

Original Research Article

Barriers of dietary salt reduction among hypertensive patients: a cross sectional study

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ABSTRACT

Background: Healthy dietary practice is an important lifestyle modification and one of the key adjuncts to pharmacotherapy in management of hypertension. A modest reduction in salt intake of 5 gm/day lowered blood pressure by 7/4 mmHg diastolic in hypertensive patients. Despite knowledge about the ill consequences, many people continue to consume high levels of salt in their diet. To motivate people to reduce salt in their diet, a solid understanding of barriers encountered by those under salt reduction recommendation is necessary. Hence, this study was conducted with the aim of identifying the barriers to dietary salt reduction among hypertensive patients.

Methods: A community based cross sectional study was conducted on a sample of 356 hypertensive patients in field practice areas (urban and rural) in Department of Community Medicine, JNMC, AMU, Aligarh. A pretested semi-structured questionnaire was used for the study. Compliance to dietary salt intake was assessed by calculating average salt intake per person per day. The tenets of health belief model were used to examine the key determinants of human behavior. Analysis was done by using correlation, proportions, chi-square and multiple linear regression.

Results: 31.4% of the participants took salt <5 gm per day. A significant association was noticed with area, religion, social class, family size, perceived benefits and perceived susceptibility. A significant positive correlation was seen with total adherence score and family size.

Conclusions: A lot of barriers hinder the compliance to dietary salt reduction. Health Education stressing the role of salt reduction in control of blood pressure is recommended.

Keywords: Health belief model, Hypertension, Salt barriers

INTRODUCTION

Hypertension is a universal epidemic, affecting one-third adults or one billion people.^{1,2} Globally cardiovascular diseases account for nearly one-third of the total. Hypertension accounts for at least 45% of deaths due to heart disease and 51% due to stroke.³ Hypertension affects more people in low and middle income countries, because more people reside in these areas in consort with a higher prevalence rate in these areas. Additionally, a large number of people are undiagnosed, untreated and uncontrolled in these countries.⁴

Suitable management of hypertension requires adequate blood pressure control, prevents complications and support appropriate therapy.⁵ Both pharmacotherapy and behavioral modifications are required for proper treatment of hypertension.^{6,7} The responsibility of management lies completely on the patient afore the health personnel.⁵ Perception, assessment of health belief, and behavioral modification strategies are required in the recent concept of self-management of chronic diseases.⁸ Adherence to medication and therapeutic lifestyle modifications are important to achieve adequate blood pressure control and have been poor in Indian settings.⁹

High salt intake is an important behavioral and biological risk factor for hypertension. A modest reduction of 3.4 mm Hg and 1.5 mmHg was noted in resting systolic and diastolic blood pressure respectively.¹⁰ Consumption of sodium more than 3.5 gm/day is also associated with cardiovascular events.¹¹⁻¹³ WHO recommends a reduction in salt intake to less than 5 gm/day (sodium 2 gm/day) to reduce blood pressure and risk of coronary heart disease and stroke.¹⁴

Measured data on mean population salt intake are available mainly for high and middle income countries with the increased processing in food industry and a greater availability of processed foods both in urban and rural areas of low and middle income countries, sources of sodium are shifting towards these foods.¹⁵

As per global Status of NCD 2014, intakes of sodium appear highest in south east and central Asia and parts of Europe. WHO regions of Americas, and European and Western Pacific regions also show salt consumption higher than the WHO recommendations. The same report also presents the mean sodium intake in India to range between 3.5-4.24 gm/day.¹⁵

Understanding from other countries have suggested poor compliance to dietary modification among patients with chronic diseases.¹⁶⁻¹⁸ Similarly, poor diet related health care practices have also been reported in different settings in India.¹⁹⁻²¹

Many physical and psychological theories have been used to scrutinize the factors in milieu of compliance. Average family size, preference of food, duration of hypertension, no. of pills, and other socio-demographic factors play a role in defining the compliance. Apart from this some psychological and behavioral dynamic have a major impact on the compliance. When these variables were conceptualized in the context of health-related behavior, the correspondences are (a) the desire to avoid illness and (b) the belief that a specific action will prevent illness. The HBM contains several primary concepts that predict why people will take action to prevent, to screen for, or to control illness conditions; these include susceptibility, seriousness, benefits and barriers to a behavior, and cues to action.²²

A dearth of literature on dietary practices remains in Uttar Pradesh. The need of the hour to apprehend the culture specific facilitating and hindering factors that influence the adoption of healthy dietary practices among patients with hypertension. Hence the current study was conducted with the aim of identifying the barriers and facilitators to dietary salt reduction among hypertensive patients.

METHODS

This was a community based cross-sectional study conducted in the field practice areas (urban and rural) of

Department of Community Medicine, JNMC, AMU, Aligarh from July 2015 to June 2016.

This study was a part of a larger study which was conducted to measure the compliance to drug adherence. Based on a previous study, prevalence for sample size calculation was taken as 15.3%.²³ At 95% confidence with a marginal error of 5% sample size and 10% non-response simple size was calculated as 356. Out of these 6 participants were excluded. A total of 350 hypertensive patients were included in the study by a simple random sampling from a list of all the hypertensive in the field practice area which was prepared by door to door survey. Line listing was done to avoid overlapping of patients. From the list, the sample to be drawn from each area was calculated depending on proportionate to population sampling method.

Inclusion criteria

All the patients ≥ 18 years and who had taken antihypertensive for at least one month were included in the study.

Exclusion criteria

The patients who did not give consent and who were too sick to participate in the study. Also, excluded from the study was pregnancy induced hypertension.

A pre-designed and pre-tested proforma was used in the study.

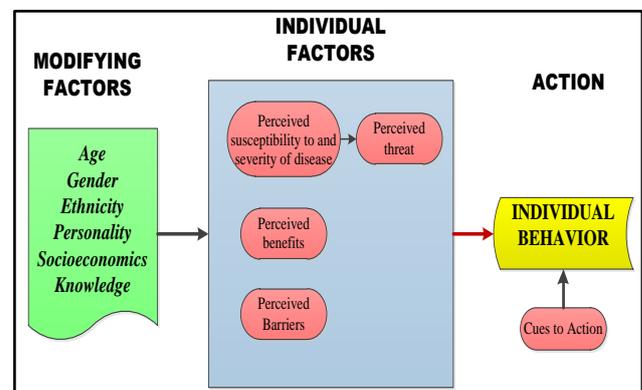


Figure 1: Interplay of tenets of health belief model.

The average salt intake per day was calculated by dividing the monthly intake with the number of family members and later the same divided by 30 to get the daily intake. A five point Likert scale was used to analyze different components of health belief model. Some questions were set such that the highest score did not reflect the worst scenario of none-compliance. To resolve these scores were reversed. For each element all the items were added to get a total score. Further dichotomization was done into two groups: high and low. Analysis was done by using correlation, proportions, chi-square and

multiple linear regression. Data was analysed using the SPSS version 20.0.

Ethical clearance was obtained from institutional ethics committee, JN Medical College, AMU, Aligarh. Informed written consent was taken from each patient before interview. The nature and purpose of the survey were explained to them.

RESULTS

Out of the 356 patients who participated in the study, 6 participants were excluded from the study because they were too sick to participate in the study. The mean age of the respondents was 58.95±10.24 with a range of 33-89 years. There were 245 males (70%) and 105 females (30%). Nearly one third of the population did not have a formal education. There was closely an equal distribution of population based on religion. Around 60% of the population was engaged in a job of any form.

Around 31% of the population testified an average consumption of salt per day of ≤5 gm/day.

However, the method adapted for assessing the average salt consumption contributes only an approximate measure of average salt consumption.

A two-predictor logistic model was fitted to the data to test the research hypothesis to test the relationship between a hypertensive patient compliant to dietary salt

and his age, gender and other socio-demographic factors. The model was first tested for the assumptions like linearity of logit (significance values for the interactions was more than 0.05) and multicollinearity (tolerance>0.1 and VIF<10). A Cox and Snell R square (0.138) and Nagelkerke’s R square (0.194) suggested that the model was a good fit. Further, a non-significant chi-square statistic by Hosmer and Lomeshaw test ($\chi^2=12.186$ and $p=0.143$) supports the above. The overall percentage of classification of the model with the predictors was 73.1%.

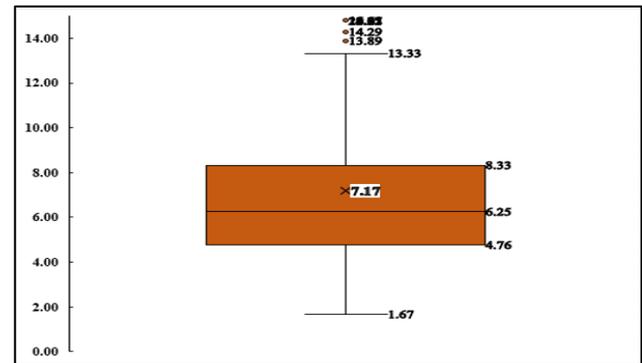


Figure 2: Distribution of salt consumption.

The result showed that:

$$\text{Predicted logit of (compliance)} = 1.337 + (-0.853) \times \text{area} + (-0.106) \times \text{family size} + 1.218 \times (\text{social class 1}) + 0.868 \times (\text{social class 3}).$$

Table 1: Logistic regression analysis for compliance of daily dietary salt and socio demographic variants (n=350).

Predictors	B	S.E.	Wald	df	Sig.	Exp (B)
Gender (1)	-0.318	0.603	0.278	1	0.598	0.728
Area (1)	-0.853	0.353	5.832	1	0.016*	0.426
Religion (1)	0.447	0.350	1.632	1	0.201	1.564
Marital group (1)	-0.324	0.327	0.985	1	0.321	0.723
Occupation group			0.130	2	0.937	
Occupation group (1)	0.048	0.665	0.005	1	0.943	1.049
Occupation group (2)	-0.109	0.579	0.035	1	0.851	0.897
Type of family (1)	0.239	0.338	0.498	1	0.480	1.270
Step 1^a Family size	-0.106	0.043	5.944	1	0.015*	0.900
Social class			7.286	4	0.122	
Social class (1)	1.218	0.523	5.426	1	0.020*	3.382
Social class (2)	0.425	0.448	0.899	1	0.343	1.530
Social class (3)	0.868	0.410	4.474	1	0.034*	2.382
Social class (4)	0.517	0.356	2.107	1	0.147	1.676
Education_2 (1)	0.187	0.344	0.294	1	0.587	1.205
Age	-0.001	0.015	0.005	1	0.942	0.999
Constant	1.337	1.163	1.321	1	0.250	3.807

Variable(s) entered on step 1: Gender, Area, Religion, marital_group, occupation_gp, Type_family, Family_size, social_class, education_2, age *p<0.05.

According to the model, the log of odds of compliance to daily dietary salt intake was negatively related to area and family size and positively related to social class. In other words, higher the family size lesser will be the compliance to daily dietary salt intake. Similarly, a better compliance was also testified in the urban area. An upper socioeconomic class was also related to a better compliance with daily dietary salt intake (Table 1).

Effect of compliance to daily salt intake was analyzed by some ancillary measures like use of table salt/pickles/chutneys. 300 patients rarely or never added salt while only 4 patients added salt without even tasting the food. A regular use of pickles and chutneys in food was discerned in 17.4% of the people. Those patients whose family members added extra salt to their diet had around thrice more odds of a better compliance to daily average salt intake. Similarly, the odds of compliance were twice superior in those patients predictable of using table salt.

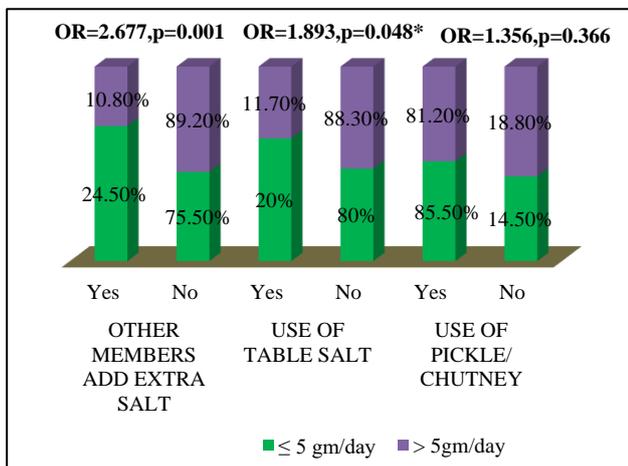


Figure 3: Use of salt in ancillary methods.

Lack of support from the family, difficulty in adhering to a diet different from the family, lack of knowledge were some of the reasons of non-compliance to dietary modifications. Other reasons included peer pressure, accessibility and cost to preparing a healthy diet.

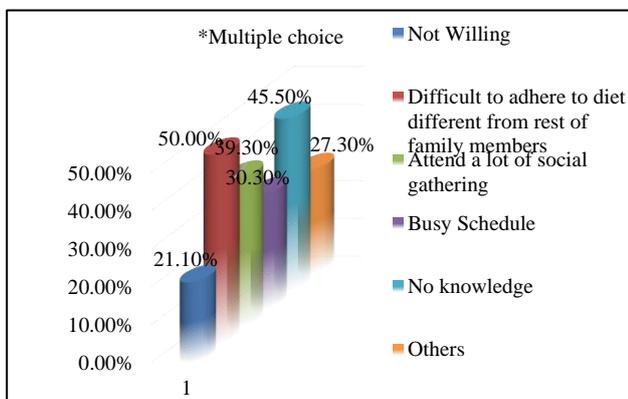


Figure 4: Reasons of non-compliance with diet.

Psychological and behavioral dynamics were gauged using the doctrines of health belief model. The distribution of average salt consumption per person per day was non parametric, so Spearman's RHO bivariate correlation was used to decrypt its relationship with different tenets of HBM. A higher daily assuredly determines a poor compliance average salt intake a five point Likert's scale was used to record responses for each of the element of HBM. Some questions here were set such that the highest score did not reflect the worst scenario of none-compliance. To resolve these scores were reversed for perceived severity.

A significant positive correlation (r=0.106, p=0.048) was noticed with perceived severity. Perceived susceptibility to complications, perceived benefits and perceived cues to action had a significant positive correlation with compliance to dietary salt (negative correlation with average dietary salt intake).

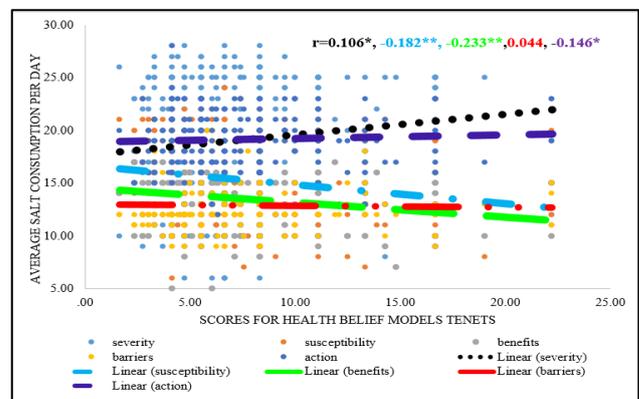


Figure 5: Correlation between average salt consumption per day and total score of tenets of HBM.

A two-predictor logistic model was again fitted to the data to test the relationship between a hypertensive patient compliant to dietary salt and psychological and behavioral factors (HBM). The model was first tested for the assumptions like linearity of logit (significance values for the interactions was more than 0.05) and multicollinearity (tolerance>0.1 and VIF<10). A Cox and Snell R square (0.060) and Nagelkerke's R square (0.084) suggested that the model was a good fit. Further, a non-significant chi-square statistic by Hosmer and Lomeshaw test ($\chi^2=0.003$ and $p=0.999$) supports the above. The overall percentage of classification of the model with the predictors was 69.7%.

The result showed that:

$$\text{Predicted logit of (compliance)} = 20.811 + (6.618) \times \text{perceived benefits}$$

Consistent with the model, the log of odds for compliance to daily dietary salt intake had a significant positive association with perceived benefits.

Table 2: Logistic regression analysis for compliance of daily dietary salt and psychological and behavioral variants (n=350).

Predictors	B	S.E.	Wald	Df	Sig.	Exp (B)
Susceptibility category (1)	-0.378	0.245	2.372	1	0.124	0.686
Benefits category			6.794	2	0.033	
Benefits category (1)	-20.767	15722.528	0.000	1	0.999	0.000
Benefits category (2)	-19.997	15722.528	0.000	1	0.999*	0.000
Barriers category (1)	20.117	14575.440	0.000	1	0.999	545332175.436
Action category (1)	0.060	42754.161	0.000	1	1.000	1.062
Constant	21.023	15722.528	0.000	1	0.999	1349435776.129

Variable(s) entered on step 1: susceptibility cat., benefits cat., barriers cat., action cat. *p<0.05.

A logistic regression was again tailored with compliance to daily dietary salt intake and five factors used to analyze the perceived benefits. A Cox and Snell R square (0.048) and Nagelkerke’s R square (0.067) suggested that the model was a good fit. Further, a non-significant chi-square statistic by Hosmer and Lomeshaw test ($\chi^2=8.961$ and $p=0.346$) supports the above. The overall percentage of classification of the model with the predictors was 69.4%. The log of odds for compliance to dietary salt intake per day had a significant positive odd (Wald=3.955, $p=0.047^*$) increase sense of well-being as a result to treatment.

DISCUSSION

Perceived benefits, socioeconomic class, family size and area of residence were significant determinants of dietary salt reduction among hypertensive patients in the current study. The results of the existing study are important because they provide initial evidence of perceived barriers among hypertensive patients in the context of India chiefly Uttar Pradesh.

A significant urban-rural difference in daily dietary salt intake was noted in the current study comparable to the results in another study in northern India.²⁴ Poor dietary practices in India were reported in other studies also, where worse cut off were reported in rural areas and among women.²⁵ Some of the possible reasons can be lack of knowledge and the cultural beliefs and practices prevalent in the country. A larger family size had a significant undesirable impact on the compliance to daily dietary salt intake. There is a scarcity of similar research, however a few studies report the impetus of social and family support.²⁶ A controlled salt intake was also found among a higher socioeconomic class similar to some other studies.²⁷

Significant proportions are utilized for production of 'value-added foods' that are high in salt; pickles, savory snacks etc. Nevertheless, there was no significant association with use of such products in the present study. Use of table salt (adding salt before eating food) both by the patient and the family members had a significant adverse impact on compliance to dietary salt.

Privation of family support and deprived taste in food were the major barriers to compliance while a stout family support boosted the same. Unwillingness, lack of knowledge, frequent social gatherings, hassles in adhering to a diet different from the family were identified as common barriers in some other studies.^{28,29} Unusual taste of food, accessibility and cost, family conflict and lack of family acceptance were some of the other key impediments to compliance.³⁰⁻³² Role of social entrenchment on the road to achieving a better compliance is very well backed by above outcomes. Since the very practice of dietary modification involves a strong role of the family and society, hence likely to affect their dynamics, social support has to play a crucial role in compliance.^{33,34} Family being a strong pillar, helps improve compliance by providing warmth and support both emotionally and practically, cushioning stress and heightening self-esteem.³³

The success of HBM in predicting other health-related behaviors and the fact that salt-restriction belongs to health behavior domain strengthened its use in the current study. Susceptibility, severity, barriers and cues to action failed to explain the adherence to daily dietary salt intake. Even so, perceived benefits strongly predicted the same.

This study had a lot of limitations. The method used for estimation of daily dietary salt intake gave a rough estimate of daily dietary salt intake. There was a potential threat of recall bias and interviewer bias. Although many variables were taken into consideration, still there might be few variables missing that might have impact of dietary salt intake among hypertensive.

CONCLUSION

This study presents an analysis of patient’s perception of barriers and facilitating factors to disease self-management. There is an opportunity to improve disease self-management by better understanding specific barriers and facilitating factors that individuals face, based on their state of change, and also through the recognition that there are factors that surpass individual level self-management.

Policies formulation at the national level to address diet concerns in the community as a step toward controlling hypertension is recommended. There should be a provision of locally available and affordable interventions such as quick home preparation of healthy food. Promotion of socialization and support by the family is also helpful in complying with dietary regimes. Health promotion at times in people's lives when substantial change occurs such as retirement or when children leave home should be emphasized.

This study opens the scope to further research. Qualitative research should be conducted to obtain much more detailed information about factors that could improve compliance. Studies aimed at comparing the lifestyle modifications compliance patterns in patients attending public and private health care centers should be conducted. Research should be conducted to demonstrate the effectiveness of the hypertension lifestyle modifications with regard to improved prognosis

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee Institutional Ethical Committee, JNMC, AMU, Aligarh

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