QUASI-EXPERIMENTAL STUDY

The evaluation of the education for earthquake preparation addressed to middle school students

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Abstract

Objective: To investigate the effectiveness of the 'Are We Prepared for an Earthquake?' education provided by nurses to students of sixth and seventh grades.

Methods: The quasi-experimental study was conducted in Kemalpasa district of Izmir, Turkey, from October 2015 to May 2016, and comprised students of sixth and seventh grades at six middle schools in the 2015-16 academic year. Data was collected using 'Are We Prepared for an Earthquake?' questionnaire that included questions about socio-demographic variables, earthquake knowledge test, and family disaster preparation plans checklist. The score ranged from 0 to 20. An interactive packet education programme consisting of class presentation, game and animated videos was delivered and post-intervention scores were compared with baseline.

Results: Of 1151 students, 559(48.5%) were in the sixth grade, and 592(51.4%) were in the seventh. The overall mean earthquake knowledge and family disaster preparedness scores increased significantly post-intervention (p-0.001).

Conclusion: Targetted training created a significant change in both the knowledge level regarding earthquakes and the family disaster preparedness plans.

Keywords: Earthquake education, School students, Nurse, Turkey. (JPMA 68: 1809; 2018)

Introduction

Earthquake is the one of the most destructive types of disaster that the world has encountered throughout history. The United Nations describes a disaster as a serious destroying of the functioning of a community or society. Earthquakes involve widespread human, material, environmental and economic impact. Earthquakes have caused the greatest natural disasters in Turkey for centuries. Turkey is located in the Alpine-Himalayan orogenic belt that is one of the most active earthquake zones according to the earthquake zoning map. The map indicates that 92% of Turkey's geographical area is included in the earthquake zone, and 98% of its population lives in this zone.[1,2] A total of 11 destructive earthquakes have occurred in Turkey over the last 25 years. These earthquakes caused a total of 20,052 deaths, while 1,164,387 people were left homeless, and US$16,627 million were lost.[3-5]

Earthquakes deeply affect the society in social, economic and psychological terms. In developing countries, 90% of the deaths in earthquakes are caused by the limited understanding of the earthquake reality, engineering deficiencies, corruption in the construction industry, lack of knowledge about disasters related to ethnicity and social class, and other socioeconomic and sociocultural characteristics.[6] In Muslim-majority countries like Turkey, people believe that death comes from God, and it is difficult to take measures for pre-empting death in events like earthquakes because of strong predestinarianism.[7] International Federation of Red Cross in 2002 reported that the education level of the people affected by earthquakes was effective in reducing the number of deaths.[8]

Schools are one of the best places where earthquake education can be provided.[1]In Turkey, children receive primary and middle school education from 6 to 13 years of age. The skills and behaviours acquired in this period yield effective results in the short and long terms.[1,4] The objectives achieved at early ages are beneficial in terms of both individual and social levels.[4,5]Although the education given for these students is provided within formal education, there is no routine course about earthquakes and other extraordinary situations in the curriculum in Turkey.[5,9] ABCD Basic Disaster Awareness protocol was signed between Bogazici University Kandilli Observatory and Earthquake Research Institute (B.U. KOERI) and the Ministry of National Education in order to fill this gap after the 1999 earthquake in Turkey, and both institutions provided training programmes to increase earthquake awareness.[10] Nurses are one of the

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occupational groups that have direct contact with the society and give community education in extraordinary situations. Nurses play a central role in disaster preparation and management, as well as in emergency response in many countries across the world.[11] Nurses take charge in health management, and provide help and care in extraordinary situations in order to minimise some of the health hazards and health-threatening harms that can be encountered in these situations.[12-16] Nurses are considered to play an active role in the management of earthquake preparation all around the world.[13-18] In this regard, the fundamental competencies of nurses for the earthquake preparation/response are determined in the reports of International Council of Nurses and World Health Organisation (WHO).[19-21]

School disaster planning is a facet of larger community planning and, therefore, requires coordinated planning and allocation of community resources. It is of critical importance to ensure the continuity of the training provided for earthquake preparedness and form the safety culture in society. In this regard, providing the continuity of this training in schools can be achieved by cooperative participation of all school personnel. Public health nurse provides leadership in all phases of earthquake preparedness and response. Nurses are a vital part of the school team responsible for developing emergency response procedures for the school setting using an all-hazards approach. However, the number of studies investigating the effectiveness of the earthquake preparedness training provided by nurses for students is very limited.[13,22,23]

The current study was planned to investigate the effectiveness of the 'Are We Prepared for an Earthquake?' education that was provided by nurses to school students.

Subjects and Methods

The quasi-experimental study was conducted in Kemalpasa district of Izmir, Turkey, from October 2015 to May 2016, and comprised students of sixth and seventh grades at six middle schools in the 2015-16 academic year. The district is one of the first-degree earthquake zones in western Turkey.

All students in the relevant grades in the participating schools were included (Figure).

Permission was obtained from the District National Education Directorate and informed consent was taken from the participants.

Data was collected using the 'Are We Prepared for an Earthquake?' questionnaire form that consisted of two parts. The first part included nine questions about socio-demographic variables (school, class, age, mother's education level, mother's employment status, father's education level, father's employment status, the number of siblings, and the number of household members). The second part consisted of 20 questions that inquired knowledge about earthquakes and 10 questions about family disaster preparation plans checklist. The questions were created by the researchers based on relevant literature.[1,4,5,24-29] The knowledge test included questions assessing general knowledge about earthquakes (3), appropriate behaviours during an earthquake (6), appropriate behaviours after an earthquake (2), and earthquake kit (9). The questions in the knowledge test were scored 1 for each correct answer, and 0 for each incorrect answer. The forms were scored out of 20. The minimum score was 0 while the highest score was 20. The higher scores indicated better knowledge. Presence of any family disaster preparation plans was determined by the responses 'Yes' or 'No'.

Pre-test was administered to students who agreed to participate in the education and were present at the school during the education session. Afterwards, the researcher had the students work on the education pack of 'Are We Prepared for an Earthquake', including theoretical presentation, game and video.

Theoretical presentation was held in 52 sessions that each student participated once. Each session was delivered to groups of 20-25. A day and time were scheduled for each school before the education. Students participated in the education in their own classrooms that were organised beforehand in terms of appropriate lighting, ambient temperature, sound, hanging posters, projector, earthquake kit, acetate pencil, and other audio-visual educational aids. Each session was delivered as the only session of that day with 15-20 minutes of data collection and the 45-minute education pack. The pack was created based on manual developed by B.U. KOERI.[30] The topics in the programme were taught respectively, students' questions were answered, and feedback was received.

After the presentation, the researcher explained the earthquake zones in Turkey during a game using a map of Turkey on the wall. The students were provided with stickers that showed the first, second, third and fourth earthquake belts, and asked to stick them to the relevant spots. The researchers advised the students when they were placing the stickers to ensure that they chose the correct spots. The accurate earthquake zones

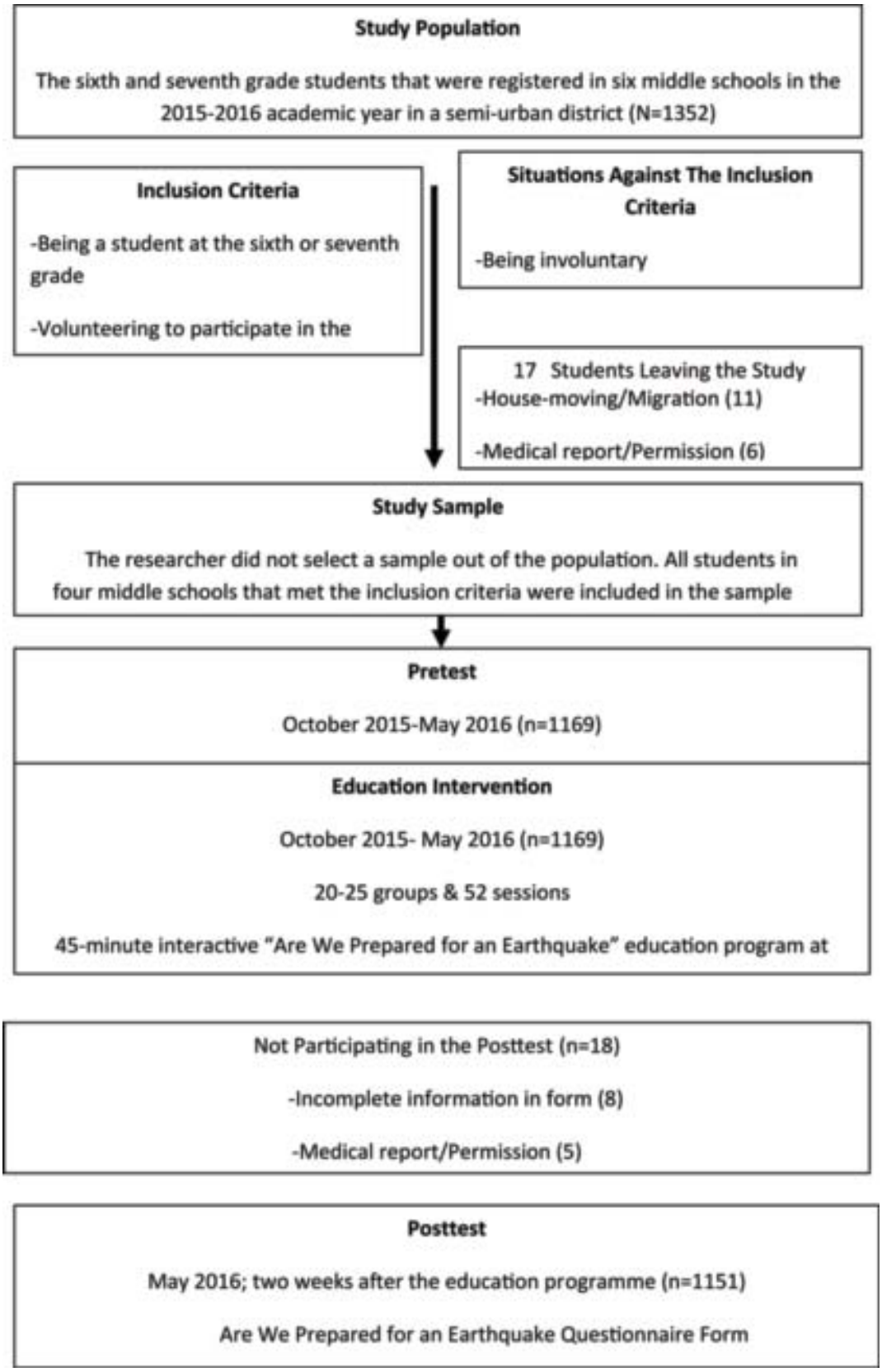

Figure-: Study flow diagram

were reviewed after the game using the stickers. The duration of the activity varied depending on the number of participants, but it lasted 10-15 minutes in all groups.

After presentation and the game, the students watched two animated videos that were 3.4 and 6.6 minutes long. They were prepared by B.U. KOERI.[30] After telling the appropriate behaviours to be displayed before, during and after earthquakes, the researchers displayed a relevant video (Crouch, Veil, Hold). After presenting the information about family disaster preparation plan and its importance, and preparing an earthquake kit, the researchers displayed the video about the preparation for earthquakes and tsunamis. The two videos took 10 minutes to watch.

In the final stage of the education pack, the researchers prepared a sample earthquake kit. The materials that are supposed to be in the kit were placed in a bag with the assistance of two students on a table that could be seen by the entire group. The education was terminated after providing the contact information of the observatory and the hotlines to be called in case of an earthquake as well as the gathering areas. The researchers summarised the education subjects in order, and took feedback from students. The post-test was administered two weeks after the pre-test and education. The dependent variables of the study were students' answers to questions regarding earthquakes and the presence of any family disaster preparation plans. The independent variables were socio-demographic in nature.

Data was analysed using SPSS 16. Frequencies and percentage were calculated for descriptive data, and paired sample t-test was used to compare the students' scores on the questionnaire form before and after the education. The threshold for significance was 0.05. The effect size was calculated for the difference of knowledge scores on the questionnaire form. Acceptable effect size was determined as >0.05.[31]

Results

Of 1151 students, 559 (48.5%) were in the sixth grade, and 592 (51.4%) were in the seventh. Regarding the education level, 485 (42.1%) of the mothers and 311 (27.0%) of the fathers were primary school graduates. A majority of fathers 1027 (89.2%) and 366 (31.8%) of mothers were employed. The subjects had mean

Table-1: Distribution of Students' Correct Answers To The Questions In Earthquake Knowledge Test In Pretest and Posttest (n=1151).

Earthquake knowledge test questions	Before % (n)	After % (n)	Change (%)	X^2	*p*
Turkey is not located in an active earthquake zone	35.3 (406)	66.1 (761)	+30.8	3.215	.001
The Aegean region is the fifth-level earthquake zone	20.0 (230)	61.4 (707)	+41.4	1.805	.001
Earthquake kit contains materials to meet the needs for the first two hours after the earthquake.	30.8 (355)	63.7 (733)	+32.9	2.927	.001
A whistle should be included in earthquake kit	35.9 (413)	84.9 (977)	+49.0	1.147	.001
A radio should be included in earthquake kit	40.7 (469)	79.1 (910)	+38.4	2.096	.001
Earthquake kit should be controlled once every six months	36.9 (425)	61.9 (713)	+25.0	4.139	.001
Elevator should not be used during the earthquake	42.8 (493)	89.5 (1030)	+46.7	1.013	.001
If you are out of the building after the earthquake, you should not wait under the balcony.	40.3 (464)	83.4 (960)	+43.1	1.547	.001
Doorsills are safe places during the earthquake	33.4 (385)	55.1 (634)	+21.7	4.417	.001
The place next to refrigerator is the dangerous place in the house during an earthquake.	34.1 (393)	68.5 (789)	+34.4	2.738	.001
One should not wait standing beside school desks during the earthquake.	37.6 (433)	85.1 (979)	+47.6	1.220	.001
The place next to cooker in the kitchen is not a safe place during an earthquake.	44.5 (512)	76.2 (877)	+31.7	2.881	.001
The foetal position is the position where we wait lying down and keeping the head .	44.2 (509)	60.0 (691)	+15.8	6.075	.001
One should not wait standing beside the buildings outside during the earthquake.	40.1 (461)	81.0 (932)	+40.9	1.087	.001
If we are at school during the earthquake, we should wait beside desks in the foetal position	42.8 (493)	65.7 (756)	+22.9	4.506	.001
Important documents should be included in earthquake kit	16.2 (186)	73.5 (846)	+57.3	1.016	.001
Paper and pencil should be included in earthquake kit	35.1 (404)	55.4 (638)	+20.3	5.005	.001

Table-2: The Distribution of Students' Correct Answers to The Questions About Family Disaster Plan Preparation in The Pretest And Posttest (n=1151).

Family disaster plan preparation items	Before % (n)	After % (n)	Change (%)	x^2	*p*
We had a family meeting for earthquake preparation	13.9 (160)	58.6 (674)	+44.7	1.199	.001
We examined the house to determine the dangerous and safe places .	15.5 (178)	39.4 (454)	+23.9	3.173	.001
We have determined how to get out of house during the earthquake.	21.5 (247)	70.0 (806)	+48.5	1.346	.001
I know the emergency telephone numbers to contact in case of an emergency.	18.9 (218)	88.0 (1013)	+69.1	6.637	.001
We determined a meeting place after the earthquake	19.5 (224)	55.9 (643)	+36.4	2.197	.001
I learned how to close the electric, water and gas valves at home.	20.6 (237)	65.7 (756)	+45.1	1.521	.001
We prepared the first-aid kit	13.9 (160)	74.3 (855)	+60.4	1.246	.001
We have prepared the cleaning, hygiene materials	14.0 (161)	69.1 (795)	+55.1	3.820	.001
We prepared important documents (bank wallet, identity card, etc.).	14.1 (162)	73.8 (849)	+59.7	7.065	.001

siblings 1.69±1.54 and the mean household members were 4.64±1.54.

The mean pre-test score of the students on knowledge test was 7.23±2.53 (range: 0-16), and the mean post-test scores were 13.99±2.60 (range: 2-10) (p=0.001). The effect size of the intervention was 2.64. The rate of correct answers improved significantly after the intervention (p=0.001) (Table-1).

The same was the pattern in the post-test with respect to family disaster preparation plan (p=0.001) (Table-2).

Discussion

It has been determined in literature that schools are among the best places to provide earthquake training.[1,4,13,22,32] For middle school students, this type of training is very effective. Although the district in the study is located in the first-degree earthquake zone in Turkey, it is remarkable that earthquake education in the schools in this region is very inadequate. This study was conducted to satisfy the need for earthquake education by nurses for students, and to contribute to the relevant literature by investigating the effectiveness of such education. Students gave correct answers at 16.2%-44.5% level to the questions about drop-cover, hold on, foetal position, life triangle, and the things to be included in earthquake kit, which is an insufficient/moderate level. In different studies carried out in Turkey, it was determined that primary and middle school students have close and insufficient knowledge about the same subjects.[4,26,27] These findings suggest that the importance of the education about earthquake preparation is underestimated in Turkey. After the education, there was a statistically significant increase in students' knowledge regarding earthquakes in general, what to do in schools during an earthquake, what to do during an earthquake, and what should be included in the earthquake kit. The high effect size supports this result. Similarly, many studies investigating the effectiveness of this education reported a significant increase in students' knowledge scores regarding earthquakes after the education.[4,24,26-29] Also, students' abilities to recognise danger and cope with it increased in line with the increase of knowledge scores.[27,29]

The students' behaviours regarding family disaster preparation plan were also insufficient (13.9%-21.5%). Baytiyeh and Öcal determined that only 15% of the students in their study had a family disaster preparation plan, and 40% of the participants believed that there was going to be a destructive earthquake within the next 50 years. Despite the fact that students had high expectations about an earthquake, their incompetence in preparing a disaster plan was striking.[31] In this study, a statistically significant increase was determined in the preparation of family disaster preparation plan after the training. Similar studies investigating the effectiveness of earthquake training also reported a significant increase in middle school students' behaviours after the training about family disaster preparation plan.[29-31] In a study conducted with primary school students in Japan, it was determined that education was more effective than actually experiencing earthquakes in increasing

the knowledge, awareness, and positive behaviour regarding the earthquake.[26] While the percentages of the practices that are commonly known in the society (taking foetal position, getting out of the house) were found to be high before the education, the increase in the rate of the less-known and specific earthquake preparation practices is noteworthy. This situation created a significant level of awareness among students, which proves the effectiveness of the education.

The study has its limitations. The participants were sixth and seventh grade students from a number of schools in a semi-urban area in western Turkey. Therefore, the results can only be generalised to the study group. Students' self-assessment was taken as the basis in the questionnaire form. The study is unidirectional as the researchers provided a single 45-minute earthquake education to a group of students, and evaluated its effect on earthquake knowledge and family disaster preparation plans. Despite this limitation, the interactive elements in the training (e.g. game, videos) helped the students remember this new information, and increased their scores on general earthquake knowledge and family disaster preparation plans.

The most important strength of this study is that, to the best of our knowledge, it is the first earthquake intervention study conducted in schools. This study might be a guide for further multilevel, holistic earthquake intervention studies

Conclusion

Before the education programme, the students had moderate/low levels of knowledge about earthquakes. Also, there were very few students who had earthquake preparation plans created with their families. After the education, there was a significant change in both these aspects. Long-term observations are recommended to test the sustainability of the knowledge and behaviour.

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