93), the mean difference was 8.6. The intervention was found significant with a p-value of 0.001. Reasons for uncontrolled hypertension was non-adherence to medications 10(37.1%), physical inactivity 5(18.5%), financial barriers 8(29.6%) and difficulty in altering lifestyle was 4(14.8%).
Conclusion: The current study assessed the effectiveness of IEC intervention in controlling hypertension was found effective among subjects. Potential reasons for uncontrolled hypertension were non-adherence to medications, physical inactivity, financial issues, and difficulty in altering lifestyles.

Keywords: Effectiveness, Information education and communication, Hypertension patients.

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1. Introduction

Hypertension can be characterized as a systolic blood pressure that equals or exceeds 140 mm Hg, or a diastolic blood pressure that equals or exceeds 90 mm hg.[1] Hypertension demonstrates an iceberg phenomenon with an extent of unknown morbidity surpasses the known morbidity.[2] Traditionally, hypertension has been perceived as asymptomatic, with even individuals deemed healthy reporting subjective symptoms. Unidentified symptoms led to inadequate medication and therapy adherence. Patients with hypertension displayed a bad quality of life about their health.[3] In low- to middle-income nations, there exists some indications suggesting that a higher socioeconomic position might be linked to an increased likelihood of hypertension.[4]

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It was projected that the global burden would experience an increase from approximately 0.9 billion in the year 2000 to 1.6 billion in 2025. In 2016, noncommunicable diseases were responsible for 40.5 million deaths worldwide, which accounted for 71% of all deaths.[5] In the Gadag district among females mildly increased blood pressure is reported at a rate of 12.1%. A higher level of blood pressure, either severely increased or moderately increased is reported at a rate of 6.8%. Blood pressure that is elevated is reported at a rate of 22.1%. Among males mildly increased blood pressure was observed in 14.7% of the studied population. The prevalence of severely increased blood pressure or moderate hypertension was found to be 7.1%. Additionally, elevated blood pressure was reported in 23.9% of the individuals.[6]

The ingestion of tobacco, alcohol, and marijuana products is a significant public health concern owing to its widespread usage and correlation with many health issues, including hypertension, and higher probability of mortality.[7] Modifiable risk factors are Diabetes mellitus, passive smoking, cigarette smoking, elevated cholesterol and dyslipidemia, Being overweight or obese, a lack of exercise or poor fitness, unhealthy diet. Nonmodifiable risk factors inherited traits, gender, aging, and genetics obstructive sleep apnea, psychological strain, and chronic kidney disease.[8]

The amalgamation of community health workers personal health intervention and doctors' expertise dropped blood pressure and was economically viable.[9] Information Education and Communication (IEC) is a systematic procedure designed to provide individuals with the necessary knowledge, motivation, and support to embrace and uphold healthy habits and essential life competencies.[10] The guidelines for managing hypertension suggest participation in self-care practices including self-monitoring of blood pressure, reducing dietary sodium intake, increasing physical activity, limiting alcohol consumption, adhering to a Dietary Approaches to Stop Hypertension (DASH) diet, managing weight, and abstaining from tobacco use as means to alter one's lifestyle for optimal blood pressure regulation.[11] The physiological processes that govern the positive effects from these changes in lifestyle on hypertension include diminished sympathetic overactivation, and prevention of traditional risk factors like obesity and diabetes alongside enhancements in circulation through a favourable oxidative and inflammatory prominence.[12]

In 2005, the World Hypertension League commemorated World Hypertension Day to enhance awareness regarding high blood pressure and its associated health complications. This annual event occurs on May 17 each year across different nations globally, with the objective of reducing the impact of the 'silent killer'.[13] There exist correlations between quantified physical fitness and the occurrence of hypertension. Enhanced levels of physical activity and heightened fitness levels at the beginning of a study are linked to a lower occurrence rate of hypertension.[14]

India expended INR 44 billion in out-of-pocket expenses as a result of hypertension, heightened incidence of out-of-pocket expenditures elevates the susceptibility to experiencing catastrophic costs and may consequently heighten the risk of falling into poverty.[15] Fiscal projections indicate that by 2035, the total cost of hypertension could surpass an estimated $221 billion, or 20% of all medical expenses.[16] The medication classifications that hypertension patients reported taking most frequently were diuretics, ACE inhibitors, beta blockers, and calcium channel blockers. Additional drugs included direct-acting agents (minoxidil), central-acting agents (clonidine and methyldopa), and peripheral alpha-blockers (terazosin, prazosin).[17] Incompetence to control Hypertension In spite of therapy stubborn illness deprived lifestyles, inadequate titration of medication, and nonadherence by patients to treatment.[18]

Uncontrolled hypertension can lead to angina, cardiac arrest, cardiac failure, and irregular heartbeats as complications. Hypertension can harm the kidneys and eventually finish in renal failure by blocking arteries and triggering a stroke.[19] Digital medical therapies offers a potential economical means of alleviating a rising health burden by offering people tailored guidance and feedback, versatile and simple access, and automatic for self-management.[20]

Through the engagement of the hypertensive person in a social network, positive attitudes pertaining to health surveillance were fostered. These perspectives embrace exchange of information, catastrophe support, and universal wellness, involving adequate nutrition, physical activity, sound sleep, and adherence to medication. When an individual confronts a sickness, family members may nurture in person an atmosphere of assurance, gallantry, and resilience.[21] The national program for prevention and control of non-communicable disease also encompasses provisions for delivering complimentary diagnostic facilities and medication to patients who seek medical attention at these NCD clinics.[22]

2. Materials and Methods

2.1. Study setting

The study was conducted in households located in the rural areas of Gadag Taluk, specifically in Kurthkoti, Nagavi, and Hulkoti. Data were collected from December 2023 to January 2024 using pre tested interview schedule. The study participants were hypertensive patients undergoing regular treatment in Gadag Taluk. Quantitative primary data were collected.

2.2. Study design

Interventional study (pre-test and post-test).

2.3. Sampling design

A two-stage sampling method was employed. In the first stage, random sampling was used to select three villages: Nagavi, Hulkoti, and Kurthkoti. In the second stage, systematic random sampling of households in each village was carried out by visiting every 5th household until the target sample size was reached.

2.4. Sample size

The sample size was calculated using the formula $4pq/l^2$. According to the ICMR Lancet report released in 2022, the prevalence of hypertension in rural Karnataka is 30% and with a margin of error of 7.5%. Based on this prevalence, a sample size of 150 was selected. Proportionate sampling was used to determine the sample size in each village: Nagavi - 21, Kurthkoti - 63, and Hulkoti - 66.

2.5. Variables

Independent variables: Gender, age, education and income status. Dependent variables: Effectiveness of intervention.

2.6. Analysis of data

Data were entered and analyzed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) version 20 software. Descriptive variables were expressed in frequencies and percentages. A paired student's T-test was used.

2.6.1. Phase -1 pre-test

The first phase involved administering a pre-test interview to participants to assess their baseline blood pressure readings, which were obtained by recording the average of three separate measurements.

2.6.2. Phase -2 intervention programme

The second phase involves implementing the intervention program, which is designed to enhance understanding of hypertension and provide Information, Education, and Communication (IEC) about controlling it. The intervention was administered once a week for four weeks.

This phase includes activities such as: a) Providing information on hypertension control. b) Distributing pamphlets regarding hypertension control.

2.6.3. Phase -3 post-test

The final phase involves administering a post-test to participants to assess blood pressure control after the intervention program. This will help determine the program's effectiveness by measuring blood pressure readings. The post-test will include the average of three blood pressure readings, similar to those taken during the pre-test.

2.7. Intervention administered

1. Regular physical activity includes daily chores, work-related tasks, leisure activities, and routines such as cycling, walking, stairs climbing and slow jogging. To benefit from its cardio-protective effects, it is essential to engage in 30 minutes of moderate-intensity exercise each day.
2. Dietary modifications: Following DASH diet 1. Consuming fruits, vegetables, low-fat dairy products; 2. Eating whole grains, legumes, seeds, nuts, and vegetable oils; 3. Cutting back on cholesterol and saturated fats; 4. Restricting sugary drinks, sweets, and red meat; 5. Eating foods high in fibre 6. Drinking enough water each day.
   a. Certain vegetables should be consumed: cucumber, beans, chickpeas, turnips, sweet potatoes, cauliflower, sprouts, and fresh tomatoes. Fried dishes, pickles, canned vegetables, and vegetables in sauce should be restricted.
   b. Bananas, oranges, apples, pomegranates, grapes, pineapples, watermelons, and papayas are among the fruits that need to be consumed.
3. Alcohol restriction: A healthy adult shouldn't frequently consume exceeding over three to four units of alcohol for men and two to three units for women every day. 48 hours should pass before consuming any alcohol if there has been substantial alcohol consumption. A normal drink is approximately 44 millilitres (ml) of distilled spirits (such as vodka or whisky), 148 millilitres of wine, or 355 millilitres of beer, or 14 grammes of pure alcohol.
4. Tobacco cessation: Quitting smoking might not directly lower blood pressure, but it significantly decreases overall cardiovascular risk. Smokers have a 2 to 6 times greater risk of myocardial infarction and a 3 times higher risk of stroke compared to non-smokers. By quitting smoking, individuals can lower their risk of coronary heart disease.
5. Weight reduction: Attain and maintain a healthy weight. All overweight or obese people should lose weight by combining a lower-calorie diet with more physical activity, behavioural modification, and dietary changes.
6. Salt reduction: According to WHO standards, individuals should be actively recommended to limit their intake of salt to less than 5 g (or 90 mmol) each day. Limiting intake of salt can be achieved in a number of ways, such as eliminating added salt from the diet, selecting low-salt processed foods, staying away from high-salt processed foods, salty snacks, and high-salted takeaway meals. Foods including pickles, sauces, chutneys, ketchups, papads, salted biscuits, cheese, salted butter, and, as well as baked goods and dried salted fish, should be consumed in moderation due to their high salt content.

7. Stress management: Practicing regular yoga meditation and deep breathing exercise reduces stress and helps in stress management. Yogasanas, Mudras and Pranayamas. Mudras for example pranayama mudra and shunya mudra and pranayamas (breathing techniques) Anuloma Villoma, Ujjayi Pranayama and Shitali pranayama.

3. Results

One-fourth of the participants were female more than half of the participants were male. In the current study, very few of the participants are in the age group of 30-40 years, one-fourth of the participants are 41-50 years and 51-60 years. Very few of the participants were 61-70 years category. Very few of the participants didn't attend any formal education, very few of the participants have completed pre-university, secondary, education, and undergraduate respectively and one-fourth of the participants have completed primary education. Very few of the participants were unemployed, one-fourth of the participants were daily labor and self-employment. Very few of them were from agricultural backgrounds and government employees. In the current study, one-fourth of the participants have annual incomes of less than 10 thousand and 10 thousand to 50 thousand and very few of the participants have an annual income of more than 50 thousand. In the current study very few of the participants were unmarried and widowed respectively and most all the participants were married. (**Table 1**)

In the current study all most all the participants are in regular treatment and very few of them are in irregular treatment. In the current study, one-fourth of the participants have accessed health care services in the government health care facilities and more than half of the participants accessed health care facilities in private health care facilities. One fourth of the participants were on medications less than 1 year, 1-2 years, 2-3 years and 3 years and above respectively.(**Table 2**)

In the current study, one-fourth of the participants were practicing physical exercises and the majority of the participants do not practice physical exercises. In the current study, one-fourth of the participants have diet patterns as non-vegetarian and more than half of the participants have diet patterns as vegetarians. In the current study, more than half of the participants have the habit of consumption of alcohol, and one-fourth of the participants do not have the habit of alcohol addiction. In the current study more than half of the participants have the habit of consumption of any form of tobacco consumption and one-fourth of the participants have the habit of any form of tobacco addiction. In the current study, one-fourth of the participants practice yoga and meditation and more than half of the participants do not practice yoga and meditation.(**Table 3**)

Table 1: Distribution of socio-demographic details of study participants (n=150)

Characteristics	Variables	Frequency (%)
Gender	Male	81(54%)
	Female	69(46%)
Age groups	30-40	16(10.7%)
	41-50	64(42.7%)
	51-60	51(34%)
	61-70	19(12.7%)
Educational status	No formal education	23(15.3%)
	Primary	61(40.7%)
	Secondary	30(20%)
	Pre-university	27(18%)
	Undergraduate	9(6%)
Occupation	Unemployed	20(13.3%)
	Daily labor	38(25.3%)
	Self -employed	42(28%)
	Agriculture	37(24.7%)
	government employee	13(8.7%)
Annual Household Income	less than 10 thousand	44(29.3%)
	10 thousand to 50 thousand	70(46.7%)
	more than 50 thousand	36(24%)
Marital Status	Unmarried	2(1.3%)
	Married	135(90.0%)
	Widowed	13(8.7%)

Table 2: Distribution of treatment seeking behaviours among hypertensive participants (n=150)

Characteristics	Responses	Frequency (%)
Regular Treatment	Yes	147(98%)
	No	3(2%)
Seeking Treatment	Government	70(46.7%)
	Private	80(53.3%)
Years on medications	Less than 1 year	37(24.6%)
	1-2 years	32(21.4%)
	2-3 years	39(26%)
	3 years and above	42(28%)

In the current study, the pre-test mean systolic blood pressure was 147.26 ± 4.2 mmHg, while the post-test mean was 137.83 ± 5.6 mmHg. The mean difference of 10 mmHg was statistically significant ($p < 0.001$, df = 149. (**Table 4**)

In the current study, the pre-test mean diastolic blood pressure was 86.27 ± 6.37 mmHg, while the post-test mean was 77.6 ± 4.93 mmHg. The mean difference of 8.6 mmHg was statistically significant ($p < 0.001$, df = 149). (**Table 5**)

In the current study more than half of the participants have family support in dietary management in controlling blood pressure and one-fourth of the participants do not have family support in dietary management in controlling blood pressure. In the current study, one-fourth of the participants have family support in practicing physical exercise in the management of blood pressure and more than half of the participants do not have family support in practicing physical exercise in the management of blood pressure. The majority of the participants have family support in medicine management and very few of them do not have family support in medicine intake. Study findings suggest that families prioritize medication adherence over modifications in lifestyle due to limited awareness or challenges associated with sustaining long-term lifestyle alterations. Study findings emphasize that the engagement of family members in IEC interventions contributes significantly to the management of hypertension. (**Table 6**)

In the current study, one-fourth of the participants were non-adherence to medications in controlling blood pressure, very few of them were physically inactive, one-fourth of them suffered financial issues and few of them found difficulty in altering their lifestyle. Study findings indicates financial limitations may have constrained participants capacity to consistently purchase medications, access more nutritious food options, or obtain timely follow-up medical care, which in turn indirectly influences blood pressure management. (**Table 7**)

Table 3: Distribution of lifestyles of the participants (n=150)

Characteristics	Responses	Frequency (%)
Physical exercise	Yes	64(42.67%)
	No	86(77.33%)
Dietary pattern	Non-Vegetarian	71(47.3%)
	Vegetarian	79(52.7%)
Alcohol addiction	Yes	83(55.3%)
	No	67(44.7%)
Tobacco addiction	Yes	102(68%)
	No	48(32%)
Yoga and Meditation	Yes	41(27.3%)
	No	109(72.7%)

Table 4: Distribution of pre-test and post-test systolic blood pressure findings (paired sampled – t-test)

Variables	Mean	Mean difference	Standard deviation	Df	p-value
Pre-test	147.26	10	4.2	149	<0.001
Post-test	137.83		5.6		

Table 5: Distribution of pre-test and post-test diastolic blood pressure findings (paired sampled – t-test)

Variables	Mean	Mean difference	Standard deviation	Df	p-value
Pre-test	86.27	8.6	6.37	149	<0.001
Post-test	77.6		4.93		

Table 6: Distribution of family support in the management of hypertension

Family support in the following activities	Responses	Frequency (%)
Diet management	Yes	91(60.7%)
	No	59(39.3%)
Physical exercise	Yes	47(31.3%)
	No	103(68.7%)
Medicines intake	Yes	131(87.3%)
	No	19(12.7%)

Table 7: Reasons for uncontrolled hypertension (n=27)

Variables	Frequency (%)
Non-adherence to medications	10(37.1%)
Physical inactivity	5(18.5%)
Financial issues	8(29.6%)
Difficulty in altering lifestyle	4(14.8%)

4. Discussion

4.1. Population characteristics

In the current study, very few of the participants are in the age group of 30-40 years, one-fourth of the participants are 41-50 years and 51-60 years. Regarding education, 15.3% had no formal education, 16.7% had PUC (Pre-University Course), 40% had primary education, and 20% had secondary education.

A similar study conducted in Assam, India, found the mean age to be 40.4 years in the interventional group and 44.5 years in the non-interventional group. In that study, 58.6% of participants were illiterate, 33.3% had primary education, and 8.7% had secondary education.[23]

4.2. Blood pressure reduction

In the current study, initial mean systolic blood pressure was 147.26 mm hg initial diastolic blood pressure was 86.27 mm hg and final blood pressure was 137.83 mm hg and final diastolic blood pressure was 77.6 mm hg and the difference in systolic blood pressure was 10 and difference in diastolic blood pressure. The significance level was 0.001.

The study conducted in Karachi, Pakistan mean systolic blood pressure was 114 mm hg and mean diastolic blood pressure was 74 mm hg among home health interventions. The difference in change in systolic blood pressure between the groups was statistically significant (P=0.02).[24]

Study conducted in Shanghai, China when comparing the intervention group to the control group, the integrative program decreased the incidence of hypertension (odds ratio (OR) = 0.27, 95% confidence interval (CI) = 0.12-0.61).[25]

The study conducted in Sousse Jawhra and Sousse Erriadh nonsmoking people in the intervention area showed a significant improvement in their mean systolic and diastolic blood pressure (DBP: 78.9 ± 11.5 mmHg to 76.7 ± 11, $p < 0.001$) and SBP: 131.9 ± 19.4 mmHg to 129.9 ± 17.4 mmHg, $p = 0.04$.[26]

4.3. Family support

In the current study, 60.7% have family support in diet management 39.3% have no family support in diet management 31.7% have family support in physical exercise and 68.7% participants do not have family support.

No similar study conducted in Kollam, Kerala on family support. A score of <1.37, 1.38-1.56, 1.57-1.68, and 1.69 or greater was considered as minimal, mild, moderate, and strong support respectively.[11]

4.4. Uncontrolled hypertension

In the current study potential reasons for uncontrolled hypertension were non-adherence with medication was 37.1%, physical inactivity was 18.5%, financial issues were 29.6% and difficulty in altering lifestyle was 14.8%.

The study conducted in Eastern Ethiopia potentially reasons for uncontrolled hypertension are attributed to the fact that the rate of non-compliance with medication stood at 55.9%, while physical inactivity was observed in 44.1%.[27]

5. Conclusion

The current study assessed the effectiveness of IEC intervention in controlling hypertension was found effective among subjects. Potential reasons for uncontrolled hypertension were non-adherence to medications, physical inactivity, financial issues, and difficulty in altering lifestyles. Despite this improvement, the intervention sessions should be continued, as a higher degree of information is necessary to achieve lasting behavior change towards hypertension control. IEC intervention has been shown to be an effective educational approach for changing behavior towards controlling hypertension.

6. Ethical Approval

Ethical approval obtained from Institutional Ethical Committee of Karnataka State Rural Development Panchayat Raj University Gadag (Ref. No. RDPRU/SEP/MPH/2023/24).

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