Original Article

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Effectiveness of Structured Educational Intervention on Knowledge Regarding First Aid of Choking and Burns among Nepalese Female Adults: A Pre-experimental Study

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ABSTRACT

Introduction: Injuries and accidents are major public health problems worldwide. Knowledge of first aid is important for female groups who can effectively promote community awareness and prevent the consequences associated with injury and accidents. Most studies have concentrated on a broad and scattered range of injuries and accidents. This study aimed to examine the effectiveness of structured educational intervention on knowledge regarding first aid management of choking and burns among female adults in the community.

Methods: A pre-experimental one-group pre-test-post-test study was conducted among randomly selected 24 female adults of Lalitpur. Sample size determined based on a power analysis. Data were collected via face-to-face interviews using researcher-developed structured questions. A structured educational intervention consisting of two sessions on burn and choking, each lasting one hour was implemented. Data were analyzed with descriptive and inferential statistics, namely the Wilcoxon Signed Rank Test.

Results: Median knowledge scores significantly increased from pre-test to post-test for choking (Md = 4 to 11, Z = –4.294) and burns (Md = 6 to 12, Z = –4.297), both with large effect sizes (r = 0.88). All participants demonstrated improved post-test scores, indicating a consistent and substantial gain in knowledge following the structured educational intervention.

Conclusions: The structured educational intervention was effective in increasing knowledge on choking and burns among female adults. Thus, this study recommends employing structured educational interventions by community health nurses and public health professionals to enhance community awareness of choking and burns.

Keywords: Burns, choking, educational intervention, first aid management, female

INTRODUCTION

Injuries and accidents are major public health problems and pose significant burdens on economies worldwide.[1] Every year, millions of people die due to unintentional injuries (approximately 3.16 million) and violence-related injuries (around 1.25 million), with a greater burden in low and middle-income countries.[1] Furthermore, the National Census of Fatal Occupational Injuries reported an increase in work-related injuries.[2] This trend is reflected globally, including in countries such as China[3] and Nepal,[4] where similar increases have been documented. Such evidence highlights a concerning escalation in injury rates.[4] These injuries not only contribute to physical harm but also increase the risk of mental illness, disability, suicide, and violence, factors that may, in turn, lead to poverty, crime, and substance abuse.[1]

Additionally, these factors may be linked to the development of chronic diseases.[1] In this context, first aid is crucial as a preventive measure to reduce complications and improve outcomes associated with injuries and accidents.[5]

First aid is the initial care or immediate assistance given to a person injured or suddenly ill.[6] First aid can be administered by anyone with minimal or no medical equipment, before the arrival of professional help.[6] Many injuries (i.e., anaphylactic shock, bleeding, burns and scalds, choking, drowning, electric shock (domestic), fractures, heart attack, poisoning, shock, falls, stroke, and unintentional injuries) require emergency first aid management.[1] Prompt and effective first aid can significantly influence recovery outcomes and minimize potential complications. [5,7,8]

Despite the increasing prevalence of injuries, awareness of appropriate first aid techniques remains limited.[2–4,9] Studies from various countries have highlighted this gap. The prior studies revealed a lack of awareness of first aid management in Saudi Arabia among school teachers,[10] a quasi-experimental study in India among mothers,[11] and a cross-sectional survey in Nepal among mothers.[12] In contrast, educational interventions on first aid in Egypt,[13] India,[14] and Nepal[15] demonstrated a significant increase in knowledge of first aid among women. This evidence stresses the effectiveness of targeted education programs in enhancing awareness and potentially reducing injury-related morbidity and mortality.

In Nepal, specific types of injuries, such as burns and choking, are prevalent yet often overlooked. Studies in Nepal highlighted the prevalence of burns among females (40.3%)[16] alongside significant incidences of choking in older adults (83.6%) and children (0.37%).[17] A systematic review highlighted that providing first aid education to laypersons can reduce both morbidity and mortality.[18] especially when effective first aid is administered at the incident site.[19] Moreover, women are recognized as key responders in emergencies, especially within domestic and community settings.[20] In the Nepalese context, female-led community groups, such as Female Community Health Volunteers (FCHVs) and Mothers' Groups, actively participate in health-related initiatives.[21] Therefore, empowering these women with first aid knowledge, specifically for managing choking and burns, can facilitate community-wide knowledge dissemination and awareness-raising.[14]

Choking, in particular, is a terrifying and potentially life-threatening emergency that can affect individuals of any age in any setting.[22,23] Basic first aid skills, including recognizing choking symptoms, performing the Heimlich maneuver, and seeking urgent care, are essential and can significantly increase survival rates.[22,24] Similarly, burn injuries, while often underestimated, contribute substantially to morbidity and mortality.[25]Notably, Nepal experiences one of the highest rates of flame-related burn injuries globally, primarily due to factors such as energy poverty, traditional cooking practices using open fires, cold climate, and the widespread use of flammable clothing.[26] Given these challenges, structured educational interventions focusing specifically on first aid for choking and burns are of utmost importance. However, the existing studies [15,27] focused on a broad range of injuries and accidents and often lacked exploration of in-depth knowledge about specific types of injuries, such as choking and burns.[15,27]

Although previous studies have demonstrated that educational interventions can improve first aid knowledge, the present study is significant in providing context-specific evidence on knowledge of choking and burns, identifying local knowledge gaps, and assessing the effectiveness of the intervention within the target population and setting. Thus, this study aimed to examine the effectiveness of the structured educational intervention on knowledge regarding first aid on choking and burns among female adults in the community of Lalitpur, Nepal.

METHODS

This study used a pre-experimental one-group pre-test-post-test design, which enabled the manipulation of independent variables and

measurement of their effects on dependent variables. This study was conducted among female groups in from Community "A", which included nine groups comprising a total of 246 women, as recorded by the Female Community Health Volunteers (FCHVs). Participants were selected from two of these groups for the pilot study and instrument pretesting. Consequently, the final sample for the main study was drawn from the remaining seven groups. The sample size for comparing two groups was calculated using the formula[28]: $n = \frac{(Z_{1-\alpha/2}+Z_{1-\beta})^2}{d^2} + \frac{Z_{1-\alpha/2}^2}{2}$; where $Z_{1-\alpha/2} = 1.96$ (significance level as 0.05), $Z_{1-\beta} = 0.84$ (80% power), and d was the effect size. Using data from Behboudi et al.,[29] a quasi-experimental study on Iranian mothers' knowledge of choking: Standard Deviation $(SD)_1 = 1.84$, $SD_2 = 1.98$, Mean $(M)_1 = 13.47$, $M_2 = 14.68$; Mean difference = $M_2 - M_1 = 1.21$; Effect size (d) = (mean difference)/$((\sigma_1 + \sigma_2)/2) = 0.63$. Substituting these values, the calculated sample size was 21.5. Accounting for a 15% refusal rate, 30 the final sample size was increased to 24. Furthermore, the chosen sample size was supported by a quasi-experimental study conducted by Qalawa et al.,[31] in Egypt. Based on the inclusion criteria, 24 women aged 20 to 50 years were selected using simple random sampling through the lottery method.

The research team developed questions and intervention protocols on choking and burns. Content validity was assessed using the Item-Level (I-CVI) and Scale-Level Content Validity Index (S-CVI), based on ratings from three experts using a four-point scale (1 = not relevant to 4 = highly relevant) as per the recommendation by Polit and Beck.[32] Ratings of 1 and 2 were recoded as 0, and 3 and 4 as 1, to compute the CVI. Both the I-CVI and S-CVI were 1.00, indicating excellent content validity of the instruments and intervention protocols. Data collection instruments consist of socio-demographic questions and twenty-nine multiple-choice questions. The scoring of knowledge level on first aid management was done based on a study given by Vallikkannu,[33] where each correct response was scored as 1 and the incorrect response was scored as 0. The intervention protocol was of two sessions [one for choking, one for burns], each of 60 minutes. As noted by Perneger et al.,[34] a minimum of 30 participants is recommended for pretesting instruments and calculating reliability coefficients. Accordingly, the research team included 30 participants in the pretesting to assess the reliability of the instruments used to measure knowledge on choking and burns in this study. The reliability coefficient, calculated using the Kuder-Richardson Formula 20 (KR-20), was 0.764 after removing 6 unreliable items. This calculation was based on 29 items retained from an original set of 35 items specifically tailored to the Nepalese context.

A pilot study of the intervention protocol was conducted on 12 samples as recommended by Tseng and Sim.[35] To maintain the integrity of the data, participants involved in the pretesting and pilot phases were not included in the main study. Administrative approval for data collection was obtained from the authority of Ward No. 8, Mahalaxmi Municipality. Ethical clearance was granted by the Institutional Review Committee (IRC) of PAHS (Reference: PNC2308011783; Date: August 1, 2023). Informed consent was taken from all participants before the data collection using an informed written consent form. Privacy and confidentiality of the participants were maintained throughout the study. The primary researcher collected data from 13 August to 22 September via face-to-face interviews. The pre-test was conducted among 24 participants from 14 August to 19 August 2023 to assess participants' knowledge of first aid management for choking and burns. Each day, four to five participants were individually interviewed via a face-to-face approach for 20–25 minutes. Following the pre-test, a two-day structured educational intervention was conducted between 22 August and 9 September 2023.

The first session focused on choking, and the second on burns, based on a standardized intervention protocol. The choking session covered principles of first aid, roles and qualities of a first aider and signs and symptoms, management, complications, and conditions requiring medical attention related to choking.

The session on burns addressed the causes, types, prevention, management, complications, and conditions requiring medical attention. Each session was 60 minutes, which was delivered by the researcher using interactive lectures, charts, and meta cards, with refreshments provided afterward. The intervention was carried out in five groups, each consisting of 4-5 female participants. Previous studies have examined post-intervention outcomes at multiple time points, including immediately after training, week, and at two and six months.27,31,36–38 In contrast, the post-test in this study was conducted one week after the intervention, between 30 August and 22 September, among the 24 participants who had completed the pre-test. This timing was intentionally chosen to assess short-term knowledge retention and to provide a practical yet meaningful measure of the intervention's immediate impact beyond initial recall. The same set of questions used in the pre-test was administered, following the approach adopted in previous studies. Field editing was done for completeness, clarity, and accuracy of information after each interview. In the case that participants provided an incorrect answer to the post-test question, the researcher provided clarification at the end of the interview to ensure that all the participants fully benefited from the proper knowledge. Descriptive and inferential statistics were used for data analysis, with the Wilcoxon Signed Rank Test applied due to the small sample size (n < 30), using SPSS version 16.

RESULTS

Table 1: Socio-demographic Information of Participants (n = 24)

Variables	Number	Percentage
Age in years		
20-30	5	20.8
30 - 40	5	20.8
40-50	14	58.4
Median- 43.5 year (Inter quartile range: 33.3, 46.0)		
Education Status		
No Education	3	12.5
Basic Level (Grade up to 8)	7	29.2
Secondary Level (Grade 9 to 12)	10	41.7
More than Secondary (13 and above)	4	16.6
Occupation *		
Home Maker	20	83.3
Self-employed	3	12.5
Non-government employee	1	4.2
Type of family		
Nuclear	17	70.8
Joint	7	29.2
Having Children		
Yes	20	83.3
No	4	16.7

**This categorization is done based on Noncommunicable disease risk factors: STEPS Survey Nepal 2019. Self-employed means a person who runs their own business, i.e., a shop owner, and a non-government employee means a person who works for a private organization*

Table 1 showed that 58.4% of females were of age group 40-50 years with a median of 43.5 and Inter-quartile range (IQR) [33.3, 46.0]. Similarly, 41.7% of the participants completed a secondary level of education and only 12.5% hadn't received any education. Likewise, the majority (83.3%) were homemakers and only 4.2% were non-government employees. Similarly, 70.8% of participants belonged to nuclear families and 83.3% had children.

Table 1. Participants' Pre-test and Post-test Responses on Each Item of the Scale of Knowledge on First Aid for Choking and Burns (n = 24)

Responses to Questions	Pre-test No. (%)	Post-test No. (%)
1. Temporary assistance to an injured or ill person, performed by non-expert persons until medical treatment arrives, is first aid.	11 (45.8)	24 (100.0)
2. To preserve life, promote recovery, and prevent complications related to injury is the purpose of first aid.	12(50.0)	23 (95.8)
3. A first aider is a person who is trained to provide emergency care.	6(25.0)	20 (83.3)
4. After assessing the victim's condition in an emergency, shout for help, but do not leave the victim alone.	19(79.2)	24 (100.0)
5. Choking is an obstruction in the throat or windpipe due to a foreign object.	19(79.2)	24(100.0)
6. Violent coughing is a sign and symptom of choking.	5(20.8)	22 (91.7)
7. Asphyxiation can happen in a complete throat obstruction during choking	15 (62.5)	24 (100.0)
8. The first step for treating choking is to ask the victim if anything is stuck in their throat.	1 (4.2)	18 (75.0)
9. The area for back slaps to the victim is between the shoulder blades.	12 (50.0)	24 (100.0)
10. The first aider swipes it out with their fingers if there is a visible obstruction in the victim's mouth after providing back slaps.	10 (41.7)	21 (87.5)
11. Abdominal thrusts (Heimlich maneuver) are the next step after performing five back slaps if the obstruction in the victim's mouth is not dislodged.	5 (20.8)	23 (95.8)
12. It is not a good idea to give a choking person a glass of water.	10 (41.7)	23 (95.8)
13. "Heimlich maneuver" should be repeated 5 times if the obstruction is not dislodged.	4 (16.7)	22 (91.7)
14. If a person is choking and able to cough, ask them to cough continuously.	5 (20.8)	15 (62.5)
15. The first aider should place the fist and thumb against the center of the victim's abdomen between the navel and bottom of the ribs when performing the Heimlich maneuver.	7 (29.2)	23 (95.8)
16. A complication of choking is brain damage due to a lack of oxygen	3 (12.5)	22 (91.7)
17. A burn is an injury to the skin caused by heat	17 (70.8)	24 (100.0)
18. Pain, redness, and blistering are some symptoms of second-degree burns.	20 (83.3)	24 (100.0)
19. Cool running water should be applied for 5 minutes to burn sites.	10 (41.7)	22 (91.7)
20. Burnt clothing should be cut off with scissors.	8 (33.3)	21 (87.5)
21. Applying home remedies such as turmeric, oil, or toothpaste to a burnt area does not decrease the risk of wound infection.	12 (50.0)	24 (100.0)
22. Rolling the victim on the ground is the recommended way to put out flames on a person who is on fire.	7 (29.2)	24 (100.0)
23. Irrigation with large volumes of water should be done in case of chemical burns.	4 (16.7)	21 (87.5)
24. Switching off the power point first should be done in case of electrical burns.	20 (83.3)	23(95.8)
25. Warm clothes or blankets should be used to prevent a cold in a burn victim.	12 (50.0)	22 (91.7)
26. Rinsing the affected area with water for at least 20 minutes should be done if someone gets a chemical burn.	10 (41.7)	24 (100.0)
27. A victim with burns "more than the size of one hand" needs emergency medical treatment.	18 (75.0)	24 (100.0)
28. Exposure to flies and insects can cause an infection in a burn victim.	19 (79.2)	22 (91.7)
29. Low body temperature and breathing problems are problems that can happen if "skin is destroyed and the area appears black, white, or charred."	1 (4.2)	17 (70.8)

Note. The Correct Answer is only included in the table.

Table 2 indicates a marked improvement in participants' knowledge on each item related to the first aid management of choking and burns from pre-test to post-test.

Table 32: Participants' Pre-test and Post-test Knowledge on First Aid Management of Choking and Burns n = 24

Level of Knowledge	Choking		Burns	
	Pre-test	Post-test	Pre-test	Post-test
	Number (%)	Number (%)	Number (%)	Number (%)
Inadequate (<50%)	19(79.2)	-	14(58.3)	-
Moderate (50-75%)	5 (20.8)	-	8(33.3)	-
Adequate (>75%)	-	24 (100.0)	2 (8.4)	24(100.0)
Minimum to Maximum Score in Percent (%)	0-66.7	75-100	23.1-76.9	76.9-100
Median (IQR) of Score in Percent (%)	33.3 (25.0, 41.7)	92.3 (92.3, 100.0)	46.2 (46.2, 61.5)	92.3 (92.3, 100.0)

Table 3 indicates that 79.2% of participants in the pre-test had an inadequate level of knowledge, and 20.8% had moderate knowledge on choking. However, all the participants had adequate knowledge of first aid management of choking in the post-test (100.0%). The minimum to maximum score of the pre-test in percent was 0-66.7% with *Md* = 33.3. Similarly, the minimum to maximum score of the post-test was 75-100% with *Md* = 92.3. Likewise, 58.3% of participants in the pre-test had inadequate knowledge, 33.3% of them had a moderate level, whereas 8.4% of them had adequate knowledge on burns. However, all the participants had adequate knowledge of first aid management of burns in the post-test (100.0%). The minimum to maximum score of knowledge on burns in percent of the pre-test was 23.1-76.9%, with *Md* = 46.2. Similarly, the minimum to maximum score of knowledge on burns in percent of the post-test was 76.9-100.0% with *Md* = 92.3.

Table 4: Comparison of Participants' Knowledge Scores on First Aid Management of Choking and Burns Before and After a Structured Educational Intervention n = 24

Knowledge	Md	Mean Rank	Negative Ranks	Positive Ranks	Sum of Ranks	*Z*	*p*-value [a]	Effect Size [b] (*r*)
Choking								
Pre-test	4	0.00	0	24	0.00	-4.294	< 0.001	0.88
Post-test	11	12.50			300.00			
Burns								
Pre-test	6	0.00	0	24	0.00	-4.297	< 0.001	0.88
Post-test	12	12.50			300.00			

Note. [a]: Wilcoxon Signed Rank Test. [b]: Effect Size = $Z/\sqrt{N}$ was calculated based on the formula by Pallant[38]

Table 4 presents a statistically significant increase in knowledge scores on first aid management of choking from pre-test (Md = 4) to post-test (*Md* = 11), *Z* = –4.294, with a large effect size (*r* = 0.88), indicating that 88% of the variance was explained by the intervention. Similarly, knowledge scores on burns increased significantly from pre-test (*Md* = 6) to post-test (*Md* = 12), *Z* = –4.297, also with a large effect size (*r* = 0.88). The rank data further revealed no negative ranks (*N* = 0), meaning no participant scored lower on the post-test. In contrast, there were 24 positive ranks (*N* = 24, Mean Rank = 12.50, Sum of Ranks = 300.00) for both topics, indicating that all post-test scores were higher than pre-

test scores. These findings reflect a consistent and substantial improvement in participants' knowledge following the structured educational intervention.

DISCUSSION

This study was conducted among 24 females to examine the effectiveness of a Structured Educational Intervention on first aid for choking and burns. The discussion was conducted on the current study's findings concerning prior studies, examining how the results align with or differ from existing research. The current study shows statistically significant differences in participants' knowledge scores on first aid management of choking from pre-test to post-test. The finding of this study aligns with the quasi-experimental studies conducted in Egypt [13,27], and India among females.[36] This consistency may be attributed to the application of comparable methodologies and instructional strategies, providing participants with similar information and learning experiences that enhanced their understanding across diverse settings. Similarly, the current study shows significant differences in the pre-test and post-test knowledge on first aid for burns. The findings of the study are consistent with the quasi-experimental studies conducted in Egypt among females,[27] and mothers,[13] Turkey among parents,[39] and a pre-experimental study in India among females.[40] The similarities in findings are likely due to the use of structured educational interventions that effectively communicated burn first aid principles and practical skills across different contexts. Furthermore, the inclusion of comparable participant demographics, particularly women, such as homemakers with multiple children, may have contributed to the observed enhancement in knowledge.[13,40] Additionally, the consistent findings observed in the current study may be attributed to the structured and focused nature of the educational intervention, the use of evidence-based content, and the relatively narrow and well-defined scope of first aid topics like burns and choking, all of which facilitate effective knowledge acquisition within a short period. However, none of the available prior studies reported findings indicating the ineffectiveness of educational interventions on choking and burn management.

The strengths of the study include the use of a valid (in terms of content) and reliable data collection instrument, which ensures the accuracy and consistency of the results. The intervention protocol was validated by experts, lending credibility to the procedures implemented. Additionally, similar intervention procedures and time intervals for the post-test were applied, enhancing the study's consistency. The use of a simple random sampling technique ensured a fair and unbiased selection of participants, contributing to the study's overall rigor and reliability. Despite its strength, the study is constrained by a few limitations. This study applies a pre-experimental design, which is susceptible to various extraneous variables (such as age, educational level, and occupation) and internal validity threats, including experimenter bias, history, and testing effects, which may have influenced the post-test outcomes. Moreover, the study was limited to female adults residing in a single ward of Community "A". Therefore, the generalizability of the findings to broader populations or different settings is constrained, and the results may not apply to all female adults.

CONCLUSIONS

Structured educational intervention was effective in improving knowledge on first aid management of choking and burns among female adults in the community. Therefore, this study recommends conducting experimental or quasi-experimental studies with a control group across the broader settings, including both genders. Additionally, this study suggests that community health nurses, health professionals, and policymakers should implement regular, well-organized educational sessions on first aid management to address these critical skills and collaborate to develop and disseminate comprehensive training programs by seeking funding and integration into public health policies to ensure widespread access and impact.

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