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Knowledge Improvement on Burn Injury Prevention and First Management after One-Day Health Promotion Event

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Abstract

Burns causes a significant number of mortality and morbidity, especially in developing countries, such as Indonesia. The majority of burns in Indonesia are caused by LPG-related (liquefied petroleum gas) flame (33%). Since the first management of burn will influence its outcome, health promotion efforts to improve knowledge to prevent burns and to provide first aid for burn is considered important to reduce morbidity and mortality. This was a descriptive study conducted in a Sub-district in Indonesia using a one-day community health promotion event as the intervention period Oktober 2018. The aim of this study was to compare the knowledge level regarding burn prevention and first management before and after the health promotion event. Respondents were recruited purposively (n=61) and a pre-event questionnaire were distributed to be filled out. Demographic data showed that 31% of participants had experienced burns in the past; 100% of participants used 3kg LPG gas tank in their home; 98% of participants had never been taught on how to handle an emergency situation or how to arrange an evacuation route; and 100% of participants felt that their neighborhood did not provide facilities for burn management. A post-event questionnaire was then distributed and results were compared. A significant improvement of knowledge was seen with an increase of median score from 2.0 to 9.0 ($p<0.001$). In conclusion, despite the fact that all participants used 3 kg LPG gas tank, they do not have proper knowledge regarding prevention or management of burns and that a one-day health promotion event can increase this knowledge significantly.

Key words: Burns, community health services, health promotion, knowledge, public health

Peningkatan Pengetahuan Melalui Penyuluhan Mengenai Pencegahan dan Penanganan Dini pada Luka Bakar

Abstrak

Luka bakar merupakan sebuah masalah yang menyebabkan morbiditas dan mortalitas tinggi di negara berkembang, termasuk Indonesia. Mayoritas luka bakar (33%) diakibatkan oleh api dari ledakan tabung gas LPG (*liquefied petroleum gas*) 3 kg dan mayoritas rumah tangga menggunakannya. Pelaksanaan penyuluhan mengenai pencegahan dan penanganan awal diharapkan dapat menurunkan angka morbiditas dan mortalitas akibat luka bakar. Penelitian deskriptif ini bertujuan membandingkan tingkat pengetahuan tentang pencegahan luka bakar dan manajemen pertama sebelum dan setelah acara promosi kesehatan. Penelitian ini dilakukan di Kelurahan/Desa Babakan Sari, Antapani, Bandung pada bulan Oktober 2018 untuk mengedukasi dan meningkatkan pengetahuan responden. Dari total 61 responden (45 wanita dan 16 pria) dengan mayoritas responden berusia di atas 60 tahun (45.9%), didapatkan 32.8% responden pernah mengalami luka bakar, 100% responden menggunakan gas LPG 3 kg, 98% peserta tidak pernah mendapatkan penyuluhan mengenai penanganan luka bakar, dan 100% peserta merasa tidak ada fasilitas penanganan kebakaran di wilayah mereka. Pengetahuan responden dinilai sebelum dan sesudah dilakukan penyuluhan dan didapatkan peningkatan secara signifikan dan bermakna ($p<0.001$). Simpulan, meskipun semua responden yang menggunakan tangki gas LPG 3 kg tidak memiliki pengetahuan yang memadai pencegahan atau pengelolaan luka bakar, penyuluhan ini efektif dapat menurunkan angka kejadian luka bakar.

Kata kunci: Kesehatan komunitas, kesehatan masyarakat, luka bakar, pengetahuan, penyuluhan

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Introduction

Burns are considered as a significant and serious health problem, accounting for an estimated 180,000 deaths annually. Data from the Bi-National Burn Repository of the Australasian-New Zealand Burn Association (ANZBA) presented that the incidence of burns from 2009–2012 affected 7,408 people in this country while the United States recorded 6.6 million major burns injuries and 400,000 burn-related deaths with fire as the most frequent cause of burns.^{1,5} Despite the high statistics of burns in developed countries, most burns still occur in low-middle income countries with almost two-thirds occur in the Southeast Asian and African regions.² In Indonesia, a study conducted in Indonesia's national referral burn center discovered that the majority of burns are caused by flame, especially flame caused by liquefied petroleum (LPG) gas explosion.^{3,4} This is understandable because most Indonesian homes use LPG for cooking.

Despite the lack of the national data on burn morbidity, data from the National Burn Unit in Cipto Mangunkusumo Hospital (*Rumah Sakit Cipto Mangunkusumo*, RSCM), which is the national referral hospital, have shown that 78%, 14%, 4%, 3%, and 1% of burns are caused by fire, electricity, hot water, chemicals, and metal, respectively, with a burn mortality rate of 27.6%.⁴ LPG or liquefied petroleum gas is a gas that is subsidized by the Indonesian Government to be used in domestic cooking. Currently, over 50 million households in the country use this type of gas and news have reported some accidents related to the domestic use of LPG. However, are no consolidated records of such accidents are maintained, making it difficult to identify the exact number of LPG-related incidence. The main hazards linked with LPG use is gas leakage followed by ignition due to the nature of this gas that is highly flammable and potentially explosive when mixed with air.⁶ According to Pertamina and World LPG Association (WLPGA), the number of reported LPG-related accidents in 2010 was 352 with unspecified number of the deaths.^{7,8} Hence, the main cause of LPG-related accidents in Indonesia is still unknown, whether it is due to the lack of knowledge of users or the faulty products.

A study conducted during the period of 2014 to 2018 in Dr. Hasan Sadikin General Hospital (*Rumah Sakit Hasan Sadikin*, RSHS) Bandung has identified that 33% of burns were caused by LPG gas leak explosions. The majority of these gas leak explosion burn patients experienced

severe burns (62.1%), and associated injuries, mainly inhalation trauma.⁹ This shows that gas leak explosion is a significant cause of burns that result in severe morbidity and mortality.

With this situation in mind, it is obvious that Indonesian people need to have good knowledge on burn prevention and first aid and initial management due to their proximity to LPG tanks. One of the methods to educate citizens on health-related issue is health promotion. Baroroh *et al.*, conducted a study assessing the improvement of knowledge through a one-day community education event about the use of antibiotics in Indonesia, and the results showed an increase in the average knowledge of non-medical respondents.¹⁰ Similar results of improvements can be seen in other health promotion programs.^{11,12} Health promotion is considered an important tool to counter socioeconomic problems and should be supported by simple, cost-effective, innovative, and culturally and geographically appropriate models.^{13,14} Burn injuries should be considered preventable and public health approaches that provide interdisciplinary education and prevention programs can help to prevent them. The purpose of this study was to obtain information regarding knowledge on burn prevention and burn first aid and initial management and to assess the effectiveness of a one-day community health promotion event in improving knowledge and understanding on this issue.

Methods

This was a descriptive study conducted between October–November 2018 with data collection performed on October 10th, 2018 in Babakan Sari sub-district, Antapani, Bandung, Indonesia, where 61 residents were included as participants. This sub-district was selected based on the presence of multiple major fires in the area that resulted in many deaths with the most recent accident resulted in 6 severely burned patients treated in the burn unit of RSHS, Bandung. The sample size was determined using the purposive sampling method, where 61 respondents were included in the study. Inclusion criteria were residents of the community that attended the whole event. Participants were excluded if they did not participate in the whole event or did not complete either the pre- or post-event questionnaires.

The questionnaires used in the study consisted of a pre- and post-event questionnaires,

Table 1 Participant Demographic Characteristics

Characteristic	Number of Participant (n=61)	Percentage
Gender		
Male	16	26.2
Female	45	73.8
Age		
<40 years old	4	6.6
40–49 years old	14	23.0
50–59 years old	15	24.6
>60 years old	28	45.9
Education		
No education	9	14.8
Elementary School	13	21.3
Junior High School	14	23.0
Senior High School	22	36.1
Higher education	3	4.9
Occupation		
Housewife	44	72.1
Government employee	6	9.8
Private employee	7	11.5
Retired	4	6.6

filled out by participants who attended the one-day health promotion event. The questionnaire was developed in Indonesian to make it easier for the public to read and understand them. Results were then translated to English. The event consisted of lecture session, burn first-aid demonstration, and discussion session, which was led by the Division of Plastic Surgery, Department of Surgery, RSHS, Bandung. The lecture topic included burn prevention in homes, burn incidence in the area, first aid and initial management for various causes of burns (flame, chemical and electrical), and burn complications. The questionnaire consisted of fourteen questions divided into 3 main sections; personal burn data, knowledge regarding burn

prevention, and knowledge regarding first aid and initial management of burns. The pre- and post-event scores were compared to assess the improvement of knowledge on burn prevention and burn first aid and initial management. Data were analyzed using the McNemar and Wilcoxon signed-rank tests.

Results

In this study, 61 participants who were Babakan Sari sub-district residents attending the one-day community health promotion event on October 10, 2018 participated in the study. The majority of participants were women (73.8%) and above

Table 2 Participant Personal Burn Data

Personal Burn Data	Number of Participant (n=61)	Percentage
Previous burn experience	20	32.8
Kitchen separated from the rest of the household	59	96.7
Use a 3 kg LPG tank at home	61	100.0
Have been taught how to handle an emergency situation and arrange an evacuation route in neighbourhood	2	3.3
Neighbourhood provides facilities for burn handling	0	0.0

Table 3 Pre-and Post-Event Questionnaire Results on Burn Prevention

Questionnaire Item (Correct Answers)	Pre-Event Test		Post-Event Test		p-value*
	n	%	n	%	
What can cause burns?	22	36.1	61	100.0	<0.001
What would you do in the event of a fire?	27	44.3	57	93.4	<0.001
If a resident smokes inside the house, what would you do?	52	85.2	60	98.4	<0.001
What would you do in the event of a gas leak?	4	6.6	61	100.0	<0.001
How do you use an electricity power socket correctly?	11	18.0	61	100.0	<0.001

*Analyzed with McNemar’s test

Table 4 Pre- and Post-Event Questionnaire Results on Burn Initial Management

Questionnaire Item (Correct Answers)	Pre-Event Test		Post-Event Test		p-value*
	n	%	n	%	
What is the first step of management when you see a burn victim around you?	15	24.6	60	98.4	< 0.001
What complications can arise from burns?	8	13.1	57	93.4	< 0.001
What would you do if there is a large vesicle filled with fluid in a burn wound?	6	9.8	59	96.7	< 0.001
What do you do when you find a victim of an electric burn?	24	39.3	61	100.0	< 0.001

*Analyzed with McNemar’s test

60 years old (45.9%). Most of the participants had an education level of lower than senior high school (59.0%) and were mostly housewives (72.1%) (Table 1).

The personal burn data section of the questionnaire show 100% use of 3 kg LPG tank among the participants and the unavailability of proper burn prevention and management in the community despite a large percentage (32.8%) of burn events in the community (Table 2).

The largest improvement of knowledge in burn prevention can be seen in the answers on questions regarding steps to be taken during a gas leak and the cause of burns (Table 3). A large portion of residents are already knowledgeable

about the prohibition to smoke inside the house prior to the educational event. In knowledge of burn first aid and initial management section, the largest improvement is found on the knowledge on burn complications and fluid-filled vesicle treatment (Table 4). Participant knowledge of burn first aid and initial management was lacking in the pre-event questionnaire, with the highest percentage of only 39.3% of correct answers for one question. Overall, there was a significant improvement in knowledge scores between the pre-event and post-event with an increase of median score from 2.0 in the pre-event to 9.0 in the post-event (p<0.001; Table 5).

Table 5 Median and Range of Pre-Test and Post-Test Questionnaires

Questionnaire Results	Pre-Test	Post-Test	p-value**
Median	2	9	< 0.001
Range	0–8	8–9	< 0.001

**Analyzed with Wilcoxon signed-rank test

Discussion

The purpose of this study was to obtain information regarding community knowledge about burn prevention; burn first aid and initial management; and personal burn data, as well as the effectiveness of a community health promotion event in improving knowledge and understanding on this issue. There was a predominance of female compared to male participants (73.8%) with the majority of participants aged above 60 years old (45.9%). A large percentage of participants were housewives (72.1%), and 95.1% of participants' level of education were senior high school or below. This population sample of mostly housewives and retired personnel is most likely linked to the fact that the study event was performed on a weekday during working hours. Therefore, the working members of the community could not participate in this study.

Personal burn data regarding safety procedures at home show that all participants use LPG 3 kg tanks in their kitchen but have not received any education on fire emergency management. According to respondents, their neighbourhood also do not provide proper facilities for burn handling, which is a common situation for low-middle income countries where the majority of citizens have low educational and low socio-economic background with the lack of proper infrastructures.^{15,16} This is evident from the demographic data obtained from a study in RSCM stating that most burns occur due to flames with a higher percentage originating from hazardous, highly flammable and potentially explosive LPG 3 kg tanks.^{3,6} This is similar to a result of a study by Ehmer-Al-Ibran et al., in Karachi, which is also an area in a low-middle income country, where the most common cause of burn injuries are related to the use of LPG tanks for cooking.¹⁶ Data in developed countries show a completely different demographic distribution regarding burns. The majority of patients are usually children and infants and the main cause of burns are scalds instead of fire.¹⁷ This study identifies the main causes of kitchen fires as the lack of awareness and poor preventive measures. Therefore, proper burn education is very much needed and the lack of it may suggest the reason behind such large numbers of burn victims in Babakan Sari. The switch from kerosene to LPG tanks for cooking in households was triggered by an initiative from the government that subsidize the LPG tank. Thoday et al have stated in their study that there has not been a clear quality

check for these tanks despite the number of recorded LPG accidents (90 reported accidents in 2009 and 352 reported accidents in 2010).⁸

Low pre-event questionnaire scores show the lack of knowledge of community residents regarding burn prevention and burn first aid and initial management. Only 36.1% of participants had knowledge on burn etiology with less than a half knew what to do when a fire emergency occurs (44.3%). Furthermore, only 6.6% of participants knew what to do in the event of a gas leak. After the one-day health promotion event, the post-event results for burn prevention questions increased significantly with above 90% of correct answers for all the questions. This lack of knowledge is typically observed in communities with lower level of education as seen in this study with most participants only had lower than senior high school education. This coincides with statements in literatures that high population density, illiteracy and poverty are the main demographic factors associated with burns.¹⁸

The largest improvement in burn first aid and initial management questionnaire result was seen in questions regarding complications arising from burns and fluid-filled bullae management. Both of these topics are considered a more advanced category of questions but are important because ability to recognize the importance of seeking medical attention in burn cases will affect the outcome of burns. Similar with the burn prevention section, post-event results also showed that more than 90% of participants answered all questions correctly.

The significant improvements in the general knowledge of the residents about burn are consistent with the impacts seen in other intervention studies, where a simple health education event leads to an improvement of knowledge. Overall, there was a significant improvement in median scores in this study from 2.0 in the pre-event to 9.0 in the post-event ($p < 0.001$). A similar study that also involves a one-day education event on antibiotic use in Central Java also shows a significant increase on the knowledge based on the pre-test and post-test scores (13.37%).¹⁰ Another similar study was conducted in Egypt to educate mothers about possible home injuries in preschool children and was able to show an increase to 18.90 from 10.21 in the total score.¹⁹ Prevention in developing countries is absolutely different from that of developed countries, where burn prevention has been integrated to their education and community systems.¹² However,

it should be the goal of the developing countries for conducting continuous education on burn prevention as good knowledge will lead to good practice that will significantly reduce burn-related disfigurement, disability, and death.

According to Van der Merwe and Steenkamp,¹⁸ there are three main strategies to reduce harm from burn injuries in developing countries: product design modification, environmental change legislation, and education towards behaviour/lifestyle changes. This study revealed that the three factors are lacking in the community of study. The one-day health promotion event acted an information campaign and a significant improvement was recognized. However, holistic approach to prevent burns should also include product design/modification and environmental/legislation change. The extremely large percentage of burns caused by gas tank explosions should be investigated to identify whether the problem lies in the manufacturing or storage of the tanks or whether tanks are illegally sold or whether there is improper use or replacement of tanks. Environmental/legislation change legislation should also done where housing design should be improved (managing the use of plastics and wood) to include access routes. Fire breaks and water hydrants should be provided and people should be encouraged to have more than one exit from their home. Government initiatives have been planned out to reduce burns through advocacy, burn care guidelines, research, promotion of prevention programs, and burn registries in third world countries, but it is yet to be realized in Indonesia.^{18,20} It is suggested that further studies should be done with regards to burn prevention education by involving a larger population sample with more demographic variety with analysis on the impact of these education programs towards an increase/reduction in the number of burn patients and the severity of their wounds when admitted. In conclusion, Knowledge regarding burn prevention and burn first aid and initial management has improved significantly after a one-day health promotion, showing the effectiveness of this type of approach. It is then suggested that this type of program should be performed out and researched more often especially in areas prone to fire in Indonesia. Significant changes is not be expected without taking actions regarding product design/modification and environmental/legislation change.

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