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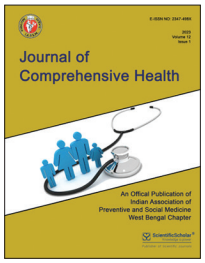

Original Article

Effect of an Educational Intervention among Rural Mothers Regarding Knowledge about Danger Signs in Children under-5 Years of Age

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ABSTRACT

Background: Despite improving different sectors, child survival remains a challenge. In 2019, an estimated 5.30 million children died globally, mostly from preventable diseases such as pneumonia, diarrhea, and malaria which are considered as danger among under-5 children.

Objectives: The objective was to assess the effect of an educational intervention among rural mothers regarding danger signs in under-5 children.

Material and Method: A community-based intervention study was conducted on 480 (240 in study and control arm each) randomly selected rural mothers who had under-5 children. Baseline data were collected from house-to-house visits. The educational intervention was given to the study arm in sub-centers/outreach camps with a laptop and projector using "Integrated Management of Neonatal and Childhood Illnesses" videos and chart booklets. Three interventions were given at 3-month intervals. Seven days after each intervention repeat data were collected by home visit and collected data coded, entered, and analyzed in Excel and the Statistical Package for the Social Sciences 20.

Results: There was no statistically significant difference in knowledge score across the arms at baseline. Friedman test indicated that the knowledge score of the study arm was found to increase significantly at all levels of assessments compared to that of baseline score as well as the previous level whereas the knowledge score at level 3 did not show a significant increase over that of level-2. However, for the control arm, it was found to be increased significantly at level-3 assessment compared to other levels of assessment.

Conclusion: Mothers' awareness regarding danger signs in children is necessary and could be improved by a cost-effective intervention strategy.

Keyword: Danger signs, Intervention study, Mothers' knowledge, Under-5 years

INTRODUCTION

Over the past 30 years, largely due to the efforts of respective governments and healthcare institutions, significant improvement has been noted globally in regard to child health and survival rates. In recent times, the fall in mortality numbers has increased. As such, out of every 27 children, one child is noted to die before reaching 5 years which during the 1990s was 1 death out of 11 children. Notwithstanding progress made in arresting the rate of under-5 child mortality, The World Health Organization (WHO) draws attention to the absence of universality

of such progress. For example, till 2020 the Sub-Saharan African countries continued to witness the death of 74 children below the age of 5/1000 live births as compared to the global 37/1000. The WHO document notes that countries of this region, together with Central and South Asian countries, accounted for 80% of over 5 million under-5 child losing their lives in 2020. Notably, 53% of the global population hails from these countries. Yet, they witness most child deaths. The report called out India, Congo, Ethiopia, Pakistan, and Nigeria as the nations with notorious records of child mortality, making up for half of 2020's mortality numbers.[1,2]

In India, analysis of the National Family Heath Survey (NFHS-4), 2015–16 revealed wide variations in mortality rates of under-5 children between different districts. From the findings of the survey, scholars have interpreted that in relation to the 2030 target regarding under-5 child mortality outlined in the sustainable development goals (SDGs), India's recorded mortality rate during 2015–16 was higher by 2 times.[3] This implies that the rate of mortality of under-5 children in India was much higher than what should have been during the period covered by the survey.

In West Bengal, an analysis of NFHS-5 (2019–2020) shows under-five mortality rate has declined from 31.8 (NFHS–4) to 25.4, and it requires utmost care to reach the SDG target.

Principal causes of mortality are mostly preventable and are complications in preterm birth cases, pneumonia, malaria, asphyxia, diarrhea, and congenital problems. Children can be guarded from these diseases by providing adequate nutrition, vaccination for diseases, safe drinking water, and care by health service providers when required.[4]

As per Health in March 2018, West Bengal has new cases of Grade I Malnutrition about 16.72% among the age group (0–6).[5] Mothers need to be made aware of this through cost-effective intervention.

The major goal of this intervention is to increase mothers' awareness regarding danger signs in children under 5 years of age. Early detection of a child's illness is a crucial step for the improvement of a child's survival. Another major reason to carry out this research is to close the knowledge and comprehension gap between mothers and these danger signs.

The purpose of this study is to improve maternal awareness about danger signs in children under 5 years of age, underlining its probable significant impact in curbing incidences of under-five mortality from preventable causes.

Objectives

1. To ascertain the effect of an educational intervention among mothers regarding danger signs in children under 5 years of age.

Hypothesis

- H_{01}: There was no change in knowledge score about danger signs in children under 5 years of age among mothers before and after intervention at the 0.05 level of significance
- H_{A1}: There were some changes in the knowledge of mothers regarding danger signs in children under 5 years of age after intervention at the 0.05 level of significance.

MATERIAL AND METHODS

A quantitative approach with community-based intervention study design was conducted from February 2018 to January 2023 among the randomly selected 480 (240 in study and control arm each) women with under-5 children residing permanently under 48 sub-centers covering 134 villages in Hariharpur Block Primary Health Centre, district of South 24 Parganas, West Bengal which is also a field practice area of Rural Health Training Centre of Nil Ratan Sircar (NRS) Medical College, Kolkata. For the current study, 25% (12) of the sub-centers were chosen through simple random sampling. Randomization was done using the "randomization by pair" method. Names of all 12 sub-centers (SCs) were written on separate papers, two drawn each time blindly, and a coin toss, determined allocation: Heads to the study arm and rest to the control arm. This was repeated to allocate all the 12 SCs into two arms. Forty mothers from each sub-center were selected through simple random sampling. Mothers who have under-5 children, living there continuously for 1 year, know Bengali, and are willing to participate were included and those who were ill or pregnant at the time of data collection were excluded.

Data were collected through structured interviews conducted at the household level using a pre-designed and pre-tested semi-structured questionnaire containing information pertaining to demographic and socioeconomic variables and knowledge of mothers regarding danger signs in children under 5 years of age.

The prepared tool and criteria checklist were tested by nine experts to establish the validity of the tool. The experts were asked to consider additions, omissions, and suggestions to improve the clarity of items. The content validity ratio was compiled as on experts' opinions. The reliability was obtained by the test-retest method. The structured teaching material was administered to 10 mothers in the community. It was found that items were clear and the time needed to complete the interview schedule is 40–50 min.

The final draft of the structured teaching program was prepared after incorporating the suggestions and opinions of the experts.

The study was conducted with approval from the Ethics Committee of NRS Medical College and Hospital (Memo No.

NMC/8161 dated December 27, 2017) and voluntary written consent from participants.

Intervention and assessment procedure

After baseline data collection, a preliminary analysis is done, and finalize intervention plan. Then, the selected 12 sub-centers were allocated into study and control arms through "Randomization by pair." Thus, 240 mothers in the study and control arms were ensured.

- Intervention by the principal investigator who is nursing personnel was given at SC/outreach camp, using a laptop and projector.
- Auxiliary nurse midwives, supervisors, accredited social health activists, and mothers at respective sub-centers were informed regarding intervention.
- The session was divided into two for 40 mothers, 20 in each session.
- Post-intervention, assessment was done after 7 days of intervention.
- Intervention done at three levels – Levels 1, 2, and 3 in 3-month intervals.
- Post-assessment was also done at three levels – Levels 1, 2, and 3 after 7 days of intervention for the study arm. For control arm assessment was done without any intervention in 3-month intervals.
- After 2nd intervention due to the pandemic of COVID-19 infection, 3rd intervention got delayed which was done after 4 months
- During 3rd intervention mothers' group was divided into 4 (10 mothers in each group) due to COVID restrictions and informed mothers to come accordingly in 3/4 days.

Collected data were coded in a Microsoft Excel sheet and summarized by descriptive statistics such as mean, standard deviation, median, and percentage. Tables and charts are used for data display. The normality of the continuous dataset was tested by the Shapiro–Wilk test, percentile-precentile (P-P) plot, Skewness, and Kurtosis statistics. Inferential statistics such as the Mann–Whitney U-test, Friedman's test for skewed continuous data, and χ^2 test for categorical data were used in analyses. The trial version of the Statistical Package for the Social Sciences-22 was used for data analysis. $P < 0.05$ was considered as significant.

RESULTS

During 3rd intervention/assessment, 8 participants from the study arm and 5 from the control arm were absent/dropped out. The total dropout rate was 2.70%.

The analyses revealed that the participants belonging to both arms were comparable in terms of religion (Hindu vs. Muslim), type of family (Nuclear vs. Joint), socioeconomic status; current age (year), age at marriage (<18 vs. ≥18 years), parity, no. of under-5 children and breastfeeding practice; and education and occupation of them and their husbands. There was no statistically significant difference between arms about the number of ante-natal (AN), post-natal (PN) visits, AN visits paid at home, place of delivery, and information/messages received before and after delivery regarding exclusive breastfeeding, family planning, and immunization of baby. They were also found to be alike as far as their knowledge of the danger signs [Tables 1 and 2].

Effect of educational intervention

It is clear that the intervention has a demonstrable role in increasing the knowledge of the mothers [Table 3]. Now, to make the outcome of the intervention evident, it is required to find out whether the same assessment encounter as well as ongoing routine information education and communication process has some impact on the knowledge of the mothers belonging to both the groups.

Analysis using Friedman test considering knowledge score of study arm showed that it has increased significantly across the levels but it has also found to be increased paradoxically at some of the levels of assessment in the control arm [Table 4].

Pairwise comparison of Friedman test indicated that the knowledge score of study arm was found to be increased significantly at all levels of assessments compared to that of baseline score as well as previous level. However, knowledge score at level 3 did not show significant increase over that of level-2 [Figure 1].

Further analysis indicated that the knowledge score of control arm was also found to be increased significantly at level-3 assessment compared to other levels of assessment [Figure 2].

DISCUSSION

Due to the scarcity of a similar study, the sociodemographic characteristics of the participants considered in the current study were compared with the general population of West Bengal as well as with district South 24 Parganas as per NFHS-5 data 2019–2020. As there was no study found on under-5 danger signs, all comparisons were made with neonatal danger signs which are a fraction of under-5.

The present study showed that 45% of mothers from both the study and control arm were married before the age of 18 years which is quite similar to the general population of West Bengal (48%) and South 24 Parganas (42%).[6]

Furthermore, the present study showed that 59% of mothers from both arms had visited the antenatal clinic (ANC) 4 times or more, which is quite lower than West Bengal (74%) and South 24 Parganas (86%). Regarding the place of delivery, the present study showed that 90% baby delivered in the institution, which reflects almost the same as in West Bengal (92%) and South 24 Parganas (91%).

Table 1: Distribution of participants according to their awareness on danger signs in under-5 children at level "0" (Baseline), *n*=480.

Issues	Response	Study arm (n_1=240)		Control arm (n_2=240)		*P*-value (χ^2 test)
		No.	(%)	No.	(%)	
Aware about danger signs	Yes	140	58.3	126	52.5	0.19
	No	100	41.7	114	47.5	
List of identified danger signs	Breathing difficulty	119	49.6	99	41.2	0.06
	Fever	85	35.4	71	29.6	0.17
	Severe dehydration	38	15.8	26	10.8	0.10
	Poor feeding	24	10	22	9.2	0.75
	Convulsion	10	4.2	05	2.1	0.18
	Malnutrition (2 m–5 years)	06	2.5	01	0.4	0.05
	Coldness of the body (0–2 m)	02	0.8	00	00	
	Lethargy	00	00	00	00	
	Infection	00	00	00	00	
	Anemia (2 m–5 years)	00	00	00	00	

Analysis further showed that the arms were akin to each other in regard to the mean Rank (238.70 vs. 242.30), Sum of Rank (57299.50 vs. 58151.50) with Mann–Whitney U of 28368.50, Z=0.29 and *P*=0.77

Table 2: Distribution of participants according to identification of numbers of enlisted danger signs at level "0" (Baseline), n=480.

Variables	Response	Study arm (n_1=240)		Control arm (n_2=240)		*P*-value (χ^2 test)
		Frequency	Percentage	Frequency	Percentage	
Number of enlisted danger signs identified	Nil	100	41.7	114	47.5	0.18
	One	47	19.6	54	22.5	
	Two	56	23.3	50	20.8	
	Three	25	10.4	18	7.5	
	Four	10	4.2	04	1.7	
	Five	02	0.8	00	00	

The present study also revealed that out of total births, 10% are still delivered in the home and that's almost the same as in West Bengal (8%) and South 24 Parganas (9%). In the case of breastfeeding immediately after birth, it was found from the present study that above 68% of mothers have breastfed their babies within 1 h after birth which is much higher in West Bengal (59%) and South 24 Parganas (46%).[6]

One study done in China[7] shows 75% of mothers visited ANC more than 4 times, 97.3% delivered a child in a health institution, 83% of mothers did at least one postnatal visit, none were educated about neonatal danger signs, and it is quite similar to present study where >50% mothers from both arms have visited ANC above 4 times, above 90% mothers have got institutional care at the time of delivery of their children, only 20% mothers from both arms have visited the post-natal clinic, and none of the mothers from either arm were aware of neonatal danger signs.

All over the world, the stakeholders are working together to achieve SDG 3, which aims to reduce preventable death among all. For children under 5 years of age and particularly for neonates, prompt action is needed after proper recognition of danger signs for the reduction of preventable death. A few main causes of under-5 death are pneumonia, diarrhea, and malaria (2019) which are preventable. Reduction of morbidity and mortality from those diseases requires immediate recognition of danger signs and prompt action.

The present study shows at baseline (41.7%) of mothers of the study arm and (47.5%) of mothers of the control arm were not aware of the term "danger signs" in children under 5 years of age. None of the mothers from either arm were able to identify "lethargy," "coldness of body," "anemia" and "infection" as dangerous signs which is consistent with the report of Challa and Krosuri in India,[8] Choi *et al.*, in Bangladesh,[9] and Merga and Alemayehu in Ethiopia.[10]

A community-based cross-sectional study conducted in Mollasimla village of Hooghly district of West Bengal concluded that acute illnesses are still largely prevalent in the rural community. Mothers are the first caregivers and need to be made aware of the preventive measures and the need to seek proper treatment at the earliest.[11]

Table 3: Distribution of knowledge scores between arms at different levels of assessment, *n*=480.

Level	Arm	*n*	Median	Ranks		Test statistics	
				Mean rank	Sum of ranks	Mann–Whitney U	*P*-values
Level 0	Study	240	5	238.70	57288.50	28368.500	0.772
	Control	240	5	242.30	58151.550		
Level 1	Study	240	8	334.92	80381.00	6139.000	<0.001*
	Control	240	5	146.08	35059.00		
Level 2	Study	240	11	360.25	86460.50	59.500	<0.001*
	Control	240	5	120.75	18979.50		
Level 3	Study	232#	11	351.50	81548.00	0.000	<0.001*
	Control	235#	6	118.00	27730.00		

#13 Mothers did not turn up during 3rd intervention/assessment, *Significant

Table 4: Distribution of knowledge score within Study Arm at different levels of assessment (n=232#).

Arms	Levels	Descriptive statistics						df	P-value
		n	Mean	Median	Standard deviation	Mean rank	χ^2 test		
Study	Level 0	232	5.1121	5	1.35334	1.02	628.26	3	<0.001*
	Level 1	232	7.7931	8	1.40511	2.03			
	Level 2	232	11.0302	11	1.18210	3.42			
	Level 3	232	11.2629	11	0.68047	3.53			
Control	Level 0	235	5.1447	5	1.51500	2.36	115.48		<0.001*
	Level 1	235	5.1362	5	1.49020	2.34			
	Level 2	235	5.1319	5	1.50627	2.33			
	Level 3	235	5.4766	6	1.19225	2.96			

Eight and five mothers in study and control arms were absent during 3rd intervention, so all those were excluded in analysis of Friedman test, df: Degrees of freedom, *Significant

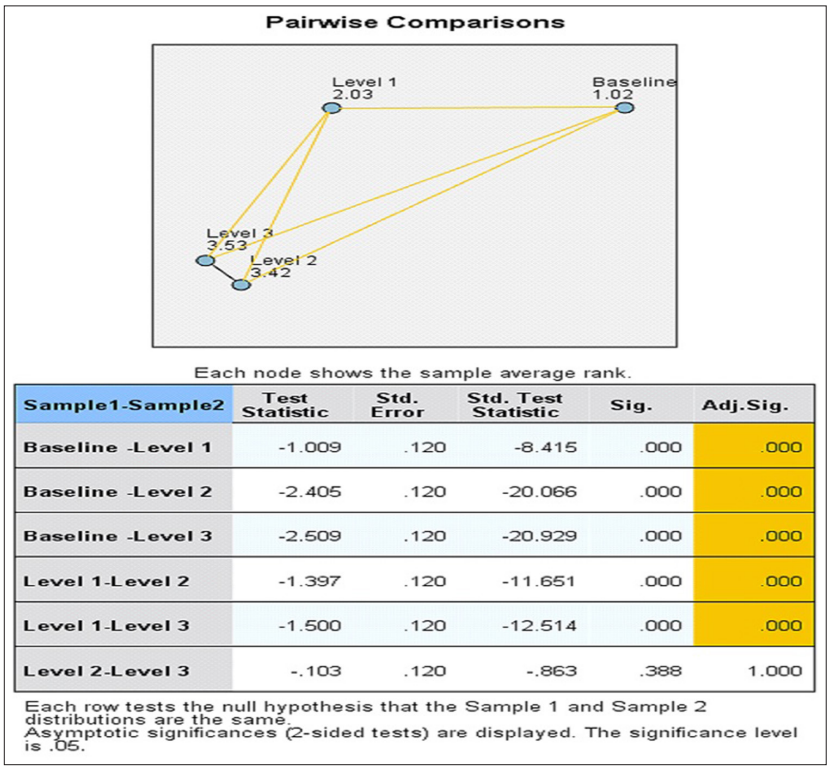
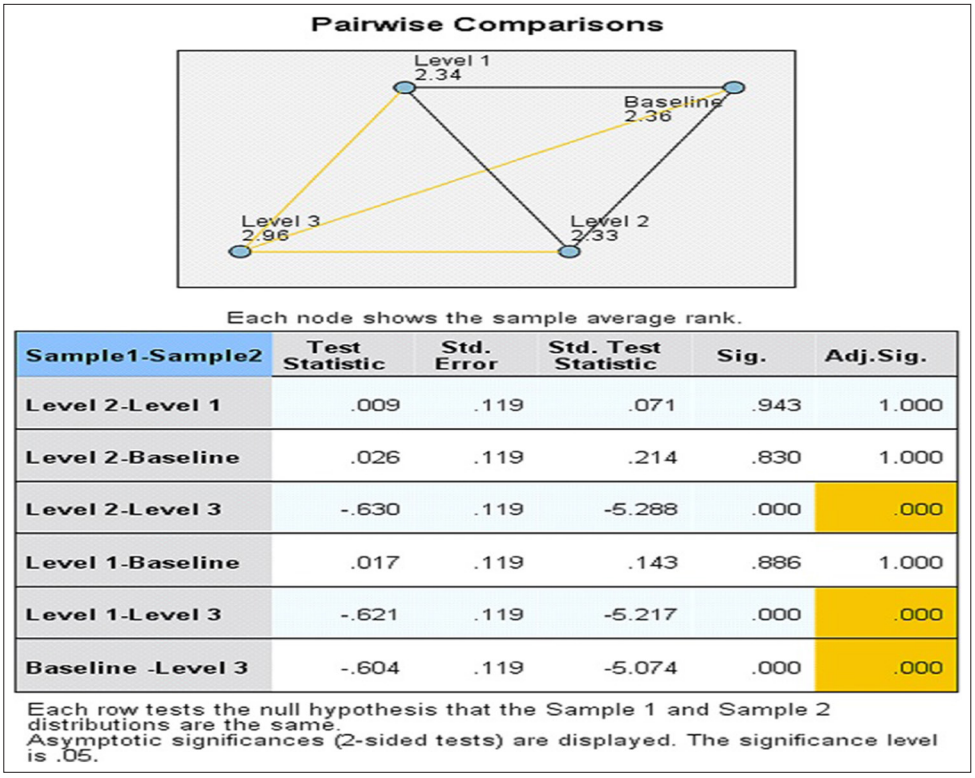


Figure 1: Distribution of test statistics at different levels of assessment in Study arm, *n*: 232. Sig: Significant



Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Level 2-Level 1	.009	.119	.071	.943	1.000
Level 2-Baseline	.026	.119	.214	.830	1.000
Level 2-Level 3	-.630	.119	-5.288	.000	.000
Level 1-Baseline	.017	.119	.143	.886	1.000
Level 1-Level 3	-.621	.119	-5.217	.000	.000
Baseline -Level 3	-.604	.119	-5.074	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Figure-2: Distribution of test statistics at different levels of assessment in control arm, $n = 235$. Sig=Significant

Limitation

Although both arms were segregated in terms of sub-centers, still there was a chance of interaction among the mothers of the study and control arm. Seeking the answers to the same questions might induce some knowledge among participants belonging to control arms. The presence of the COVID-19 pandemic situation might induce improvement in knowledge.

CONCLUSION

It is evident from the study results that there was a huge gap between the expected and existing knowledge levels regarding the danger signs among mothers of under-5 children. It is also noteworthy that significant improvement in knowledge about the danger signs could be possible through an effective educational intervention which is quite possible during AN/PN checkups/visits by the community health workers (CHW). Hence, a feasible strategy for utilizing the CHWs may be contemplated for increasing the knowledge of women regarding danger signs among under-5 children during routine AN/PN check-ups/visits which must be made universal.

Ethical approval: The research/study was approved by the Institutional Review Board at NRS Medical College, number NMC 8161, dated 27th December 2017.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship: Nil.

Conflicts of interest: Dr. Nirmal Kumar Mandal is the Editor in Chief and Dr. Dibakar Haldar is on the Editorial board of the journal.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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