RESEARCH ARTICLE

KNOWLEDGE OF STROKE AMONG FEMALE MULTIPURPOSE HEALTH WORKERS IN INDIA

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ARTICLE INFO	ABSTRACT
	Background: Public health is increasingly concerned with recognizing factors that lead to differences on the basis of profession & teaching practices in stroke. We conducted a study to determine the knowledge of stroke risk factors and warning signs, and how both are perceived, in a representative sample of female multipurpose health care workers (FMPHWs) in Kashmir valley **Methods:** A representative sample of the female healthcare workers of two districts of Kashmir division were selected using a double randomization technique. Data was collected by giving a structured questionnaire to the participants. **Results:** 202 subjects were interviewed (52.0 % from district Anantnag ; mean age (SD) 34.9 (6.1) years).Thirty two percent of FMPHWs had never heard of the term stroke. Surprisingly eighty five percent of all subjects reported at least one correct warning sign of stroke (OR: 1.4; 95 % CI: 0.66 – 3.22). The most frequently mentioned individual warning signs were sudden difficulty speaking, sudden weakness. There were no district wise differences regarding the types of warning symptoms that respondents listed. Female Healthcare workers from district Anantnag displayed better knowledge of risk factors than from District Baramulla (OR: 1.1; 95 % CI: 0.8–1.6). 8.6% FMPHWs from Anantnag answered risk factors incorrectly & Hypertension accounted for 61.9% followed by smoking (27.6%) among the correct answers whereas 34% of FMPHWs from Baramulla answered incorrectly about risk factors and also listed Hypertension(57.7%) followed by smoking(11.3%) as risk factors. In response to stroke, FMPHWs from Anantnag were significantly less likely than from Baramulla to choose to call an ambulance or to send the patient immediately to hospital (OR: 0.7; 95 % CI: 0.60–1.01). **Conclusions:** Stroke knowledge is sub optimal in both districts. This study demonstrates gaps in the knowledge of these health care providers about stroke, and treatment choice. Therefore, workshops, seminars and public awareness campaigns must be implemented to increase knowledge of stroke among female multipurpose health workers and make them aware of the importance of referring the patient immediately to hospital if they experience warning signs of stroke

INTRODUCTION

Stroke is a leading cause of death and disability. Poor knowledge of stroke risk factors (Gupta and Thomas, 2002) symptoms and appropriate response to acute stroke are causes of delay of stroke treatment and a possible cause of poor outcome (California Acute Stroke Pilot Registry (CASPR) Investigators, 2005; Deng *et al*., 2006). Although awareness of stroke is improving, there is still a gap in public knowledge as

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well as health care providers about stroke even in the developed countries (Pancioli *et al*., 1998; Reeves *et al*., 2008; Sug Yoon *et al*., 2001; Derex *et al*., 2004; Carroll *et al*., 2004). In the absence of national public stroke education and awareness programs in most developing countries, hospital workers have become an important source for information for the public and are frequently contacted by family, friends and neighbors in this respect (Kamran *et al*., 2007; Schneider *et al*., 2003). It is known that stroke is more harmful to women in terms of mortality, functional prognosis, and impact on quality of life. Numerous studies carried out in the past few years have evaluated knowledge of stroke in the general

population, but far fewer of them have analyzed female multipurpose health workers (FMPHWs) who are the ground level health care workers, especially in India. According to available data, the population's general knowledge of stroke, its risk factors and warning signs, and response in the event of stroke or stroke symptoms show room for improvement (Jones *et al*., 2010). Limited knowledge can contribute to delays in seeking medical attention after stroke onset, which may have repercussions on the final outcome (Kwan *et al*., 2004). The aim of the present study is to identify knowledge of stroke, its vascular risk factors and warning symptoms, illness perception, and attitude towards strokes in a representative sample of FMPHWs in India.

MATERIALS AND METHODS

The sample included 202 subjects older than 18, randomly selected for National Adolescent Health Program training. Under National Health Mission in collaboration with the Department of Community Medicine, Government Medical College, Srinagar certain FMPHWs were selected randomly for training regarding various National Adolescent Health Programs. We conducted the study on these subjects. The survey instrument was a structured questionnaire divided into four sections with open-and closed-ended questions. The first section of the questionnaire collected information on socio demographic variables. The second section contained a list of open-ended questions about knowledge of stroke, its symptoms and risk factors, and unhealthy habits. The third section consisted of open ended questions about the respondent's hypothetical response to presenting or witnessing signs of a cerebrovascular event, and upon suspecting stroke or transient ischemic attack (TIA) in a family member or herself. The fourth section contained questions about the respondent's experiences with the disease and presence of any risk factors or unhealthy habits. The study was approved by the hospital ethics committee. The procedure for collecting information was self reported questionnaires by the respondent. Questionnaires were administered by a research group. Equal numbers of questionnaires were assigned to each population unit. For each population unit, researchers extracted a second random sample; this one was seat-number specific and every participant had the same likelihood of being selected. This process yielded a selected seat number and an alternate seat number. Eligible candidates were individuals older than 18 residing in Kashmir who had no cognitive impairment and were willing to participate in the study. All participants gave their express permission to participate. The subject received a copy of the signed and dated consent form.

Analysis

Data analyses were performed using SPSS software version 20.0 (SPSS Inc.). Some of the variables were recoded as discrete variables to facilitate logistic regression analysis. Knowledge of warning symptoms and classic risk factors was encoded as naming one or more appropriate responses, or none. The dependent variable "hypothetical response to warning symptoms or stroke" was categorized as appropriate (going immediately to hospital or calling the emergency number) or inappropriate (all other options). The total sample

was also divided into age groups in order to make the evaluation easier. We completed a district-based logistic regression analysis to examine demographic and socioeconomic variables, previous experience with the disease, and presence of vascular risk factors.

RESULTS

Sample profile

The final sample comprised 105 FMPHWs from district Anantnag (51.9 %) and 97 from district Baramulla (48.0 %). 12.9 % of FMPHWs reported a first degree relative having suffered a stroke and 7.6% reported of a relative having suffered a heart attack. Mean age was 34.9 years (SD=6.1) among FMPHWs from Anantnag and 29.3years (SD= 4.2) from Baramulla.

Table 1. Socio demographic features & self reported lifestyle and medical conditions related to stroke in the study sample by district

	Anantnag n = 105		Baramulla n=97		P
Age in years, median , IQR	33	8	28	5	0.071
Education level, n %					0.351
Higher Secondary	105	100	72	74.2	
Diploma	Nil	Nil	25	25.8	
Income/yr, n %					
≤30000	81	77.1	97	100	<0.001
>30000	24	22.9	Nil	Nil	
Vascular Risk factors					
Hypertension Present	Nil	Nil	8	8.2	<0.001
Not Sure about Hypertension	16	15.2	9	9.2	
Dyslipidemia					
Present	Nil	Nil	1	1	<0.001
Not sure about Dyslipidemia	8	7.6	7	7.2	
Diabetes Melitus					
DM Present	2	1.9	1	1	<0.001
Not Sure about DM	7	6.6	9	9.2	
Smoking	Nil	Nil	2	2.1	<0.001

Knowledge of stroke

More FMPHWs from Baramulla (66.0 vs. 45.7 %; *p* = 0.004) knew what cerebrovascular diseases are and more FMPHWs from Anantnag than from Baramulla (30.5% vs. 0.0 %; *p* = 0.004) thought thrombosis, embolism, infarction and stroke are same. More of respondents from Baramulla than Anantnag (16.5% vs. 7.6%) admitted that they didn't know whether thrombosis, embolism, infarction & stroke are same or not. Most respondents identified the brain as the organ affected by stroke: 91.4 % of FMPHWs from Anantnag and 83.5 % from Baramulla (p = 0.088). However, 8.6 % from Anantnag and 16.5 % from Baramulla erroneously named the heart (p = 0.069).

Knowledge of stroke warning signs (SWS)

Knowledge of SWS was tested with open-ended questions and data were later recoded for analysis in logical categories. Respondents able to correctly name at least one warning sign of the disease accounted for 82.9 % of FMPHWs from Anantnag and 87.6 % from Baramulla. The mean number of listed symptoms was similar between the districts: 0.82 (SD:

0.37) for Anantnag and 0.87 (SD: 0.33) for Baramulla (P = 0.343). Likewise, there were no significant differences among the districts for the type of warning signs that were listed. The most commonly reported stroke symptoms were paralysis/weakness, sudden difficulty in speaking. Other warning signs, such as confusion and sudden headache, were reported by less than 1 out of every 100 respondents and 1 out of 25 respondents respectively regardless of district they belonged (Table 2). Facial paralysis was not named as SWS by any of the respondents. Figure 1 shows that knowledge of atleast one SWS broken down by age, follows a negative trend with fewer individuals among both the youngest and oldest respondents and thus demonstrating poor knowledge of stroke. FMPHWs from Baramulla who used to smoke (OR: 9.5; 95 % CI: 5.2–17.0) and had an experience heart attack (OR: 11.1, 95% CI: 5.7- 21.5) had a significantly better knowledge of SWS and knowledge of at least one risk factor. FMPHWs from Baramulla who were stressed, diabetic, sedentary had significantly worst knowledge of risk factors of stroke. FMPHWs from Anantnag who were stressed and had an experience of a relative suffered from a heart attack had better knowledge of at least one risk factor of stroke.(Table 3)

Knowledge of stroke risk factors

Open-ended questions were also used to test knowledge of stroke risk factors. Respondents able to name at least one vascular risk factor accounted for 53.3 % of FMPHWs from Anantnag and 16.5 % from Baramulla. FMPHWs from Baramulla were less likely than from Anantnag to name one or more risk factors (OR: 0.17; 95 % CI: 0.08–0.33). The risk factors most frequently named by FMPHWs from both districts were hypertension, smoking and high cholesterol. Hypertension was named by 1 in 3 respondents, smoking by approximately 1 in 4 from Anantnag, and high cholesterol by 1 in 8 respondents (Table 2). Respondents from Anantnag were more likely to name tobacco (OR: 2.4; 95 % CI: 1.2 – 4.6), high cholesterol (OR: 1.3; 95 % CI: 0.5 –2.9) comparatively. Surprisingly, 38.1% respondents from Anantnag admitted they didn't know any risk factors of stroke at all. On the other hand, 49.5% respondents from Baramulla admitted they didn't know any risk factor of stroke, which is again a matter of concern. The alarming sign here is that 34% of respondents from Baramulla mentioned risk factors which had no relation with stroke.

The most common incorrect risk factors mentioned were accidents, nephritis and renal failure. Figure 1 shows that knowledge of at least one risk factor broken down by age group follows a negative trend. Interestingly, respondents with vascular risk factors did not display a better knowledge, except for FMPHWs from Anantnag who had an experience of a relative undergone a heart attack (OR: 2.0; 95 % CI: 1.6–2.4), FMPHWs from Baramulla who herself had suffered a heart attack (OR: 11.1; 95% CI: 5.7 – 21.5) and respondents from Baramulla who used to smoke had better knowledge of stroke warning sign (OR: 9.5; 95% CI: 5.2 – 17.0). A prior history of stroke was not associated with better knowledge of risk factors (Table 3, part 2).

Response to stroke

Respondents were asked open-ended questions with no clues about their hypothetical response to experiencing different symptoms suggesting stroke. Next, they were asked how they would respond if they believed they were experiencing a stroke or a TIA. Symptoms causing the most concern in the respondents were sudden difficulty in speaking & sudden onset of weakness; confusion and intense headache caused the least concern. Significantly more respondents from Anantnag than Baramulla selected an appropriate response for the sudden difficulty in speaking (OR: 1.3; CI: 1.1 – 2.6) & sudden onset of weakness (OR: 1.2; CI: 1.1 – 2.9). Majority of the respondents from Anantnag mentioned all four symptoms as SWS i.e., sudden difficulty in speaking, sudden onset of weakness, confusion and intense headache (OR: 1.5; 95% CI: 1.1 – 2.1). An appropriate response to a suspected stroke was indicated by 45.7 % from Anantnag and 33.0 % from Baramulla. The difference between respondents from Anantnag and Baramulla for response to stroke was statistically significant (OR: 1.38; 95 % CI: 1.2 –3.7), and it remained same after adjusting for income level (OR: 1.49; 95 % CI: 1.04 –2.1). Responses given by participants with vascular risk factors were poor overall, and only smokers from Baramulla indicated more appropriate responses to suspected stroke (OR: 9.5; 95 % CI: 5.2– 17.0). Rates of appropriate responses in FMPHWs from Anantnag who were stressed and FMPHWs from Baramulla who were stressed and diabetic were significantly lower than in subjects without these risk factors.

Table 2. Stroke warning signs and risk factors reported by survey respondents answering open-ended questions

	Anantnag			Baramulla			P
	N	%	95% CI[a]	n	%	95% CI[a]	
Signs and Symptoms							
Paralysis/Weakness	13	12.4	5.9 - 18.7	18	18.6	10.6 – 26.4	<0.001
Confusion	2	1	-0.9 – 2.8	1	1.0	-1.0 – 3.0	0.320
Sudden difficulty speaking	15	14.3	7.4 – 21.0	27	27.8	18.7 – 36.9	<0.001
Sudden headache	3	2.9	-0.3 – 6.1	6	6.2	1.31 – 11.0	0.083
All of the above	55	52.4	42.6 – 62.0	33	34.0	24.4 – 43.6	<0.001
Didn't know	18	17.1	9.81 – 24.4	12	12.4	5.7 – 19.0	<0.001
Risk factors							
Able to answer	56	53.3	43.6 – 63.0	16	16.5	8.9 – 24.0	<0.001
Wrong answer	9	8.6	3.1 – 14.0	33	34.0	24.4 – 43.6	0.002
Admitted didn't know	40	38.1	28.6 – 47.5	48	49.5	39.3 – 59.6	<0.001
Smoking	29	27.6	19.0 – 36.0	11	11.3	5.0 – 18.0	<0.001
High cholesterol	13	12.4	6.0 – 19.0	9	9.3	3.0 – 15.0	<0.001
Stress	10	9.5	4.0 – 15.0	2	2.1	-1.0 – 5.0	0.158
Sedentary life style	5	4.8	1.0 – 9.0	6	6.2	1.0 – 11.0	0.048
Diabetes Mellitus	1	0.9	0.3 – 2.3	5	5.2	1.0 – 10.0	0.052
Hypertension							
Yes	65	61.9	52.4 – 71.3	56	57.7	47.7 – 67.7	0.005
Didn't know	16	15.2	8.2 – 22.2	41	42.3	32.2 – 52.2	<0.001

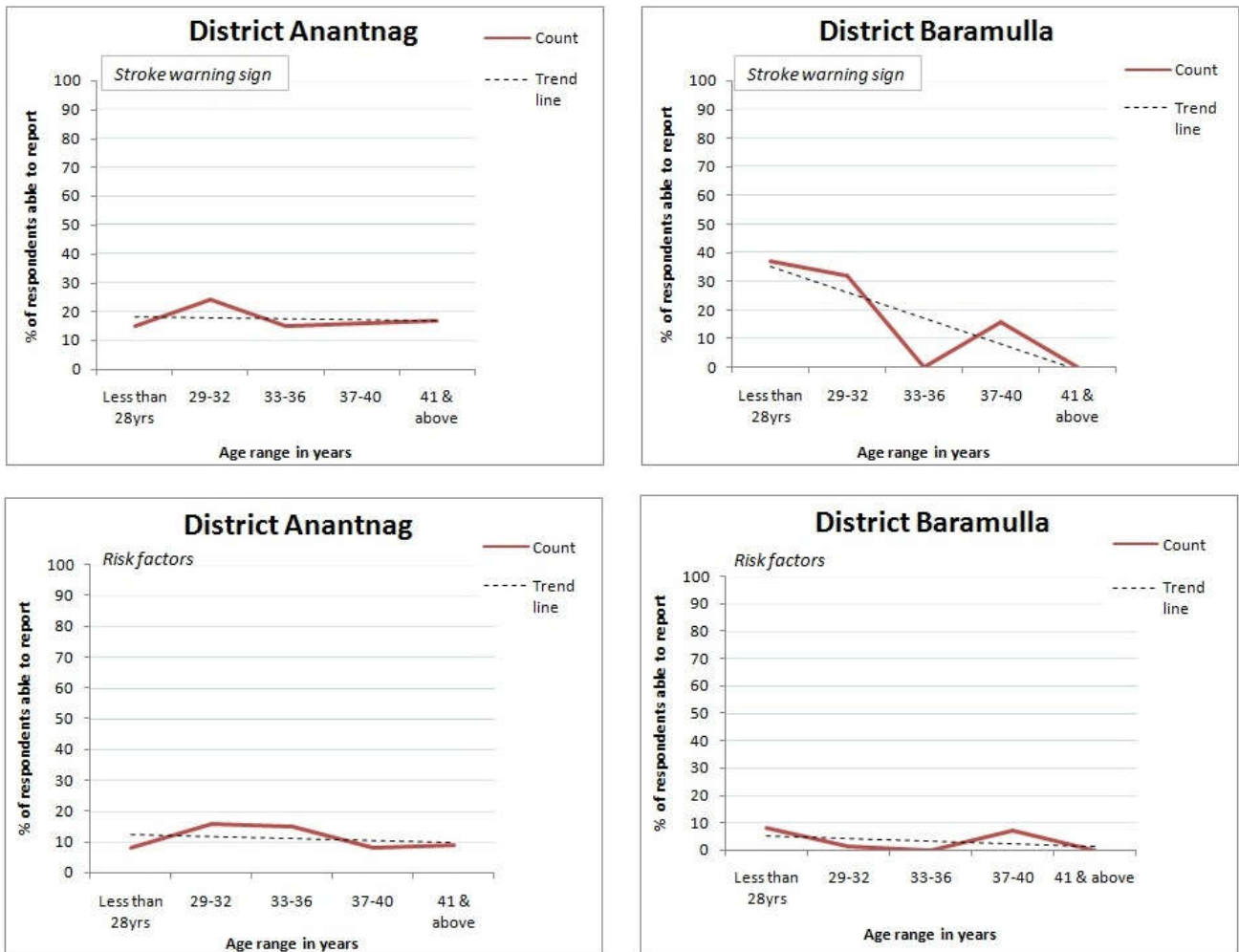*Breakdown by district; 95% Confidence interval for proportions; [a] Exact Method*

Fig. 1 Percentage of respondents able to report at least one stroke warning sign or risk factor broken down by age and district

Table 3. District wise differences in stroke knowledge broken down by self reported risk factors and experience with stroke

	Anantnag			Baramulla		
	OR	95 % CI	*P*	OR	95 % CI	*P*
Part 1 Knowledge of at least one warning sign						
Vascular Risk factor						
Hypertension	1.3	0.4 – 3.8	0.547	1.0	0.8 – 1.4	0.548
Smoking	1.0	0.8 – 2.9	0.840	9.5	5.2 – 17.0	<0.001
Stress	0.8	0.7 – 0.8	0.133	0.8	0.8 – 0.9	0.596
Diabetes Mellitus	0.8	0.7 – 0.9	0.521	0.8	0.8 – 0.9	0.709
Sedentary lifestyle	0.8	0.7 – 0.8	0.302	0.6	0.07 – 6.4	0.745
Dyslipidemia	0.8	0.5 – 1.1	0.254	0.8	0.8 – 0.9	0.709
Stroke experience						
Personal	1.2	1.1 – 1.3	0.651	1.0	0.7 – 1.1	0.814
Relatives	1.2	1.1 – 1.3	0.081	6.8	1.7 – 26.7	0.002
Cardiovascular ailment experience						
Personal	0.8	0.1 – 1.3	0.635	1.0	0.1 – 9.0	0.991
Relatives	1.2	1.1 – 1.3	0.184	1.1	1.0 – 1.2	0.193
Part 2 Knowledge of at least one risk factor						
Vascular Risk factor						
Hypertension	1.2	0.8 – 1.7	0.287	0.8	0.7 – 0.9	0.193
Smoking	0.6	0.5 – 0.8	0.731	1.2	1.0 – 1.3	0.530
Stress	0.4	0.4 – 0.5	0.002	0.1	0.09 –0.2	<0.001
Diabetes Mellitus	0.5	0.4 – 0.6	0.185	0.4	0.4 – 0.5	<0.05
Sedentary	0.5	0.4 – 0.6	0.032	0.1	0.06 – 0.1	0.000
Dyslipidemia	0.8	0.5 – 1.2	0.814	0.8	0.7 – 0.9	0.659
Stroke experience						
Personal	1.8	1.5 – 2.2	0.352	0.9	0.7 – 1.8	0.734
Relatives	0.9	0.3 – 3.1	0.969	1.2	1.1 – 1.3	0.087
Cardiovascular ailment experience						
Personal	1.0	0.2- 1.8	0.521	11.1	5.7 – 21.5	<0.001
Relatives	2.0	1.6 – 2.4	0.006	1.2	1.1 – 1.3	0.193

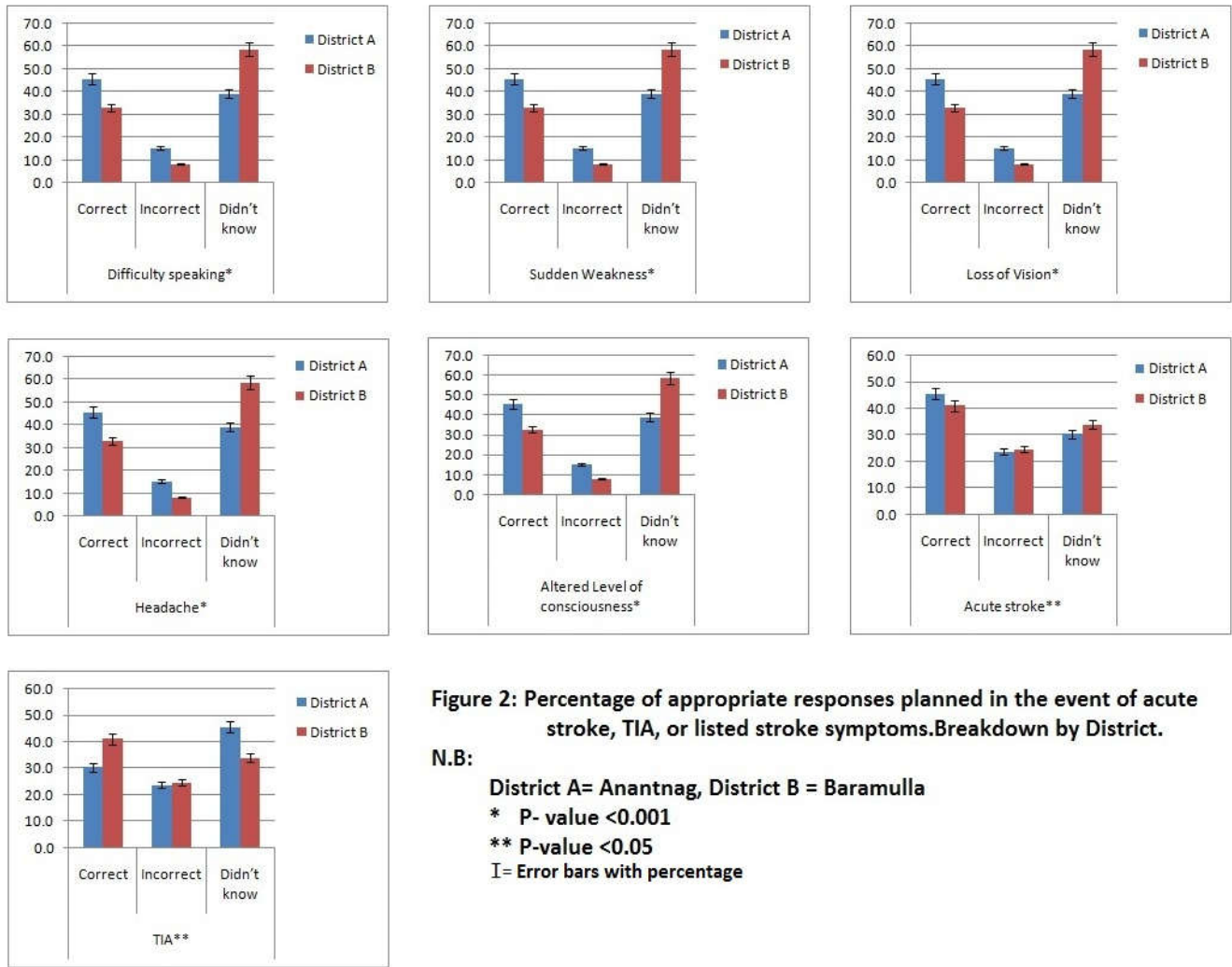*Univariate analysis; 95 % CI= 95% Confidence interval; OR = Odds Ratio*

Figure 2: Percentage of appropriate responses planned in the event of acute stroke, TIA, or listed stroke symptoms. Breakdown by District.

N.B:

District A= Anantnag, District B = Baramulla

* P- value <0.001
** P-value <0.05
I= Error bars with percentage

Experience with the stroke in the family was not associated with higher rates of appropriate responses to suspected stroke in either respondents from Anantnag ($p = 0.651$) or Baramulla ($p = 0.814$). Upon suspecting a TIA, respondents from Baramulla would be more likely than from Anantnag to go refer the patient immediately to the hospital or call the emergency number (41.2 vs. 30.5 %). These differences were found to be significant in the univariate analysis (OR: 1.6; 95 % CI: 1.1–2.9) and remained almost same after adjusting age, education and income level ($p = 0.03$) (Fig. 2).

DISCUSSION

Stroke knowledge has been addressed by many population-based cross-sectional studies, although few of them have investigated knowledge among female multipurpose health workers especially in India. Previous studies have defined knowledge of cerebrovascular disease symptoms as the ability to name one or more warning signs in response to open-ended questions (Yoon *et al*., 2001). Our study found significant differences among districts in the number of correctly identified SWS or the type of signs mentioned. A study conducted in Spain showed that more than 70 % of population is able to name at least one symptom of stroke

(Ramírez☐Moreno *et al*., 2015). As reported by other studies (Parahoo *et al*., 2003; Neau *et al*., 2009; Hickey *et al*., 2012; Schneider *et al*., 2003) the most frequently named warning symptom was weakness. Hypertension was the commonest risk factor identified; whilst one-sided body weakness was most commonly identified as warning symptom but again the overall knowledge among health care providers are poor and these finding are in line with a study conducted among hospital workers in Nigeria and even in Egypt (Akinyemi *et al*., 2009; Shehata *et al*., 2016). Approximately 1 out of every 25 individuals wrongly identified chest pain and shortness of breath as SWS; this reflects the confusion between ischemic heart disease and stroke even among health workers (Yoon *et al*., 2001; Reeves *et al*., 2002). Other studies have also reported that individuals with known vascular risk factors do not display more ample knowledge of the disease (Schneider *et al*., 2003; Sug Yoon *et al*., 2001; Greenlund *et al*., 2003). These findings have important implications for health education, since FMPHWs workers are the first contact health care providers on ground and therefore their lack of knowledge can lead to delay in referral of the patient and ultimately increasing the burden of morbidity and mortality in our country.

In our study, only respondents who smoked and whose relative had undergone a stroke or a heart attack seemed to be better informed. FMPWs from Anantnag display considerably more knowledge of risk factors than Baramulla, but overall the health care providers had a very poor knowledge of risk factors of stroke (Hawkes *et al*., 2015). There were differences between the types of vascular risk factors listed from Anantnag and Baramulla. Respondents from Anantnag more frequently named risk factors like smoking and high cholesterol. Majority of respondents from Baramulla as well as Anantnag admitted they didn't know any risk factor of stroke. The alarming sign here being that 34% of respondents from Baramulla mentioned risk factors which had no relation with stroke which as a consequence can lead to wrong referral of the patient which is in line with previous research in which it was found that generally that knowledge of stroke warning signs seems to be suboptimal even in some developed countries (Pancioli *et al*., 1998; Baldereschi *et al*., 2015). The most common incorrect risk factors mentioned were accidents, nephritis and renal failure. A possible explanation for this tendency is lack of knowledge among grass root level workers and their preconception about accidents being the only emergency. Concerning immediate response to stroke or its warning signs, respondents from Baramulla are significantly more likely than from Anantnag to call an ambulance or refer the patient immediately to hospital. These differences remain almost same after adjusting for age, education and income level as these were factors shown by previous research to be associated with a more appropriate response to stroke (Baldereschi *et al*., 2015; Nedeltchev *et al*., 2007; Pandian *et al*., 2005; Johnston *et al*., 2003; Mikulík *et al*., 2008; Hamdy *et al*., 2013; El Sherbiny *et al*., 2011). Pre hospital delay is known to be one of the major factors limiting use of reperfusion therapy for stroke because stroke has a narrow therapeutic window. Therefore, any kind of delay in referral can lead to increased morbidity and mortality due to stroke (Moser *et al*., 2006). Knowledge and awareness of proper measures that should be taken when identifying an attack of stroke has been shown to significantly decrease pre hospital delay (Koo *et al*., 2008).

Our study has some methodological limitations. First, the survey may have a selection bias since the numbers of respondents from district Anantnag and Baramulla did not match exactly. Second, there may also be a non-response bias, given that individuals who refused to participate or could not be contacted might have a different level of stroke knowledge. Third, results depend on the type of data collection method used; since the respondents were sitting together while answering they may unintentionally or intentionally influence the results by asking the answers to colleagues or even cheating and leading to inconsistent measurements. Fourth, cross-sectional studies cannot prove causality. Lastly, our respondents were only female health care providers which may lead to gender bias but in turn proves to be an advantage in this setting and also as some studies have shown that women delay going to hospital significantly compared to men and that they are attended later than men after reaching the hospital (Foerch *et al*., 2007; Mandelzweig *et al*., 2006). Plausible explanations for these delays are unclear, although they may be due in part to sex-related differences in clinical presentation (Di Carlo *et al*., 2003) and also to differences in patient`s knowledge of

stroke and response to symptoms. Therefore, the female multipurpose health workers being the backbone of health care at ground level ought to have a sound knowledge because in Muslim dominant areas the female patient have an inclination to be examined by same gender as such if the female health workers lack basic knowledge about stroke, an imminent threat awaits. A number of tests have been developed to assess specific stroke knowledge, including the stroke symptom questionnaire, stroke action test, and stroke awareness questionnaire, in which residents learn how to dial emergency numbers, etc., for general directions when a stroke has occurred (Zhao *et al*., 2014). However, there are presently few references to methods assessing community resident knowledge regarding ways to cope with pre-hospital stroke symptoms in the scientific literature. Therefore, other limitation of this job is that no psychometric properties that show the validity and reliability of this type of survey.

Conclusion

This study demonstrates gaps in the knowledge of these health care providers about stroke, and treatment choice. Health education is still important, even, amongst health workers and stroke awareness campaigns may need to involve faith-based organizations. Stroke's differential effect on women will continue to gain importance in the decades to come. Therefore, workshops, seminars and public awareness campaigns must be implemented to increase knowledge of stroke among female multipurpose health workers and make them aware of the importance of referring the patient immediately to hospital if they experience warning signs of stroke. Both the general population and the scientific and medical communities stand to benefit from better education on stroke.

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