



Effect of a Health Education Program on Empowering Rural Mothers in Preventing Home Accidents of Children Under Five



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ABSTRACT

Aims This study aimed to investigate the effect of a health education program on empowering mothers to prevent home accidents among rural children under five years old in Ilam County.

Materials & Methods This research was a randomized controlled trial involving 88 mothers with children under five years old attending healthcare houses in Ilam County in 2022-2023 who were randomly assigned to the intervention and control groups. A one-month online educational intervention was implemented for the intervention group using the WhatsApp application, while the control group received no education. Data were collected using a questionnaire assessing the constructs of the health belief model regarding home accidents in children, completed online by the participants at baseline and three months later. Data were analyzed using SPSS 16 software, employing an independent sample t-test and paired sample t-test.

Findings No significant difference was found between the two groups in the mean scores of the health belief model constructs regarding preventing home accidents in the pre-test phase ($p > 0.05$). The results of the independent sample t-test showed a significant increase in the mean scores of health belief model constructs in the intervention group compared to the control group after a three-month follow-up ($p < 0.05$).

Conclusion Designing interventions based on the health belief model effectively empowers mothers to prevent accidents in rural children under five years old.

Keywords Adult Children; Mothers; Empowerment; Accidents, Home; Health Belief Model; Health Education

CITATION LINKS

[1] Results of a randomized controlled trial assessing the efficacy of the Supervising ... [2] Home accidents among children: A retrospective study ... [3] IParent's adherence to children's home-accident preventive ... [4] Analysis of the home accidents and their risk factors in Iran: A systematic ... [5] Too serious to ignore: The epidemiologic and economic burden of home injuries in the ... [6] Epidemiology of non-fatal injuries among Egyptian children: A community-based ... [7] Examination of mothers' home accident awareness and ... [8] Investigating the effect of education based on the health belief model on safe behavior preventing ... [9] Incidence of accidents and injuries in children under 6 years old ... [10] Effect of educating mothers on injury prevention among children aged <5 years ... [11] The effect of home safety education program given to mothers with children with ... [12] An application of a theory of planned behaviour to determine the association ... [13] Theoretical foundations of health education ... [14] Factors associated with mothers' beliefs and practices concerning injury ... [15] Children at danger: Injury fatalities among children ... [16] Caregiver reports of serious injuries in children who remain ... [17] Effective communication with caregivers to prevent ... [18] Effect of theory-based education on the promotion of preventive ... [19] Home accident awareness: Education increased ... [20] Determination Of the First Aid Knowledge Levels of the Mothers with ... [21] Effect of a childhood burn prevention program ... [22] Young children's perceptions of fire-safety messages: Do ... [23] A randomized, clinical trial of a home safety intervention ... [24] Effect of educational intervention based on health belief ... [25] The effect of health education based on health belief ... [26] The effectiveness of a home visit to ... [27] Efficacy of a mobile technology-based intervention for ... [28] Parenting interventions for the prevention of unintentional ... [29] Diagnostic levels of mothers having children between the age of 0-6 years ... [30] Effect of community-based intervention on knowledge, attitude, and self-efficacy ... [31] The measurement of health belief model (HBM) constructs in ...

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Introduction

Home accidents are a leading cause of mortality among children under the age of five. In addition to fatalities, millions of children suffer from temporary and permanent disabilities each year [1]. Home accidents are defined as "any event occurring inside the home or in the immediate vicinity of the home resulting in injury" [2, 3]. Unintentional injuries account for 12% of deaths globally, with the highest mortality rates caused by disease burden [4]. Approximately ten million children worldwide suffer from injuries resulting from home accidents annually, with a mortality rate of 10% [5].

The prevalence of home accidents in Iran is reported to be 44%. The prevalence among children is estimated to be 25% [4]. Among the children who survive these accidents, some may require permanent care. Disabilities resulting from accidents not only jeopardize the child's health but also affect their education and other aspects of life, placing a significant financial burden on the healthcare system [6].

Scientific evidence indicates that parents' beliefs and perceptions about the probability of an accident, the severity of a child's injury or efforts to prevent it, affect their behavior [4, 7]. Therefore, implementing preventive programs plays a crucial role in increasing caregivers' awareness, attitudes, and performance, highlighting the need for strategies to enhance public awareness at home [8, 9]. Education has been confirmed as one of the most effective preventive methods, through which individuals can be empowered to face accidents by increasing their awareness, knowledge, and skills, thereby altering their attitudes toward accidents [2, 10, 11]. To design and implement an effective educational intervention, the use of behavior change models and theories can contribute to the success of the program [12, 13].

The health belief model (HBM) is an individual-level behavior change model that predicts individuals' behavior based on their awareness and attitudes. This model, considering perceived susceptibility and perceived severity, leads to individuals' perception of a health threat. Moreover, it clarifies the reasons for adopting or not adopting health-related or preventive behaviors based on behavioral cues (perceived benefits and barriers, self-efficacy, and cues to action) [13, 14].

Numerous studies have reported the impact of educational interventions and interventions on increasing awareness, perceived threat (fear), self-efficacy, and preventive behaviors on home accidents in children [15-17].

Hence, given the importance of education in preventing home injuries, this study aimed to investigate the effect of a health education program on empowering mothers to prevent home accidents among rural children under five years old in Ilam County.

Materials and Methods

Study design

This randomized controlled trial was conducted on 88 women who met the inclusion criteria from November 2020 to March 2023.

Sampling

Simple random sampling was conducted among women with children under five years old attending healthcare houses in Ilam County, Western Iran. The sample size, based on Fathi *et al.* [18], was estimated to be 88 individuals (44 in the intervention and 44 in the control groups) at a confidence level of 95% and a test power of 80% using the following formula:

$$n = \frac{(S_1^2 + S_2^2) \times (Z_{1-\beta} + Z_{1-\alpha/2})^2}{d^2}$$

According to the Samane Yekparcheh Behdasht (SIB) system, the number of children under five years was 280 who were distributed in Shahid Keshvari (n=46), Mahdiabad (n=52), Banqalan (n=40), Haft Cheshme (n=53), Chalsara (n=47), and Cheshme Kabud (n=42) villages.

Initially, 280 questionnaires were distributed among mothers of children in the villages of Ilam County to assess the status of preventive behaviors and factors influencing them based on the HBM. Then, considering the low levels of knowledge regarding child accident prevention, villages with high knowledge levels were excluded. Finally, Mahdiabad, Chalsara, Shahid Keshvari, and Banqalan villages were selected to implement the intervention. Villages were grouped into the intervention and control groups using random assignment. Chalsara and Mahdiabad villages were assigned to the intervention group (n=44), while Banqalan and Shahid Keshvari villages were assigned to the control group (n=44). Subsequently, the required sample size was selected from each village using random sampling. The study objectives were explained by establishing telephone contact with mothers who met the inclusion criteria, and a written consent form was sent to them via WhatsApp application. Inclusion criteria included having an active household health record, obtaining a low score of awareness based on the questionnaire, willingness to participate in the empowerment program, signing the written consent form, having access to the Internet, and owning a smartphone. Exclusion criteria included having a child under five years old suffering from a severe, incurable disease, a child with severe disabilities and mental retardation, changing residence during the study period, and incomplete questionnaire completion.

Tools

Data collection involved demographic variable questionnaires, including age, education level, employment status, total number of children, number of children under five years old, and child gender. The assessment of HBM constructs related to children's

home accidents was conducted using a questionnaire developed by Poorolajal *et al.*, who evaluated the reliability of this questionnaire, with an overall Cronbach's alpha score reported to be 0.83 [14]. The questionnaire consisted of questions on knowledge (15 questions), perceived susceptibility (five questions), perceived severity (five questions), perceived benefits (five questions), cues to action (four questions), self-efficacy (four questions), and performance (20 questions). Items in the HBM construct were scored using a five-point Likert scale, ranging from strongly agree to strongly disagree, where higher scores indicated a more favorable condition. Notably, the scoring interpretation for the perceived barriers construct differs, as a lower score indicates a better situation. The questionnaire was distributed to mothers via the WhatsApp application and completed through self-reporting for initial data collection, and a follow-up occurred three months later.

Intervention

The intervention lasted one month and was conducted online via WhatsApp. After obtaining written consent from the mothers, educational content tailored to the components of the HBM was sent to the intervention group. This educational content was designed in line with the study objectives based on the HBM constructs. To facilitate participation in the intervention program and attract mothers' interest, a one-month package of free Internet was provided to intervention group members.

Short messages titled "Did You Know" were disseminated through the WhatsApp channel to enhance knowledge. These messages introduced various types of home accidents in children, highlighted potential times and locations of incidents, and emphasized the importance of prevention as the simplest and most effective approach.

Images of common types of home injuries in children, which receive less attention from mothers, were sent to increase perceived sensitivity. Additionally, real-life videos and photos emphasized the risks and damages resulting from injuries. To increase perceived severity among mothers, information was provided through interview videos with families of children who experienced accidents at home and suffered temporary or permanent injuries. Motivational short messages, images, and educational videos related to preventive behaviors were shared to emphasize the perceived benefits of preventing accidents and home injuries. Also, the educational content emphasizing the effectiveness of preventive methods on saving treatment costs due to injuries, reducing irreparable damages, and preventing adverse physical, mental, and psychological conditions in children was shared in text format on WhatsApp. Online discussions were used to overcome potential barriers in preventing children's accidents. Cost-effective, simple, and

accessible methods for implementing safety measures at home were introduced at this phase. During online discussions, mothers were also encouraged to share their experiences and creative preventive solutions for child accidents.

Furthermore, online discussions were conducted to share emotions and feelings resulting from the proper protection of children, the successful experiences of mothers in preventing accidents, the introduction of successful patterns of injury prevention, and verbal encouragement of mothers. To alter mothers' performance in relation to injury prevention, practical methods to make the home environment safe and prevent accidents in children were introduced. Emphasis was placed on performing simple and cost-effective actions to ensure home safety. Mothers were also invited to share images of actions taken at home to ensure safety through the designed channel.

It should be noted that after the educational intervention, the researcher made phone calls with the mothers and provided online counseling, through which mothers' feedback was received regarding the educational activities provided.

Data analysis

Data analysis was performed using SPSS 16 software. The Chi-square test, paired sample t-test, and independent sample t-test were employed to analyze the data at a significance level of 0.05.

Findings

The average age of mothers in the intervention and control groups was 30.0 ± 4.4 and 29.8 ± 4.3 years, respectively. Additionally, the average age of children under five years in the families of the intervention and control groups was 2.8 ± 1.4 and 2.7 ± 1.4 years, respectively.

The groups were homogeneous regarding demographic variables ($p > 0.05$; Table 1).

Table 1. Comparing the frequency of demographic characteristics between the two groups by the Chi-square test

| Parameter | | Intervention | Control | p-Value |
|----------------------------------|---------------|--------------|-----------|---------|
| Gender | Male | 21 (47.7) | 21 (47.7) | 0.847 |
| | Female | 23 (52.3) | 23 (52.3) | |
| Number of children < 5 | 1 | 36 (81.8) | 37 (84.1) | 0.776 |
| | 2 | 8 (18.2) | 7 (15.9) | |
| Mothers' education | Elementary | 5 (11.4) | 3 (6.8) | 0.986 |
| | Middle School | 8 (18.2) | 8 (18.2) | |
| | Diploma | 17 (38.6) | 19 (43.2) | |
| | Academic | 14 (31.8) | 14 (31.8) | |
| Occupation | Housewife | 38 (86.4) | 39 (88.6) | 0.942 |
| | Employed | 6 (13.6) | 5 (11.4) | |

There were no significant differences between the groups in the constructs of the HBM in the pre-test ($p > 0.05$), except for performance ($p = 0.001$). However, three months later, there was a significant increase in the mean scores of the HBM constructs, except for performance, in the intervention group compared to the control group ($p < 0.05$; Table 2).

Table 2. Comparison of mean scores of HBM constructs between groups in the pre-test and post-test (three months after treatment)

| Constructs | Group | Pre-test | Post-test | p-Value* |
|--------------------------|--------------|------------|------------|----------|
| Knowledge | Intervention | 7.36±2.09 | 10.61±1.49 | 0.007 |
| | Control | 6.64±1.99 | 6.07±2.13 | 0.058 |
| | p-Value** | 0.063 | 0.001 | - |
| Perceived susceptibility | Intervention | 14.64±3.60 | 19.18±2.34 | 0.001 |
| | Control | 13.14±2.87 | 13.70±3.32 | 0.160 |
| | p-Value** | 0.054 | 0.001 | - |
| Perceived severity | Intervention | 18.42±2.97 | 20.70±2.00 | 0.001 |
| | Control | 17.68±2.89 | 16.77±3.00 | 0.605 |
| | p-Value** | 0.077 | 0.001 | - |
| Perceived barriers | Intervention | 19.25±2.94 | 15.41±4.01 | 0.001 |
| | Control | 15.84±4.13 | 15.45±4.31 | 0.061 |
| | p-Value** | 0.958 | 0.001 | - |
| Perceived benefits | Intervention | 25.18±3.34 | 27.73±1.72 | 0.001 |
| | Control | 24.70±3.24 | 25.02±3.00 | 0.061 |
| | p-Value** | 0.877 | 0.001 | - |
| Perceived self-efficacy | Intervention | 15.11±2.93 | 17.09±2.47 | 0.001 |
| | Control | 14.45±3.03 | 14.55±2.95 | 0.210 |
| | p-Value** | 0.304 | 0.001 | - |
| Cues to action | Intervention | 15.95±2.74 | 17.43±2.54 | 0.007 |
| | Control | 15.64±2.77 | 16.14±2.03 | 0.061 |
| | p-Value** | 0.590 | 0.001 | - |
| Performance | Intervention | 10.75±3.03 | 15.05±2.03 | 0.001 |
| | Control | 14.86±3.23 | 15.23±3.07 | 0.675 |
| | p-Value** | 0.001 | 0.074 | - |

*paired t-test; **independent t-test

Discussion

The primary goal of this study was to empower rural mothers of children under five to prevent and manage household accidents involving children and to assess the impact of education on accident prevention using the HBM. The findings of this study show a significant increase in awareness among the intervention group after training. Other researchers have noted similar increases in awareness following training. Gülbetekin & Tüfekci reported that training mothers about child home accidents significantly boosted their awareness [19]. Çalışkan *et al.* found that most mothers who had experienced household accidents with their children were either unaware of the risks or had not received any training on these incidents [20]. Similarly, Yondem & Tuncbilek noted that education increased caregivers' awareness of burn prevention in childhood [21]. Given the results of this study and the emphasis by numerous studies on the importance of primary prevention to minimize risk factors, it is clear that enhancing parental awareness is essential for achieving this goal [10, 22, 23]. Post-intervention, mothers' average scores for perceived sensitivity and severity showed significant differences. Moridi *et al.* also found significant differences in mothers' perceived sensitivity and severity toward safety measures for household accidents after training [24]. Likewise, both Fathi *et al.* [18] and Gilasi *et al.* [25] observed that training improved mothers' perceived threat scores. The average scores for perceived barriers and benefits among mothers regarding child home accident prevention in the intervention group also differed significantly. According to King *et al.*, the intervention group reported significantly lower care costs compared to the control group for each preventive

measure [26], suggesting that education can improve mothers' ability to address barriers such as the cost of child safety measures, the time-consuming nature of supervising children, and the need for constant vigilance, and facilitate efforts to mitigate them.

We have observed that using WhatsApp as an intermediary for transferring educational content has enhanced mothers' performance. McKenzie *et al.* also reported the effectiveness of mobile-based applications in improving knowledge of safety actions [27]. Additionally, Kendrick *et al.* have reported that implementing educational interventions has improved the performance of underprivileged families in preventing accidents and child injuries [28]. Educating families to make small, low-cost changes in the home environment by applying simple precautions can be an innovative and important solution for reducing household accidents involving children, which proved effective in our study.

The average self-efficacy score among mothers after the educational intervention showed a significant difference. Akça *et al.* found that mothers who performed poorly in preventing household accidents among their children had lower levels of self-efficacy [29]. Similarly, El Seifi *et al.* demonstrated in their study on Egyptian urban mothers that an intervention significantly increased mothers' self-efficacy, aligning with the present study's findings [30]. Therefore, by educating and increasing mothers' awareness, we can ensure they can prevent injuries that may occur to their children at home.

The average performance score of mothers in preventing household accidents among children under five years old in the intervention group showed significant improvement three months after the training compared to the control group. This improvement aligns with the findings of Fathi Shykhi *et al.* [31] and Fathi *et al.* [18] regarding home safety education for mothers of 1 to 3-year-old children. Furthermore, McKenzie's study demonstrated that implementing an online intervention for accident prevention decreased the incidence of accidents in children [27]. Thus, it is evident that education on safety principles and identifying hazardous environments can enhance mothers' ability to protect their children from potential dangers.

In general, providing low-cost, practical solutions, emphasizing cost-effectiveness, and sharing successful experiences from other mothers boost confidence in the effectiveness of these solutions. This approach encourages a sense of responsibility and enhances understanding of the benefits of preventive behaviors in reducing incidents involving children in the home environment.

A limitation of this study is that the research team could not visit homes to evaluate mothers' performance directly; instead, findings were based on mothers' self-reports. If this intervention had included repeated observational visits to the homes

of the target group, it might have yielded different results. Moreover, the assessment period of this intervention was three months, which does not reveal the long-term effects of education on performance. The target group for this study was rural mothers, making the results potentially non-generalizable to urban mothers. Future studies should explore not only the use of behavior change models and messaging applications but also improvements to the home environment to prevent accidents.

Conclusion

Health education programs based on the HBM, utilizing the WhatsApp application, empower mothers to prevent home accidents and injuries in children under five.

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Ethical Permissions: This study was approved by the ethics committee of Ilam University of Medical Sciences (IR.MEDILAM.REC.1400.012).

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