

# Knowledge and practice regarding hypertension and diabetes among the elderly in a rural area in southern India following an educational program: A comparative study

Arvind Kasthuri, Aditi Krishnamurthy, Pretesh Rohan Kiran, As Mohammad, Deepthi Shanbhag

Department of Community Health, St John's Medical College, Bangalore, Karnataka, India

## ABSTRACT

**Aim:** Hypertension and diabetes mellitus are important problems in the elderly. They can largely be avoided through appropriate lifestyle modification. We implemented an ongoing education program for the elderly in the villages near Bangalore, Southern Karnataka, India. This study aimed to assess the knowledge and practice regarding hypertension and diabetes among elderly residents in the study area with and without exposure to the education program. **Materials and Methods:** Elderly residents of three villages who attended the educational sessions ("exposed") and two similar villages without educational exposure ("unexposed") were identified, matched with regard to age and gender, and interviewed to assess the knowledge and practice regarding hypertension and diabetes. The responses were scored, and mean scores were calculated in the two groups. **Results and Discussion:** A total of 130 elderly persons, 65 "exposed" and 65 "unexposed" to the education program were interviewed. Overall, the "exposed" group scored significantly higher than the "unexposed" group with respect to knowledge (11.17 vs 4.97,  $P < 0.05$ ) and practice (1.35 vs 0.40,  $P < 0.05$ ) regarding hypertension. Knowledge (14.85 vs 6.57,  $P < 0.05$ ) and practice (1.49 vs 0.34,  $P < 0.05$ ) scores regarding diabetes were also higher in the "exposed" group. However, the scores were less than 50% of the maximum attainable score even in the "exposed" group showing the need for further educational input. **Conclusion:** Regular health education sessions by physicians, nurses, and community health workers for the elderly are a useful strategy in improving the knowledge and practice for preventing and managing chronic disease. This is a model of health promotion in the elderly.

**Key words:** Diabetes, elderly, hypertension, knowledge, practice

## INTRODUCTION

Chronic diseases are a leading cause of morbidity and mortality globally. In India, chronic disease is estimated to account for 53% of all deaths and 44% of disability-adjusted life-years (DALYs) lost in 2005.<sup>[1,2]</sup> India has the largest number of diabetics in the world with a prevalence

of 3.8% in rural adults and 11.8% in urban adults.<sup>[3,4]</sup> Epidemiological studies show that the prevalence of hypertension in adults is 25% in urban areas and 10% in rural areas in India.<sup>[5]</sup> The prevalence of these diseases rises with age. The proportion of persons above the age of

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** Kasthuri A, Krishnamurthy A, Kiran PR, Mohammad A, Shanbhag D. Knowledge and practice regarding hypertension and diabetes among the elderly in a rural area in southern India following an educational program: A comparative study. J Soc Health Diabetes 2016;4:30-5.

### Access this article online

#### Quick Response Code:



**Website:**  
www.joshd.net

**DOI:**  
10.4103/2321-0656.176574

**Corresponding Author:** Dr. Pretesh Rohan Kiran, Department of Community Health, St John's Medical College, Bangalore - 560 034, Karnataka, India. E-mail: preteshkiran@gmail.com

60 years in India is 8%<sup>[6]</sup> and this proportion is expected to rise to 21.3% by 2050.<sup>[7]</sup> Elderly subjects in rural areas are especially less likely to be aware of and be on treatment for chronic diseases such as hypertension.<sup>[8]</sup> It is a difficult task to address these problems with limited health resources.

Studies suggest that 80% of heart disease, stroke, type 2 diabetes, and 40% cancers could be avoided through a healthy diet, regular physical activity, and the avoidance of tobacco use.<sup>[9]</sup> The Department of Community Health, St. John's Medical College, has a Senior Citizen Health Service (SCHS) since the year 2005. As part of this service, monthly geriatric clinics are held in village outreach sites. Preceding each clinic is a short group education session on chronic disease prevention, with a focus on hypertension and diabetes mellitus, using methods such as roleplays and stories, along with simple flip charts developed for the purpose. The educational content is based on the World Health Organization (WHO) Guidelines for the Prevention of Cardiovascular Disease.<sup>[10]</sup> The educational input is reinforced at individual consultations by doctors and by a health worker who makes home visits between clinics.

This study was undertaken to assess and document the effect of this education program, and was aimed at assessing the knowledge and practice regarding hypertension and diabetes among elderly residents of a rural area in Karnataka, India with and without exposure to the education program.

## MATERIALS AND METHODS

This study was conducted in five geographically contiguous villages in the Bangalore district, Karnataka, India in November 2009. These villages belonged to two groups: One group of three villages where the elderly (defined as those  $\geq 60$  years) were “exposed” to the education program and another group of two similar villages where the elderly were “unexposed,” since the education program was not carried out in these villages. An interview schedule assessing the baseline demographics, socioeconomic status, reported disease status, and questions relating to knowledge and practice regarding hypertension and diabetes mellitus was developed, validated by circulation to experts and peers, and pretested. The knowledge and practice regarding hypertension and diabetes mellitus were divided into key components. Each key component had subcomponent answers. A score of 1 was given for a correct answer and 0 for an incorrect answer. Total scores under each key component and overall scores were calculated, representing the “score” obtained by each individual

respondent. The key components, subcomponents, and scoring in the questionnaire are outlined in Table 1.

Assuming that the difference in mean knowledge scores obtained by the two groups is 5 marks, with an expected standard deviation (SD) of 10, the number of subjects required in each group is 63, with 95% confidence and 80% power. Elderly persons residing in the “exposed” group of villages who attended at least six education sessions in the preceding 2 years were listed, stratified for gender, and the required number was selected by stratified random sampling. Elderly residents of the “unexposed” villages were enumerated, and the same number was selected using stratified random sampling to ensure that the gender and age distribution were similar to the “exposed” group. Following translation, a set of locally resident community health workers were trained on the use of the schedule, and were deployed to collect information from the study subjects. The workers were supervised by a doctor-member of the team, and data were collected following the obtaining of consent at community and individual levels. Elderly persons who were not available after three visits to their house, who were moribund, or otherwise unable to participate in the interview (communication difficulties like hearing and speech impairment) were excluded and replaced with others selected randomly from the list of elderly. Data were entered into Microsoft (MS) Excel spreadsheets and was analyzed using Epi Info 6.0.

## RESULTS

### Baseline characteristics of the study population

A total of 130 elderly persons were interviewed, 65 residents “exposed” to the education program and 65 “unexposed” to the education program. Forty females and 25 males were interviewed in each group. There was no significant difference in the mean age, education, or economic status of the subjects in the “exposed” and “unexposed” groups. Self-reported hypertension and diabetes were significantly higher in the “exposed” group [Table 2].

### Knowledge regarding hypertension and diabetes mellitus

Table 3 shows the mean knowledge scores for hypertension and diabetes mellitus obtained by the groups “exposed” and “unexposed” to the education program as a whole and among those who reported having either of the two diseases.

The maximum attainable score was 34 for hypertension and 41 for diabetes mellitus. Overall, the “exposed” group scored significantly higher than the “unexposed” with respect to knowledge regarding both the diseases. The

**Table 1: Key components, subcomponents, and scoring pattern in interview schedule to assess knowledge and practice regarding hypertension and diabetes mellitus**

Key components and sub components	Score
<i>Knowledge regarding hypertension</i>	
Risk factors including age, family history, obesity, sedentary lifestyle, increased salt/fat intake, or decreased vegetable/fruit/fiber intake, tobacco use, alcohol intake, drugs, and stress	1 each
Symptoms including headache, dizziness, blurring of vision, palpitations, breathlessness, chest pain, and swelling of body	1 each
Diagnosis by checking of blood pressure	1
Complications including heart attack, heart problems, stroke, kidney problems, eye problems, breathing problems, and death	1 each
Treatment, that persons with hypertension must be on medication	1
Duration of treatment--lifelong/as per doctor's instructions	1
Dietary modification for persons with hypertension including decrease salt intake, decreased fat intake, and increased vegetable and fruit intake	1 each
Physical activity for persons with hypertension including exercising, a brisk walk for at least 30 min daily, and increased physical activity	1 each
Habits including stoppage of tobacco consumption and stoppage of alcohol consumption	1 each
Maximum score	34
<i>Knowledge regarding diabetes mellitus</i>	
Risk factors including age, family history, obesity, sedentary lifestyle, increased sugar/fat intake, or decreased vegetable/fruit/fiber intake, tobacco use, alcohol intake, drugs, stress	1 each
Symptoms including weight loss, increased thirst, increased appetite, increased frequency of micturition, constant fatigue, tingling numbness in feet, nonhealing wounds	1 each
Diagnosis, blood test for sugars	1
Complications including heart attack, heart problems, stroke, kidney problems, eye problems, frequent infections, problems with the feet, nonhealing wounds, tingling numbness in the feet, problems with the nerves, death	1 each
Dietary modification for persons with diabetes including small frequent meals, decreased sugar intake, decreased salt intake, decreased fat intake, and increased vegetable and fruit intake	1 each
Physical activity for persons with diabetes, exercising, brisk walk for at least 30 min daily, and increased physical activity	1 each
Habits, tobacco consumption, stoppage of tobacco consumption, alcohol consumption, stoppage of alcohol consumption	1 each
Foot and eye care, organs to be examined frequently in a diabetic, feet, eyes	1 each
Treatment, persons with diabetes must be on medication	1
Duration of treatment, lifelong/as per doctor's instructions	1
Maximum score	41
<i>Practice to prevent or control hypertension</i>	
Diet including decreased salt intake, decreased fat intake, and increased vegetable and fruit intake	1 each
Physical activity, increased physical activity, and brisk walk for at least 30 min per day	1 each
Avoidance of tobacco/alcohol, stopped/decreased consumption	1
Maximum score	7
<i>Practice to prevent or control diabetes mellitus</i>	
Diet, avoidance of sweets/sugar, decreased salt intake, decreased fat intake, and increased vegetable and fruit intake	1 each
Physical activity, increased physical activity, and brisk walk for at least 30 min per day	1 each
Avoidance of tobacco/alcohol, stopped/decreased consumption	1 each
Maximum score	8

scores are significantly higher in the “exposed” group compared with the “unexposed” group even among reported hypertensives and diabetics.

#### Practice of lifestyle modification for hypertension and diabetes mellitus

Table 4 shows the scores for practice of lifestyle modification regarding hypertension and diabetes obtained from the subjects in the groups “exposed” and “unexposed” to the education program.

Overall, the “exposed” group scored significantly higher than the “unexposed” group. Among reported hypertensives, there was no significant difference between the “exposed” and “unexposed” groups in the practice of lifestyle modification for hypertension. Among reported diabetics, however, the scores for practice of lifestyle modifications in diet and physical activity were higher

among self-reported diabetics “exposed” to the education program compared to the “unexposed.”

## DISCUSSION

Unhealthy nutrition, physical inactivity, excessive use of tobacco, alcohol, and psychosocial stress are major lifestyle issues leading to noncommunicable diseases. Carefully planned community programs are important for prevention. Most strategies for change in chronic disease-related lifestyles have included education of people regarding risk factors.<sup>[11]</sup> Chronic disease education is not a priority in the developing world unlike in developed countries.<sup>[12]</sup> Though some community-based studies have been conducted on the knowledge, attitude, and practice regarding diabetes in India,<sup>[13,14]</sup> few have focused on the elderly. This study employed a historical cohort design based on the geographic contiguity of the two groups of villages, the similarity in age, and socioeconomic

and education status of the respondents who were “exposed” and “unexposed” to an education program.

**Table 2: Characteristics of the study subjects**

Variable	Study subjects (%)		
	Exposed to education program	Unexposed to education program	Total
Age in years*			
60–69	32 (24.6)	35 (26.9)	67 (51.5)
70–79	25 (9.2)	22 (16.9)	47 (36.2)
80≥	8 (6.2)	8 (6.2)	16 (12.3)
Total	65 (50.0)	65 (50.0)	130 (100.0)
Gender			
Male	25 (19.2)	25 (19.2)	50 (38.4)
Female	40 (30.8)	40 (30.8)	80 (61.6)
Total	65 (50.0)	65 (50.0)	130 (100.0)
Education status**			
Illiterate	33 (25.4)	45 (34.6)	78 (60.0)
Primary school	15 (11.5)	6 (4.6)	21 (16.2)
Middle school	7 (5.4)	8 (6.2)	15 (11.5)
High school/higher	10 (7.7)	6 (4.6)	16 (12.3)
Total	65 (50.0)	65 (50.0)	130 (100.0)
Economic status***			
Below poverty line	41 (31.5)	47 (36.2)	88 (67.7)
Above poverty line	24 (18.5)	15 (11.5)	39 (30.0)
Total	65 (50.0)	62 (47.7) <sup>†</sup>	127 (97.7)
Self-reported hypertension****			
Hypertension	26 (20.0)	9 (6.4)	35 (26.4)
No hypertension	39 (30.0)	56 (43.6)	95 (73.6)
Total	65 (50.0)	65 (50.0)	130 (100.0)
Self-reported diabetes*****			
Diabetes mellitus	23 (17.7)	11 (8.5)	34 (26.2)
No diabetes	42 (32.3)	54 (41.5)	96 (73.8)
Total	65 (50.0)	65 (50.0)	130 (100.0)

\* $\chi^2 = 0.33$ ,  $P = 0.85$ , \*\* $\chi^2 = 6.77$ ,  $P = 0.08$ , <sup>†</sup>3 persons--could not be assessed, documents not available, \*\*\* $\chi^2 = 2.42$ ,  $P = 0.12$ , \*\*\*\* $\chi^2 = 11.299$ ,  $P < 0.01$ ,

\*\*\*\*\* $\chi^2 = 5.735$ ,  $P < 0.05$

### Knowledge regarding hypertension and diabetes

Studies have reported that basic awareness regarding diabetes is 49.9% (rural, population of 15–75 years) and 75.5% (rural and urban, population of >20 years) that increases with age.<sup>[13,14]</sup> Promoting awareness among the elderly is a means of improving the general level of awareness regarding diabetes, reports one study.<sup>[15]</sup>

Knowledge regarding most aspects of hypertension and diabetes was significantly higher in the population “exposed” to the education program in our study. This finding suggests that education regarding hypertension and diabetes is a useful tool to improve knowledge levels among patients suffering from these diseases, as has been found in other studies.<sup>[16,17]</sup> However, the overall knowledge scores were less than 50% of the maximum attainable score even in the “exposed” group. Western studies state that the dose of intervention or scale of exposure to an intervention such as health education has a greater effect on the community.<sup>[11]</sup> This suggests that even if educational efforts appear to have an effect on the study population, in order to be useful they need to be continuous and sustained. The instrument used to assess knowledge and practice required the respondent to cite every aspect of knowledge/practice to attain the maximum score. This manner of assessment could also have resulted in low absolute scores.

In the Chennai-based Chennai Urban Rural Epidemiology Study (CURES) study, the knowledge among diabetics regarding the risk factors and complications was found

**Table 3: Knowledge regarding hypertension and diabetes in the study group**

A. Among entire study group	Maximum attainable score	Mean score (SD) <sup>†</sup>	
		“Exposed” group (n = 65)	“Unexposed” group (n = 65)
Knowledge re: Hypertension (n=130)	34	11.17 (5.84)	4.97 (3.98) <sup>*</sup>
Knowledge re: Diabetes mellitus (n=130)	41	14.85(8.73)	6.57(5.97) <sup>*</sup>
B. Among reported hypertensives and diabetics	Maximum attainable score	Mean score (SD)	
		“Exposed” group	“Unexposed” group
Knowledge re: hypertension (reported hypertensives) (n=35)	34	13.54 (4.78) (n=26)	8.67 (3.04) <sup>*</sup> (n=9)
Knowledge re: diabetes (reported diabetics) (n=34)	41	18.87 (8.18) (n=23)	9.64 (6.68) <sup>*</sup> (n=11)

<sup>\*</sup> $P < 0.01$ , unpaired *t*-test, <sup>†</sup>SD: Standard deviation

**Table 4: Practice of lifestyle modifications for hypertension and diabetes mellitus in the study group**

A. Among the entire study group	Maximum attainable score	Mean score (SD) <sup>†</sup>	
		“Exposed” group (n = 65)	“Unexposed” group (n = 65)
Practice re: hypertension (n=130)	7	1.35 (1.82)	0.40 (1.06) <sup>*</sup>
Practice re: diabetes mellitus (n=130)	8	1.49 (2.26)	0.34 (0.99) <sup>*</sup>
B. Among reported hypertensives and diabetics	Maximum attainable score	Mean score (SD)	
		“Exposed” group	“Unexposed” group
Practice re: Hypertension (reported hypertensives) (n=35)	7	2.62(2.04) (n=26)	1.67(1.12) <sup>**</sup> (n=9)
Practice re: diabetes (reported diabetics) (n=34)	8	3.65(2.27) (n=23)	1.18(1.40) <sup>*</sup> (n=11)

<sup>\*</sup> $P < 0.01$ , <sup>\*\*</sup> $P > 0.05$ , unpaired *t*-test, <sup>†</sup>SD: Standard deviation



to be low and was attributed to patients not being educated adequately regarding the disease.<sup>[13]</sup> Hence, it is not enough to assume that persons with the reported disease know about the disease. In our study, the levels of knowledge even among reported diabetics and hypertensives were lower among those “unexposed” to the education program.

### Practice regarding hypertension and diabetes

Studies have demonstrated the usefulness of risk reduction strategies in the prevention of chronic disease.<sup>[11]</sup> Educational intervention in the general population emphasizing physical activity and dietary changes have successfully reduced systolic and diastolic pressures in prediabetic adults in rural Tamil Nadu, India.<sup>[18]</sup> In a Japanese study, the practice of lifestyle modification among the elderly was found to decrease the need for long-term care and also the cost of care.<sup>[19]</sup>

Practice of dietary and physical activity modification to prevent or manage hypertension and diabetes was significantly higher in the group “exposed” to the education program. The difference is less among those with reported disease, as would be expected, considering that the management of the disease when known would include advice on lifestyle change. However, as with the knowledge scores, the overall practice scores were less than 50% of the maximum attainable scores in both the groups, indicating that more is required to be done.

In conclusion, we found that knowledge regarding hypertension and diabetes is higher among the elderly in villages “exposed” to the educational program. Practice of lifestyle modification (diet, physical activity) is also higher among elderly persons following exposure to the education program. The absolute scores for knowledge and practice were less than 50% of the maximum attainable score even among the group exposed to the program, indicating a need for more intense and sustained educational efforts. Programs such as introducing a lifestyle intervention booklet may be useful in further reinforcement and improvement of the levels of control of hypertension and diabetes.<sup>[20]</sup>

One limitation of the study is that the baseline scores for knowledge and practice in the two groups before the educational program were not available, precluding a definitive conclusion regarding the usefulness of the educational program. Since the villages were geographically contiguous and the groups appeared to be similar with respect to basic demographic characteristics, the difference in scores might have been due to exposure to the program.

## CONCLUSION

In conclusion, regular health education sessions by physicians, nurses, and community health workers for the elderly are a useful strategy in improving the knowledge and practice for preventing and managing chronic disease, especially in rural areas. This model of prevention in the elderly as demonstrated in this paper can be considered for adaptation by other organizations in similar settings working toward chronic disease prevention.

### Acknowledgements

The authors of the paper acknowledge the assistance received from St. John’s Medical College in providing the basic infrastructure for the study. The community health workers attached to the Mugalur Community Health Training Centre of St. John’s Medical College were of great help in data collection and identification of the study population. There was no conflict of interest. The study was not supported by any grant, and was conducted as a part of the routine work of the Department of Community Health, St. John’s Medical College.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Srinath Reddy K, Shah B, Varghese C, Ramadoss A. Responding to the threat of chronic diseases in India. *Lancet* 2005;366:1744-9.
2. Joshi R, Cardona M, Iyengar S, Sukumar A, Raju CR, Raju KR, *et al.* Chronic diseases now a leading cause of death in rural India--mortality data from the Andhra Pradesh Rural Health Initiative. *Int J Epidemiol* 2006;35:1522-9.
3. Narula AS. Chronic kidney disease: The looming threat. *MJAFI* 2008;64:2-3.
4. Ramachandran A, Snehalatha C, Shyamala P, Vijay V, Viswanathan M. High prevalence of NIDDM and IGT in an elderly south Indian population with low rates of obesity. *Diabetes Care* 1994;17:1190-2.
5. Gupta R. Trends in hypertension epidemiology in India. *J Hum Hypertens* 2004;18:73-8.
6. Census of India, 2011. Available from [http://www.censusindia.gov.in/vital\\_statistics/SRS\\_Report/9Chap%202%20-%202011.pdf](http://www.censusindia.gov.in/vital_statistics/SRS_Report/9Chap%202%20-%202011.pdf) [Last accessed on 2015 Nov 11].
7. Ashish B. Demographic Transition. Available from: <http://www.india-seminar.com/2000/488/488%20bose.htm>. [Last accessed on 2011 Feb 6].
8. Kalavathy MC, Thankappan KR, Sarma PS, Vasan RS. Prevalence, awareness, treatment and control of hypertension in an elderly community-based sample in Kerala, India. *Natl Med J India* 2000; 13:9-15.
9. Epping-Jordan JE, Galea G, Tukuitonga C, Beaglehole R. Preventing chronic diseases: Taking stepwise action. *Lancet* 2005;366:1667-71.
10. World Health Organization. Prevention of Cardiovascular Disease, Guidelines for assessment and management of Cardiovascular

- risk. 2007. Available from: [http://www.who.int/cardiovascular\\_diseases/guidelines/full%20text.pdf](http://www.who.int/cardiovascular_diseases/guidelines/full%20text.pdf). [Last accessed on 2011 Feb 4].
11. Nissinen A, Berrios X, Puska P. Community-based noncommunicable disease interventions: Lessons from developed countries for developing ones. *Bull World Health Organ* 2001;79:963-70.
12. Kensing C, Boucher J, Cypress M, Weinger K, Mulcahy K, Barta P, *et al.* National standards for diabetes self management. *Diabetes Care* 2002;25:140-7.
13. Mohan D, Raj D, Shanthirani CS, Datta M, Unwin NC, Kapur A, *et al.* Awareness and knowledge of diabetes in Chennai- The Chennai urban rural epidemiology study (CURES-9). *J Assoc Physicians India* 2005;53:283-7.
14. Rani PK, Raman R, Subramani S, Perumal G, Kumaramanickavel G, Sharma T. Knowledge of diabetes and diabetic retinopathy among rural populations in India, and the influence of knowledge of diabetic retinopathy on attitude and practice. *Rural Remote Health* 2008;8:838.
15. Sabri AA, Qayyum MA, Saigol NU, Zafar K, Aslam F. Comparing knowledge of diabetes mellitus among rural and urban diabetics. *McGill J Med* 2007;10:87-9.
16. Babaei Beigi MA, Zibaeenezhad MJ, Aghasadeghi K, Jokar A, Shekarforoush S, Khazraei H. The effect of educational programs on hypertension management. *Int Cardiovasc Res J* 2014;8:94-8.
17. Roopa KS, Devi GR. Impact of intervention programme on knowledge, attitude, practices in the management of hypertension among elderly. *Stud Home Com Sci* 2014;8:11-6.
18. Kamioka H, Ohsiro H, Mutoh Y, Honda T, Okada S, Takahashi M, *et al.* Effects of Long term comprehensive health education on the elderly in a Japanese village: Unnan cohort study. *Int J Sports Health Sci* 2008;6:60-5.
19. Balagopal P, Kamalamma N, Patel TG, Misra R. A community-based diabetes prevention and management education program in a rural village in India. *Diabetes Care* 2008;31:1097-104.
20. Wehedy AA, Elhameed SH, El-Hameed DA. Effect of lifestyle intervention program on controlling hypertension among older adults. *Journal of Education and Practice* 2014;5:61-71.