

Original Research Article

Effectiveness of intervention by accredited social health activists in the control of hypertension and diabetes in a rural population of Kolar district, Karnataka

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Received: 04 January 2019

Accepted: 05 February 2019

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ABSTRACT

Background: Non-communicable diseases are the leading causes of death globally, of which cardiovascular diseases are the most common. Cost-effective strategies, such as task shifting, are needed to mitigate the rising epidemic by controlling hypertension and diabetes in our country.

Methods: This was a non-randomized interventional study undertaken in six (3 intervention and 3 control) villages of Lakkur primary health centre (PHC) area under Malur taluk, Kolar district, Karnataka, from November 2013 to April 2015. After obtaining written informed consent, baseline survey was done among 180 diabetics and hypertensives (adults >30 years). In the intervention villages, ASHAs who were trained did the intervention for 6 months. In non-intervention villages, standard usual care was given and repeat survey was done after 6 months to re-measure.

Results: This study demonstrated that there was an increase of 44.8% in the proportion of hypertensives whose blood pressure was under control and increase of 26.5% in the proportion of diabetics whose blood sugar was under control in villages that received household visits by trained ASHAs (intervention villages). There was an increase in the medication adherence levels (29.6%) and reduction in tobacco usage (median difference of 4 times per day) among hypertensives and diabetics who are on medication in intervention villages.

Conclusions: Findings from this study will provide policy makers and other stakeholders needed information to recommend scalable and cost-effective policy in respect to cardiovascular risk reduction, hypertension and diabetes control in resource-poor settings.

Keywords: Cardiovascular disease, Hypertension and diabetes control, Accredited social health activist, Interventional study, India

INTRODUCTION

The global burden and threat of non-communicable diseases (NCD) constitutes a major public health challenge that undermines social and economic development throughout the world. According to the global status report on non-communicable diseases 2014 by World Health Organization (WHO), NCDs are the leading cause of death globally and responsible for 38

million (68%) of the world's 56 million deaths in 2012. More than 40% of them (16 million) were premature deaths under age 70 years.¹ Almost three quarters of all NCD deaths (28 million), and the majority of premature deaths (82%), occur in low and middle income countries.² Rural population comprises more than 70% of the total Indians and has direct impact on health indicators. NCDs cause significant mortality and morbidity in rural

populations with consequent loss in potentially productive years (aged 35-64 years).³

The prevalence of diabetes mellitus in India was 9.09% in 2013.⁴ Prevalence of hypertension in India, for the last three decades has increased by about 30 times among urban residents and by about 10 times among rural residents.⁵ The prevalence of hypertension and diabetes is increasing in trend. As most of the urban areas have access to health facilities, the hidden mass of hypertension in the community can be detected and treated. However, the situation is reversed in rural areas. A majority of the rural population in India have inadequate access to healthcare.⁶

National programme for prevention and control of cancer, diabetes, cardiovascular diseases and stroke (NPCDCS) aims at integration of NCD intervention in National Rural Health Mission (NRHM) framework for optimization of resources. One of the key components of NRHM is to provide villages in the country with trained female community health activists (ASHA) selected from the village itself who will be trained to work as an interface between community and public health system.¹ Studies have shown that community based health workers can have a beneficial effect in quality of care and contribute to significant improvement in community members' access to and continuity of care and adherence to treatment for control of diabetes and hypertension.⁷ No studies have documented the effectiveness of Intervention by ASHAs, in the control of hypertension and diabetes.

Primary objectives

To achieve an increase of 20% in the proportion of hypertensives whose blood pressure is under control and increase of 20% in the proportion of diabetics whose blood sugar is under control in villages that receive household visits by trained ASHAs (intervention villages).

Secondary objectives

To increase the adherence levels among hypertensives and diabetics who are on medication and to achieve a reduction in tobacco usage in villages that receive household visits by trained ASHAs (intervention villages).

METHODS

This was a non randomized interventional study conducted during November 2013 to April 2015. The study was conducted in Lakkur primary health centre (PHC) area under Malur taluk, Kolar district, Karnataka, located about 45 kilometers from Bangalore. Lakkur PHC caters to a population of about 23,556 people residing in 31 villages coming under 6 sub centers. We included adults (>30 years) who were known diabetics and hypertensives and who were residing in the study area

continuously for more than one year. We excluded adults who were known diabetics and hypertensives who were seriously ill, or unable to give information. The project proposal along with the study tool, patient information sheet and informed consent were submitted and approved by the institutional ethical committee.

Permission was obtained from concerned government authorities. A list of known hypertensives and diabetics of the study area were obtained with the help of ASHAs.

The baseline survey of known hypertensives and diabetics was conducted by the principal investigator in both the intervention and non-intervention areas. After obtaining informed written consent, interview schedule was administered by the principal investigator to those who fulfil the inclusion criteria. Blood pressure (BP) was measured using digital BP apparatus (OMRON, HEM 7113 model) and random blood sugar (RBS) was measured using glucometer (Accu-chek). Standard methods were used to measure weight, height, waist circumference.

After completing the above baseline survey, villages were divided into intervention and non-intervention villages. The intervention villages were selected based on the ASHA being resident in that village. In intervention villages, ASHAs were trained for periodic household visits, counselling on lifestyle pattern including diet, physical activity, and tobacco cessation, advice on adherence to medicines using the flipchart and showcard and to check BP. In Non-intervention villages, standard available care was given. The knowledge and skill of the ASHA's following the training was evaluated by pre and post-test evaluation and objective structured practical examination (OSPE).

Post the training, ASHAs were allotted the villages and were given the list of hypertensives and diabetics in their villages along with the kit consisting of intervention formats, BP apparatus with the batteries, module for the ASHAs, flipchart, showcard and stationeries. In the Intervention villages, ASHAs who were trained did the intervention for 6 months. They were given incentives every month based on the number of subjects they followed up. In non-intervention villages, standard available care was given. The principal investigator monitored the work of the ASHAs by visiting them every month and incentives were given to them according to the number of people they followed up. Repeat survey was done by the principal investigator after 6 months to re-measure BP and RBS levels, adherence to medicines and tobacco cessation.

Sample size and statistical analysis

Earlier studies have revealed that the proportion of control of blood pressure in a population is 50%.⁴ Assuming the expected improvement in proportion of control of blood pressure in intervened population to be

70%. Estimated risk difference was 0.2, using 90% power and alpha error=5 sample size calculated was 124. After calculating 20% non-response rate, sample size for study was 150. However all hypertensives and diabetics in the study area who satisfied the inclusion criteria were included in the study population. The data were coded and entered in Microsoft Excel spread sheet and were analysed using standard statistical software. The socio-demographic profile of the intervention and the non-intervention villages was described using descriptive statistics like means and proportions. The study variables (like blood pressure, random blood sugar) were checked for normality using Shapiro Wilk test. Chi square test and Fishers exact test were used as applicable to study the association between proportion of diabetics and hypertensive under control and the different socio-demographic variables. Independent samples 't' test and Mann Whitney U test were used to compare means and medians between the two villages. Repeated measures analysis of variance (RMNOVA) was done to evaluate the differences between systolic and diastolic blood pressure recordings during monthly visits by the ASHAs.

RESULTS

The total population and households of the villages cater to 2131 people and 490 households in the intervention and 2332 people and 487 households in the non-intervention villages. In total, 104 adults were included in the intervention villages and 76 were included in the non-

intervention villages for the baseline survey accounting to a total of 180 study subjects. At the end of six months after the intervention i.e. follow up by the ASHAs, total number of people included in the follow-up survey was 173. Of the 173 people, 100 belonged to the intervention villages while 73 belonged to the non-intervention villages. The follow up rate was found to be 96.1%. The reasons identified for dropout rate includes migration of the family to a new place, death and moving to the children's place.

Tables below describe the details of hypertensives and diabetics in the two villages. Baseline survey showed that the difference in the socio demographic profile including other baseline values (age, gender, education, socioeconomic status, financial dependence, anthropometric measurements) between the intervention and non-intervention villages were not statistically significant. The two villages were found comparable. Of the 180 people studied, in the intervention villages 65 (62.5%) and in the non-intervention villages 56 (73.6%) were hypertensives. The mean duration of hypertension was 6.07 ± 5.05 years. Of the 180 people studied, in the intervention villages 68 (65.4%) and in the non-intervention villages 58 (76.3%) were known diabetics. The mean duration of diabetes was 5.07 ± 4.05 years. The difference in the number of hypertensives and diabetics between the intervention and non-intervention villages was not found to be statistically significant.

Table 1: Distribution of the study population by age and gender.

Factor	Intervention villages			Non-intervention villages			Test statistic	P value
	N (%)			N (%)				
Age (years)	Male	Female	Total	Male	Female	Total	$\chi^2=0.1$	0.9
30-45	6 (60)	4 (40)	10 (9.6)	4 (66.7)	2 (33.3)	6 (7.9)		
46-60	24 (53.3)	21 (46.7)	45 (43.3)	14 (41.2)	20 (58.8)	34 (44.7)		
>60	16 (32.7)	33 (67.3)	49 (47.1)	12 (33.3)	24 (66.7)	36 (47.4)		
Total	46 (44.2)	58 (55.8)	104 (100)	30 (39.5)	46 (60.5)	76 (100)		

Table 2: Details about history of hypertension and diabetes and anthropometric measurements in the intervention and non-intervention villages.

Variables	Intervention villages (n=104)	Non-intervention villages (n=76)	Test statistic (χ^2)	P value
	N (%)	N (%)		
Factors				
Hypertension present	65 (62.5)	56 (73.6)	2.4	0.1
Diabetes present	68 (65.4)	58 (76.3)	2.4	0.1
Both hypertension and diabetes	24 (23.0)	19 (25.0)	0.09	0.7
Measurements				
	Mean±SD	Mean±SD		
Weight (kg)	69.16±9.3	68.84±9.0	t=0.2	0.8
Height (cm)	160.1±5.6	161.5±6.0	t=1.5	0.1
Body mass index (BMI)	26.7±2.8	26.4±2.9	t=0.7	0.4

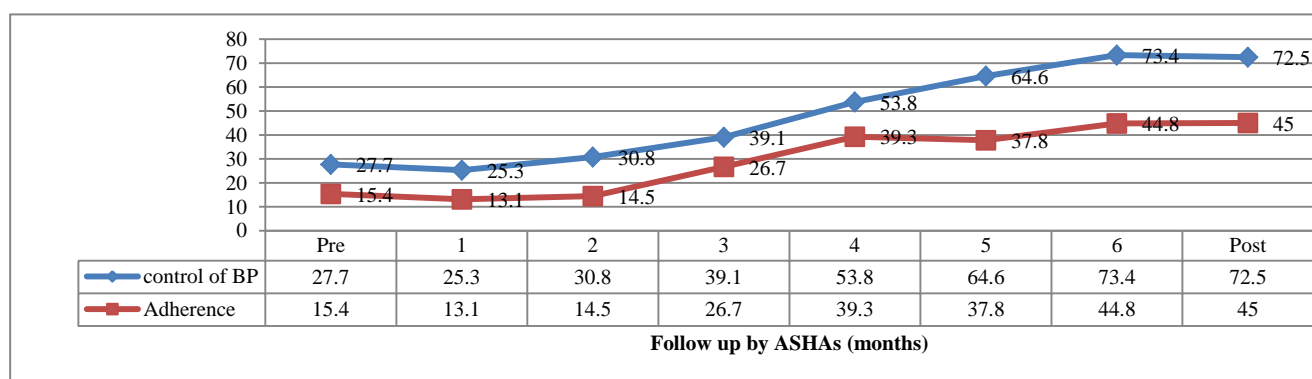


Figure 1: Proportion of hypertensives with BP under control and good medication adherence over time.

Table 3: RMNOVA comparison of SBP.

Follow up (months)	Mean SBP	SD	Effect size	F value	P value
Pre	145.82	22.649	0.18	20.3	<0.01*
1st follow up	151.58	18.667			
2	144.24	10.600			
3	142.78	11.278			
4	140.07	8.249			
5	139.16	8.053			
6	136.29	7.853			

*Statistically significant at 5% level.

Table 4: RMNOVA comparison of DBP.

Follow up (months)	Mean DBP	SD	Effect size	F value	P value
Pre	94.05	21.8	0.9	3.3	<0.01*
1st follow up	93.96	19.3			
2	91.88	10.8			
3	89.99	11.2			
4	89.96	11.2			
5	88.05	8.0			
6	88.01	8.8			

*Statistically significant at 5% level.

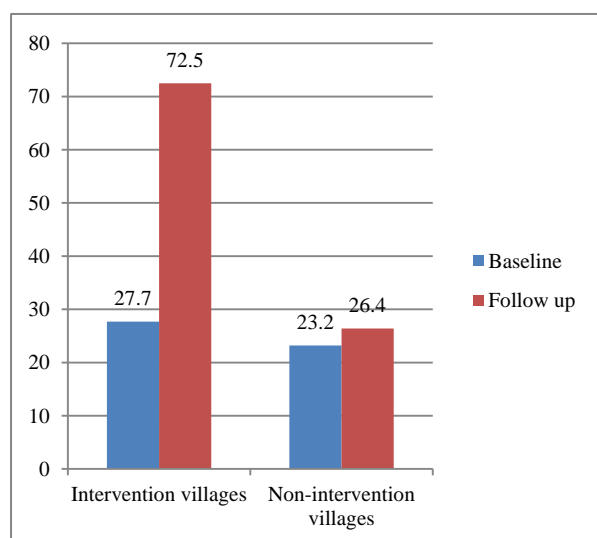


Figure 2: Proportion of the hypertensives with BP under control in the two villages.

After the intervention, it was evident from the RMNOVA statistical analysis (Table 3 and 4) that before ASHAs follow up SBP and DBP was not under control and after regular follow-ups for six months, BP started decreasing and was under control and this decrease of BP was highly significant in the Intervention villages. The results of the RMNOVA showed that there was significant evidence that there was a variation in BP along with time after the intervention. This study demonstrated that there was an increase of 44.8% in the proportion of hypertensives whose blood pressure was under control (Figure 2) and increase of 26.5% in the proportion of diabetics whose blood sugar was under control (Figure 3) in villages that received household visits by trained ASHAs (intervention villages) compared to those in villages that did not receive such visits (non-intervention villages). There was an increase in the medication adherence levels (29.6%) and reduction in tobacco usage (median difference of 4 times per day) among hypertensives and diabetics (Figure 4 and 5) who are on medication in villages that received

household visits by trained ASHAs (intervention villages) compared to those in villages that did not receive such visits (non-intervention villages).

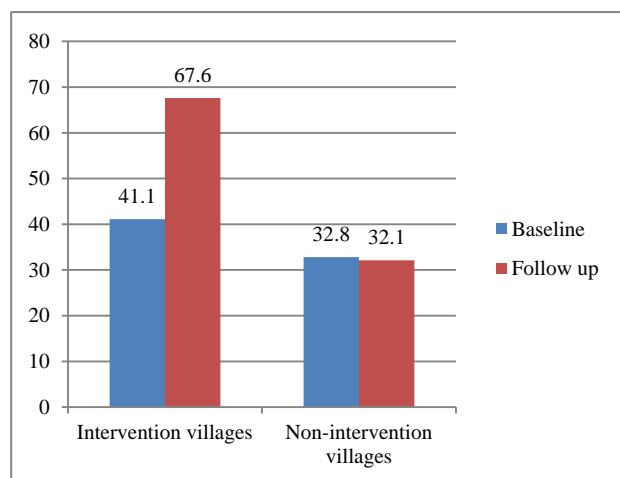


Figure 3: Proportion of the diabetics with random blood sugar (RBS) under control in the two villages.

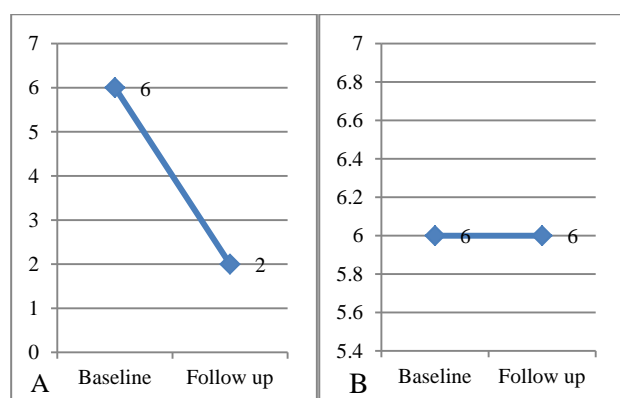


Figure 4: Tobacco usage (median number of times per day) in the two villages; (A) Intervention villages; (B) non-intervention villages.

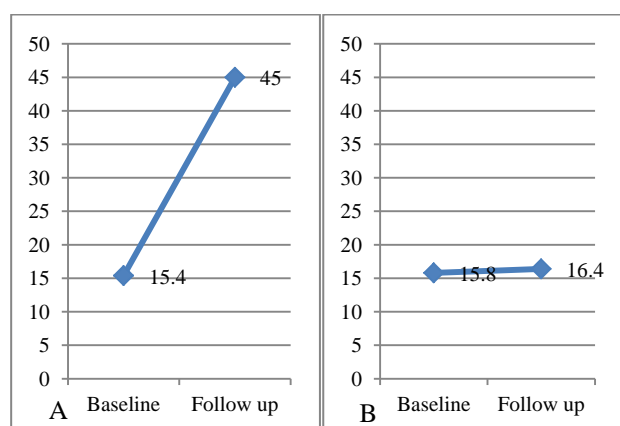


Figure 5: Proportion of the study population with good adherence in the two villages; (A) Intervention villages; (B) non-intervention villages.

DISCUSSION

There are many studies on the effectiveness of community health workers in non-communicable disease control.⁸⁻¹⁰ To the best of our knowledge in our extensive literature search this is the first study that looks into the effectiveness of ASHAs in NCDs. In our study, in the intervention villages, 18 (27.7%) and in the non-intervention villages had their BP under control; in the intervention villages, 28 (41.1%) and in the non-intervention villages 19 (32.8%) had their RBS under control. In the Davangere study, only 12.5% adequately controlled their BP which is less compared to this study. In Diabcare Asia Study, more than 50 per cent of patients had poor control of diabetes.¹¹ When the “rule of halves” is compared to this study around 25% do not take treatment, and finally among those who take treatment, over 70% are not under control. This poses a huge challenge and underscores the need to urgently raise awareness in the community at large.

Research has found that lifestyle interventions are more cost effective than medications.¹²⁻¹⁴ The next step after having the high risk groups detected is to advise lifestyle modifications. Community based primary care programs involving community health workers (CHW) like community outreach and cardiovascular health (COACH) trial and prepare trials have been done and came out with promising results.¹⁵ In COACH trial the CHW intervention focused on behavioral interventions and adherence to medications and appointments as well as the prescription and titration of medications for a period of 1 year.

The results of the RMNOVA showed that there is significant evidence that there is variation in BP related to time after the intervention. The baseline mean SBP in this study was 145.8 ± 22.6 mmHg and after intervention it was 136 ± 12.3 mmHg whereas DBP in the baseline was 94 ± 16.5 mmHg and after intervention 88 ± 10.3 mmHg. In this study, a significantly greater 6 month improvement in SBP (difference, 9 mmHg), DBP (difference, 6 mmHg), RBS (difference, 43 mg/dl) is found. In COACH trial, patients in the CHW groups had significantly greater 12 month improvement in SBP (difference, 6.2 mmHg), DBP (difference, 3.1 mmHg). Also Jafar et al study done in 2009 in Pakistan showed 10.8 mmHg BP reduction in combined home based health education and provider level intervention.¹⁶ In a systematic review of 44 trials, SBP decreased by a mean of 7.5 mmHg (95% CI, 1.8–9.6) versus a mean of 9.5 mmHg in this study.¹⁷ The changes in adherence levels and tobacco usage in this study are clinically meaningful.

There is now clear evidence that stopping smoking decreases the risk of cardiovascular disease, death from coronary heart disease and experiencing a stroke.¹⁸⁻¹² Poor adherence to a medicine regimen results in a two to six fold increase in the risk of cardiovascular deaths.²⁴

During the follow up, tobacco reduction and medication adherence improved significantly.

Findings from this study will be important for several reasons. First, majority of the population in this country, reside in villages and ASHAs who are the native residents will be able to successfully implement such an intervention. Second, a recent survey has shown that ASHAs have been a contributing factor to the increase in institutional deliveries from 65% (DLHS 3, 2007-8) to 86.4% (UNICEF CES 2009).^{25,26} The outcome variable used in this study to measure diabetes control was RBS. HbA1c was not used due to cost considerations. Main concern was that since ASHAs are involved in maternal and child health services, they might be burdened with the CVD work. This needs to be studied by time motion study to evaluate the work of ASHAs. Though this study provides evidence that an ASHA led CVD control program is an effective model of care, adoption and sustainability of this model will require financing mechanisms and government backing.

CONCLUSION

This study demonstrated that people with uncontrolled hypertension and diabetes given intervention through ASHAs achieved significant improvement in their control of BP and RBS levels. The concept of community level workers intervention is receiving increased attention as a means to improve care and potentially reduce costs.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Surekha A, Fathima FN, Agrawal T, Suguna A, Misquith D. Effectiveness of intervention by accredited social health activists in the control of hypertension and diabetes in a rural population of Kolar district, Karnataka. *Int J Community Med Public Health* 2019;6:1522-8.