Multicompont Short-term Training of ASHAs for Stroke Risk Factor Management in Rural India

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Abstract

Background Stroke is one of the leading causes of disability-adjusted life years and may be the leading cause of death in rural regions in India. We aim to train the ASHAs (Accredited Social Health activist) for nonpharmacological management of risk factors for secondary stroke prevention in rural India. We tested the hypothesis that focused, multicomponent, short-term training on secondary prevention of stroke enhances the knowledge of ASHAs about risk factor management.

Objectives To test the hypothesis that focused, multicomponent, short-term training on secondary prevention of stroke enhances the knowledge of ASHAs about risk factor management.

Materials and Methods This study is part of the ASSIST trial (Training ASHA to Assist in Secondary Stroke Prevention in Rural Population). The study design is quasi-experimental (pretest and posttest). Culturally appropriate and pragmatic training material was developed by the study team. Three focused group training sessions were conducted in Sidhwan Bet and Pakhowal blocks of Ludhiana district, Punjab.

Results A total of 274 ASHAs from 164 villages with mean ± SD age of 39.5 ± 7.6 years participated in the three training sessions. The perceived knowledge of stroke risk factors and blood pressure assessment was 67.5 ± 18.3% and 84.4 ± 16.7%, respectively. The objective baseline knowledge about stroke prevention and management among ASHAs was lower 58.7 ± 19.7% compared with perceived knowledge (p = 0.04). This increased to 82.5 ± 16.36% (p < 0.001) after the mop-up training after a mean of 191 days. More than 30% increment was seen in knowledge about the stroke symptoms (35.9%, p < 0.001), avoiding opium after stroke for treatment (39.5%, p < 0.001), causes of stroke (53.3%, p < 0.001), modifiable risk factors for stroke (45.4%, p < 0.001), and lifestyle modifications for stroke prevention (42.1%, p < 0.001).

Conclusions Focused group training can help enhance the knowledge of ASHAs about stroke prevention and management. ASHAs are also able to retain this complex multicomponent knowledge over a 6-month period. ASHA may be able to partake in reducing the secondary stroke burden in rural India.
Secondary prevention after stroke involves the persistent control of risk factors. In patients with minor ischemic stroke receiving dual antiplatelet therapy, high blood pressure (BP) is associated with twofold risk of recurrent stroke.\(^7\) INTER-STROKE study demonstrated that 10 potentially modifiable risk factors are associated with 90% of population attributable risk of first ever stroke. Developing strategy to control them is a global priority.\(^1\) Management of risk factors includes screening, education, treatment, and follow-up. Except pharmacological treatment, all steps can be delegated to nonphysician health workers.\(^6\) The first step would be to increase the knowledge base of the community health workers (CHWs).\(^7\) Nurses can assist in control of stable uncontrolled hypertension and non-communicable disease.\(^5,9\) However, auxiliary nurse midwife (ANM) in rural India is burdened with multiple tasks, including communicable diseases prevention and treatment as well.

In India, ASHAs (Accredited Social Health activists) are a village-level community health volunteers and social mobilisers. They are female residents of the villages and paid a fee-for-service for certain primary health care services. They are trained to provide a linkage between the health system and the community for maternal and child health care to the rural population. An ASHA may be trained for the nonpharmacological hypertension management.\(^10,11\)

Stroke prevention is multicomponent and encompasses the control of high BP, diabetes, increasing physical activity, augmenting diet with fruits and vegetables, reducing serum cholesterol levels, decreasing the waist-to-hip ratio, reducing psychosocial stress, management of cardiac causes of stroke, and measures to quit smoking and stop alcohol consumption. We aim to train the ASHAs for nonpharmacological management of risk factors for secondary stroke prevention in rural India. We tested the hypothesis that focused, multicomponent, short-term training on secondary prevention of stroke enhances the knowledge of ASHAs about risk factor management.

Materials and Methods
This study is part of the ASSIST trial (Training ASHA to Assist in Secondary Stroke Prevention in Rural Population, CTRI/2018/09/015709). ASSIST study is a cluster randomized controlled, blinded endpoint trial to reduce BP in patients with stroke. This study design is quasi-experimental (pretest and posttest). The ethics committee of the Christian Medical College and Hospital, Ludhiana, Punjab, India, approved the study.

Study Area and Study Participant
The study was conducted in Pakhowal and Sidhwan Bet blocks of Ludhiana District of Punjab state in India (Fig. 1). The study area has been part of Ludhiana Rural Stroke Registry from 2015 to 2018, which aimed to ascertain the incidence and prevalence of stroke in these regions. The ASHAs in the region were trained to detect stroke patients. In Pakhowal, a total of 140 ASHAs and 25 ANMs cater to 70 villages with a population of 109,201 (Census 2011). There is 1 community health center (CHC), 4 primary health centers (PHCs), and 25 subcenters. In Sidhwan Bet, a total of 120 ASHAs and 25 ANMs cater to 94 villages with a population of 127,065. There is 1 CHC, 5 PHCs, and 25 subcenters. We included both ASHAs and ANM in the teaching sessions.

Training Material Development
The training material development team included stroke neurologists (J.P. and M.K.), public health specialists (S.S., C.S., and D.K.), a field expert (M.J.), a Punjabi language expert, and ASHAs from the study area. The categories were decided by the team after reviewing the available literature, including ASHA training module for noncommunicable diseases developed by National Health Mission, India, Patient education material for SPRINT INDIA trial, and patient resources from Heart and Stroke Foundation, Canada. The material was developed keeping local context in mind and based on the Malcolm Shepherd Knowles principles of Andragogy.

Categories
1. Stroke: types of stroke, symptoms of stroke, early investigation, and management
2. Risk factor of stroke: what is a risk factor, modifiable and non-modifiable risk factors
3. Myths and beliefs: discourage from stopping medications and continue exercise
4. High BP: effects of high BP and measures to control them
5. Exercise to prevent stroke: finding every opportunity to be active
6. Diabetes mellitus or high blood sugar: effects of high blood sugar and measures to control it
7. Dyslipidemia or high cholesterol in blood: relevance of cholesterol in our body and measures to control if it is increased in blood
8. Atrial fibrillation or irregular heart beat: how to detect and reduce the risk of stroke
9. Food for stroke prevention: how to bring about change in diet with practical tips
10. Living after stroke

The workbook consisted of practical tips how to check BP with a digital machine and blood glucose levels with a
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point-of-care device. The workbook chapters were further divided according to the weeks of planned visits for the ASSIST study patients. \(^2\) Stories were included to highlight the messages in the chapters and initiate conversation with the patients.

Focused Group Training Sessions

The training sessions were planned to be small focused group (20–25 ASHAs or ANMs allocated to one trainer) so that individual attention could be given. The training team comprises a neurologist (M.K.) and public health experts (S.S., C.S., D.K., and M.J.). The 15- to 18-hour sessions were spread over 3 days given separately to each block. The first two sessions were conducted in the local CHC and third session was conducted at the subcenter level with 8 to 10 ASHAs in each session.

First Training

The aim of the first training was sensitization about the risk factors of stroke and hands-on measurement of BP with digital machine. A total of 25 interactive teaching sessions were conducted for four ASHA groups and one ANM group with the help of five trainers, each lasting 30 to 40 minutes. The sessions included understanding the burden of stroke in the district of Ludhiana, India, early/easy identification of stroke symptoms, top-10 risk factors of stroke, measurement of BP and understanding high BP, and effective ways of communication with the stroke patients to adopt healthy lifestyle.

Second Training

The aim of the second day was revision of stroke risk factors and hands-on training of BP and blood glucose measurement. A total of 20 interactive teaching sessions were conducted for three ASHA and one ANM group with the help of five trainers, each lasting for 30 to 40 minutes. The sessions included top-10 risk factors of stroke, monitoring of risk factors, hands-on BP measurement and high-BP management (pharmacological and nonpharmacological), and hands-on blood glucose measurement and high-glucose management (pharmacological and nonpharmacological). In each session, emphasis was given on communication with patients and family members. Examples of effective nonthreatening methods to improve compliance and adopt healthy lifestyles were given.

Mop-up Training Session

ASHAs who could not come to the first and second training sessions were involved in the mop-up training sessions. A total of 14 training sessions (2 hours each) were conducted (6 in Pakhowal and 8 in Sidhwan Bet) at the subcenter level. The topics discussed were understanding the top-10 risk factors of stroke, hands-on session on measurement of BP and blood glucose, and how to adopt effective communication strategies while talking to the patients. ASHAs were also provided with the teaching material (a workbook) in Punjabi language at home for revising the topic discussed in the sessions. All ASHAs were given Rs 100 only for attending each day, which covered the travel.

Training Evaluation

All participating ASHAs completed three questionnaires at the beginning of the first training session. The first questionnaire had a theme of perception of ASHAs about BP measurement and high-BP (Supplementary Appendix I, available online only). The second questionnaire assessed perception of ASHAs about risk factors of stroke and their control (Supplementary Appendix II, available online only). None of the above questionnaires actually assessed the objective knowledge. Both these instruments were in the form of a forced-choice design (yes/no).

A third objective, self-reported questionnaire about stroke risk factor monitoring and management was used for pre- and posttraining assessment (Supplementary Appendix III, available online only). The tool was of multiple-choice pattern with a single or multiple correct option from four similar distractor options. The stem and options of the questionnaire were designed for grade 4 level reading. The ASHAs were given instructions regarding the test instrument and 20 minutes were given to complete the test. The test was repeated at the end of second training or during the mop-up training sessions.

Statistical Analysis

Demographic characteristics of ASHAs were reported as medians and ranges. Quantitative data on knowledge about stroke were assessed using two-tailed paired \(t\)-tests for comparing scores within groups (SPSS version 20 for windows). The McNemar test was used to compare the individual question response of pretraining with the follow-up training 1 and 2. The ANOVA with repeated measures after the Bonferroni adjustments was performed to evaluate the effect of two follow-up training sessions. The comparison among ANMs and ASHAs was done using independent \(t\)-test.

Results

A total of 274 ASHAs from 164 villages participated in the training program in both the blocks. The mean ± SD age of ASHAs and ANMs, respectively, was 39.5 ± 7.6 years and 40.1 ± 7.1 years, respectively. The mean duration of education was 8.6± 3.1 years for ASHAs and 12.89 ± 0.75 years for ANMs. The mean work experience of ASHAs in service was 7.4 ± 3.2 years and 14.30 ± 7.7 years for ANMs. During the training period, 14 ASHAs left the job, which were replaced by the 14 new ASHAs, and 3 ANMs retired and were replaced by new ones. All the new ASHAs and ANMs received at least one training session. Seventy-eight percent (214/274) ASHAs and 53% (28/53) ANMs participated in two or more training sessions.

Pretraining

During the first training, the participating ASHAs (213) and 47 ANMs were assessed for their perceived knowledge about stroke risk factor control and BP (\(→\)Tables 1 and 2). ASHAs perceived that they knew about stroke risk factor control in both the Sidhwan Bet and Pakhowal blocks. More than three-fourths of the ASHAs felt that they were aware about the
top-10 stroke risk factors (mean of 67.5 ± 18.3%) except about atrial fibrillation and measurement of waist-to-hip ratio. Almost 90% ASHAs felt that they knew BP measurement and hypertension management (mean of 84.4 ± 16.7%) except side effects of antihypertensive medications. In the objective multiple-choice questionnaire, the average knowledge score of all ASHAs at baseline was 58.7 ± 19.7% (63.4 ± 18.1% in Sidhwan Bet and 54.4 ± 18.3% in Pakhowal, p = 0.94). The objective baseline knowledge about stroke prevention and management was lower compared with the perceived knowledge (p = 0.04).

**Posttraining**

The time gap between first and second training sessions was 69 days for Sidhwan Bet and 75 days for Pakhowal. The time gap between second training and mop-up training was 129 days for Sidhwan Bet and 112 days for Pakhowal. The mean overall knowledge score in the objective multiple-choice questionnaire increased to 82.5 ± 16.4% after the mop-up training (t = −14.4, p ≤ 0.001). Both the sites showed a statistically significant increase with 49 ± 18.06% (p ≤ 0.001) at Pakhowal and 32 ± 16.25% (p ≤ 0.001) at Sidhwan Bet in the mop-up (third) posttraining assessment compared with the pretraining. However, there was no difference between the two areas (p = 0.346). The knowledge about the normal BP and normal blood glucose remained 100% throughout the training sessions (Table 3). The knowledge about the medicine that helps in stroke prevention has increased from 37 to 59%. Medical condition as risk factors knowledge was 99% in posttraining (Table 4).

A total of 274 ASHAs were trained to measure BP with digital BP machine. They were trained to take three readings in nonparetic upper arm with appropriate positioning of the BP cuff. The ASHAs checked BP on two separate occasions to the satisfaction of the field trainers. A total of 274 ASHAs were trained to measure blood glucose with point-of-care device. They were trained to maintain aseptic condition prior to finger-prick. There were able to appropriately place the drop of blood on the sensor zone. The ASHAs checked blood glucose on two separate occasions to the satisfaction of the field trainers. All the ASHAs were also made aware of the ASSIST study protocol. Activities to be conducted during each visit. A total of 274 ASHAs were trained to make video call to the study doctor on the WhatsApp messaging mobile application.

More than 30% increment was seen in knowledge about the stroke symptoms (35.9%, p < 0.001), avoiding opium...
Table 3 Correct responses by the ASHAs to the individual objective multiple choice questions

| Questions                      | Pakhowal | Sidhwan Bet |
|--------------------------------|----------|-------------|
|                                | Pretraining (n = 112) (%) | Second training (n = 80) (%) | Mop-up training (n = 114) (%) | Pretraining (n = 101) (%) | Second training (n = 99) (%) | Mop-up training (n = 86) (%) |
| 1 Stroke symptoms              | 32 (28.6) | 41 (51.3) | 78 (68.4) | 45 (44.6) | 75 (75.8) | 68 (79.1) |
| 2 Stroke treatment             | 81 (72.3) | 58 (72.5) | 94 (82.5) | 72 (71.3) | 51 (51.5) | 70 (81.4) |
| 3 Stroke prevention- medication| 42 (37.5) | 42 (52.5) | 63 (55.3) | 26 (25.7) | 61 (61.6) | 56 (65.1) |
| 4 Stroke prevention-lifestyle  | 23 (20.5) | 45 (56.3) | 80 (70.2) | 38 (37.6) | 75 (75.8) | 63 (73.3) |
| 5 Risk factors for stroke      | 31 (27.7) | 45 (56.3) | 72 (63.2) | 48 (47.5) | 63 (63.6) | 57 (66.3) |
| 6 Normal blood pressure        | 112 (100) | 80 (100)  | 114 (100) | 101 (100) | 99 (100)  | 86 (100)  |
| 7 Normal blood glucose         | 112 (100) | 80 (100)  | 114 (100) | 101 (100) | 99 (100)  | 86 (100)  |
| 8 Opium in stroke              | 57 (50.9) | 74 (92.5) | 111 (97.4) | 61 (60.4) | 84 (84.8) | 81 (94.2) |
| 9 Brain control                | 37 (33.0) | 15 (18.8) | 69 (60.5) | 52 (51.5) | 32 (32.3) | 50 (58.1) |
| 10 Types of stroke             | 57 (50.9) | 62 (77.5) | 87 (76.3) | 52 (51.5) | 80 (80.8) | 71 (82.6) |
| 11 Modifiable risk factors     | 29 (25.9) | 31 (38.8) | 86 (75.4) | 34 (33.7) | 66 (66.7) | 62 (72.1) |
| 12 Medical conditions as risk factors | 37 (33.0) | 72 (90.0) | 96 (84.2) | 45 (44.6) | 92 (92.9) | 79 (91.9) |
| 13 Diagnostic test for stroke  | 63 (56.3) | 61 (76.3) | 103 (90.4) | 90 (89.1) | 82 (82.8) | 83 (96.5) |
| 14 Golden time period for stroke treatment | 98 (87.5) | 76 (95.0) | 113 (99.1) | 96 (95.0) | 97 (98.0) | 86 (100.0) |
| 15 Improving good cholesterol  | 103 (92.0) | 79 (98.8) | 113 (99.1) | 100 (99.0) | 93 (93.9) | 83 (96.5) |

Table 4 Effect of the training program on the ASHAs’ knowledge about stroke

| Variables                      | Pretraining, n (%) | Second training, n (%) | p-Value | Pretraining, n (%) | Mop-up training, n (%) | p-Value |
|--------------------------------|--------------------|------------------------|---------|--------------------|------------------------|---------|
| Stroke symptoms                | 53 (39.6)          | 85 (63.4)              | <0.001  | 54 (35.5)          | 107 (70.4)             | <0.001  |
| Stroke treatment               | 91 (67.9)          | 85 (63.4)              | 0.12    | 105 (69.1)         | 129 (84.9)             | 0.12    |
| Stroke prevention-medication   | 44 (32.8)          | 78 (58.2)              | <0.001  | 51 (33.6)          | 85 (55.9)              | <0.001  |
| Stroke prevention-lifestyle    | 40 (29.9)          | 90 (67.2)              | <0.001  | 41 (27.0)          | 105 (69.1)             | <0.001  |
| Risk factors for stroke        | 56 (41.8)          | 79 (59.0)              | <0.001  | 57 (37.5)          | 91 (59.9)              | <0.001  |
| Opium in stroke                | 77 (57.5)          | 124 (92.5)             | <0.001  | 87 (57.2)          | 147 (96.7)             | <0.001  |
| Brain control                  | 59 (44.0)          | 35 (26.1)              | 0.001   | 64 (42.1)          | 90 (59.2)              | 0.003   |
| Types of stroke                | 68 (50.7)          | 111 (82.8)             | <0.001  | 76 (50)            | 119 (78.3)             | <0.001  |
| Modifiable risk factors        | 40 (29.9)          | 71 (53.0)              | <0.001  | 44 (28.9)          | 113 (74.3)             | <0.001  |
| Medical conditions as risk factors | 57 (42.5)      | 131 (97.8)             | <0.001  | 57 (37.5)          | 138 (90.8)             | <0.001  |
| Diagnostic test for stroke     | 99 (73.9)          | 110 (82.1)             | 0.13    | 106 (69.7)         | 141 (92.8)             | <0.001  |
| Golden time period for stroke treatment | 122 (91.0) | 127 (94.8)             | 0.03    | 138 (90.8)         | 151 (99.3)             | <0.001  |
| Improving good cholesterol     | 128 (96.2)         | 129 (97.0)             | 1       | 143 (94.1)         | 148 (97.4)             | 0.3     |

Abbreviation: ASHAs, Accredited Social Health activist.
after stroke for treatment (39.5%, \( p < 0.001 \)), causes of 
stroke (53.3%, \( p < 0.001 \)), modifiable risk factors for stroke 
(45.4%, \( p < 0.001 \)), and lifestyle modifications for stroke pre-
vention (42.1%, \( p < 0.001 \)).

**ANM and ASHA Comparison**

A total of 53 ANMs were trained. The perceived knowledge 
of ASHAs about stroke risk factors and BP assessment was 
67.5 ± 22.5% and 84.5 ± 16.2%, respectively, and in ANMs 
were 51.7 ± 19.1% and 82.5 ± 13.6%, respectively. ASHAs’ 
perceptions about stroke risk factors were more than the 
ANMs' and statistically significant (\( p < 0.001 \)) and no dif-
ference in perception about BP assessment between the 
two groups. The average score on the objective question-
naire of ANMs during pretraining was 78.01 ± 15% and it 
 improved to 89.8 ± 10.1% after second training (\( p = 0.001 \)). 
The ANMs performed better than the ASHAs during pre 
training (\( p < 0.001 \)) and also during follow-up train-
ing (\( p = 0.015 \)).

**Discussion**

In this focused training study, there was incremen-
tal enhancement and retention of knowledge of ASHAs 
regarding stroke treatment and prevention over a peri-
od of 6 months. The ASHAs additionally were trained for 
measurement of BP on digital machine and measurement 
of blood glucose on point-of-care device. Furthermore, 
they were trained to do video and audio phone call on 
WhatsApp messaging mobile application.

In an observational study, CHWs were able to accurately 
screen for cardiovascular disease risk and also allocate risk 
score in comparison to the health care professionals (mean 
level of agreement 96.8%).\(^5\) The training was done over a 
period of 1 to 2 weeks. A total of 68 CHWs were trained and 
42 scored >60% qualified for the community screening. They 
were trained to measure BP and body mass index. In another 
study, 15 ASHAs from South India were trained for deliver-
ing community health education, measuring BP and weight 
for hypertension management. The baseline knowledge of 
the ASHA in that study improved from 64 to 76% after train-
ing and to 84% after 3 months’ intervention.\(^11\) In our study, 
the baseline objective knowledge for stroke prevention and 
treatment also improved from 58.7 to 82.5% after mop-up 
training at 6 months.

Culturally appropriate and pragmatic training of CHWs 
is the first step for effective task shifting and task-sharing 
strategies. In the SimCard trial, CHWs were effectively 
able to deliver a simplified cardiovascular management 
program with the aid of smartphone-based electronic 
support system.\(^6\) The antihypertensive medication use 
in villages in both India and China increased by 25.5%. The 
DISHA study is currently assessing the role of frontline 
CHWs, including ASHAs and Anganwadi workers for deliv-
ering structured multicomponent intervention for cardio-
vascular risk reduction.\(^9\) The CHWs received a training for 
2 days on CVD risk factors, how to prevent progression of 
risk factors, lifestyle interventions, and intervention pack-
age. The CHWs will undertake nine visits over an 18-month 
period. This is a primary prevention study and the aim is 
BP reduction. In secondary prevention for coronary artery 
disease trial, a recent study showed significant uptake of 
healthy lifestyle (regular physical activity +29%, odds ratio 
[OR] = 5.2, \( p < 0.001 \)) and evidence-based medications 
(+5%, OR 2.62, \( p = 0.006 \)) when CHWs were involved early.\(^7\)

The CHWs used unstructured discussion, visual methods, 
and patients’ diaries for a total of six visits. A similar ongo-
ing study (CTRI/2015/12/006424) in rural Gadchiroli dis-
 trict of Maharashtra, India, is trying to reduce the primary 
stroke mortality with the help of village-based CHWs and 
outreach physicians. CHWs are targeting reduction of salt 
take, tobacco, and alcohol use. The outreach physician 
targets hypertension, diabetes, and secondary stroke pre-
vention. The results of this study are early awaited. Thus, 
ASHAs may be able to assist in task-shifting across the 
entire spectrum of NCD care pathway, primordial, primary, 
secondary, and tertiary prevention.

ASHA program was launched in 2005 with the aim of 
 improving maternal and child care. It has become largest 
all-female CHW program in the world with almost one 
 million ASHAs. The ASHA program is further strengthened 
by the ASHA empowerment initiatives of government.\(^8\)

Being from the same village and motivated, she has direct 
access to most households and members.\(^9\) As the ASHAs 
are monitored and supported by the ANMs, sensitizing the 
ANMs about prevention strategy of NCDs can help them 
guide the ASHAs to meet the unmet need for NCDs pre-
vention in the rural community efficiently.\(^10\) Although the 
ANMs performed better than the ASHAs in both the phases 
of the training, but after the posttraining the difference is 
small. Despite wide difference in the education and train-
ing of ANMs and ASHAs, the study shows that ASHAs can 
be trained to deliver certain health care facilities. This may 
allow better screening, treatment, and follow-up monitor-
ing of high-priority disease conditions with a stable course. 
The enhancement, retention, and efficacy of knowledge of 
the ASHAs can be further bolstered with the use of smart-
phone and mobile applications.\(^21\)

**Strengths and Limitations**

The training material was developed after involvement of 
all community stakeholders. We took into consideration 
the multitheories model of medical. Thus, we initially 
tested the perception of ASHA about the topics of training 
to challenge existing concepts (dissonance phase).\(^22\)

The focused group training helped us refine, organize, and 
consolidate the knowledge and also get appropriate feed-
back. We are able to give at least one training to all the 
ASHAs in the respective blocks. All the ASHAs were not 
able to attend all the training sessions because of several 
reasons; transportation to the training venue (CHC of the 
block) was the main reason.
Conclusion

Focused group training can help enhance the knowledge of ASHAs about stroke prevention and management. ASHAs are also able to retain this complex multicomponent knowledge over a 6-month period. ASHA may be able to partake in reducing the secondary stroke burden in rural India.

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Conflict of Interest

None declared.

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