Araştırma Makalesi
Research Article

Evaluation of the Basic Life Support Training Provided to Search and Rescue Staff

ARAMA VE KURTARMA PERSONELİNE VERİLEN TEMEL YAŞAM DESTEĞİ EĞİTİMİNİN DEĞERLENDİRİLMESİ

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ABSTRACT

Background: This research aimed to assess the effect of theoretical and practical Basic Life Support training on the knowledge level of research and rescue staff who encounters lots of wounded people during their work.

Materials and Methods: Random pre-test - post-test control group pattern was used in the research. Thirty of the participants were untrained and they were selected for the experiment group whereas the other 30 with previous training were placed in the control group. Once all the participants were pre-evaluated, the experiment group received a 315-minute training. Then, both groups were taken through a post-test evaluation.

Results: It was found that the differences between the experimental group's Basic Life Support (BLS) knowledge level and the assessment scale of the post-test and the pre-test were significantly higher than the differences between the control group's post-test and the pre-test results ($p<0.001$). It is determined that the experiment group had significantly higher differences between pre-test and post-test results in all parameters except for adult, compression success rate, number of presses per minute and adult and pediatric CPR cycle rate ($p<0.05$). It is determined that the experiment group, compared to the control group, had significantly higher differences between pre-test and post-test results in all parameters except for adult, compression success rate, number of presses per minute and adult and pediatric CPR cycle rate ($p<0.05$).

Conclusions: It has been found that the training given to search and rescue staff is effective in increasing the knowledge levels of the participants. It is seen that the participants experienced a significant rise in their knowledge level, especially in terms of pediatric training.

Keywords: Basic Life Support, Disaster Management, Disaster Medicine, Health Education, Search and Rescue Staff.

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ÖZ

Amaç: Araştırma çok sayıda yaralı ile karşılaşan arama ve kurtarma personeline verilen teorik ve pratik Temel Yaşam Desteği (TYD) eğitimlerinin bilgi düzeyleri üzerindeki etkisinin değerlendirilmesi amacıyla gerçekleştirilmiştir.

Gereç ve Yöntem: Araştırmada deneysel araştırma yöntemlerinden rastlantısal ön test-son test kontrol gruplu desen kullanılmıştır. Eğitim alan 30 deney ve eğitim almayan 30 kontrol grubu olmak üzere toplam 60 arama ve kurtarma personeli katılımı ile gerçekleştirilmiştir. Katılımcıların tamamına ön test değerlendirilmesi yapılmasının ardından deney grubuna 315 dakika eğitim verildikten sonra her iki grubun son test değerlendirmeleri yapılmıştır.

Bulgular: Deney grubu TYD Bilgi Düzeyi ve Değerlendirme Ölçeği son test ile ön test farklarının, kontrol grubu son test ile ön test farklarından anlamlı düzeyde yüksek olduğu görülmüştür ($p<0,001$). Yetişkin; kompresyon başarı oranı yüzdesi, dakikadaki bası sayısı ile yetişkin ve pediatrik CPR döngü başarısı parametreleri dışındaki tüm parametrelerdeki son test ile ön test farklarının deney grubunda anlamlı düzeyde yüksek olduğu tespit edilmiştir ($p<0,05$). Yetişkin; kompresyon başarı oranı yüzdesi, dakikadaki bası sayısı ile yetişkin ve pediatrik CPR döngü başarısı parametreleri dışındaki tüm parametrelerdeki son test ile ön test farklarının deney grubunda kontrol grubuna oranla anlamlı düzeyde yüksek olduğu tespit edilmiştir ($p<0,05$).

Sonuç: Arama ve kurtarma personeline verilen TYD eğitiminin katılımcıların bilgi düzeylerini arttırmada etkili olduğu tespit edilmiştir. Eğitim grubundaki katılımcılarda özellikle pediatrik eğitim düzeylerinde anlamlı bir artış olduğu tespit edilmiştir.

Anahtar Sözcükler: Afet Yönetimi, Afet Tıbbı, Sağlık Eğitimi, Arama Kurtarma Personeli, Kardiyopulmoner resüsitasyon, Temel Yaşam Desteği.

The destruction caused by disasters and emergencies is ever- increasing (1-2). Preparation and harm reduction activities are important in reducing the damages caused by the large number of disasters and emergencies that occur. The effective application of risk management procedures contributes to the disaster resilience. Therefore, the preparation and risk reduction efforts which are parts of risk management processes for disaster and emergency plans are now being much more prioritized (3-4). One of the activities included in these efforts is the training of disaster and emergency response staff. The training of staff that will work during disasters and emergencies not only reduces the damages of those incidents but also contributes to the social and national resilience.

Search and rescue staff who is on duty during disasters and emergencies meet with many injured people. The health industry becoming incapacitated upon disasters/emergencies, the challenges of reaching to the location of these events, the fact that those locations are not safe upon the incidents sometimes inhibits or limits the health staff from reaching out. Therefore, search and rescue teams have to perform life-saving actions as soon as they reach to the wounded people at the site of these incidents.

These first aid interventions performed at the site of disasters/emergencies have a critical role in decreasing the mortality rates. For instance, in Pakistan, where disasters occur frequently and devastatingly, 50.000 people lost their lives in the earthquake that happened in 2010. The roads were damaged badly and there was no access to villages due to landslides blocking the roads. The health staff could not go to regions affected by the earthquake for 3-4 days and this caused the fatality rate to rise even more (5). The studies conducted reveal that 25 to 50% of the lost lives at earthquake sites in various parts of the world could

have been saved with first aid actions at the sites of the disasters (6). It is undeniable that early and accurate first aid interventions are very important in cases of disasters, but it is also very important that search and rescue teams can perform first aid. The acting team members during times of disasters and emergencies having high levels of medical knowledge and skills significantly contributes to the lowering of mortality and morbidity rates (7).

One of the most important first aid actions that search and rescue staff must apply after disasters and during emergencies is the Basic Life Support (BLS). BLS includes early detection of a patient/wounded whose heart has stopped, the activation of the emergency health system, early cardiopulmonary resuscitation (CPR) and early defibrillation applications with an automatic external defibrillator (OED) (8–10) The earlier the BSL procedure is accurately applied to an arrested heart, the better rates of survival (11–13). BLS is extremely important for decreasing the mortality and morbidity rates and therefore every individual in a society(14) and every member of staff that is to help out during disasters and emergencies should be trained on BSL. Many studies conducted on different groups reveal that BSL theory and practice-based training increase the knowledge and skill levels of individuals (5,15–17).

In the literature, there are studies on BLS training given to other professional groups using different methods. This study aims to assess the effect of BSL training on search and rescue team members and their levels of knowledge. This study is unique in that it constitutes one of the few studies in the world and in Turkey in terms of evaluating the theoretical and practical training offered to search and rescue team members.

Our study is completely different from other studies in terms of its sample, simulation-supported training process and the fact that the trainings cover both pediatric and adult groups together.

METHODS

The population of this study is composed of search and rescue team members in Amasya's city center. Power analysis was performed with the G*Power Version 3.1.9.4 program to calculate the sample size. Considering a study in the literature (18) in which measurement parameter (compression rate) like the planned study were evaluated, an effect size of 0.70 is expected. As a result of the calculation, it was calculated that the number of participants required to obtain an effect of 0.70, significance at the level of 0.05 and power at the level of 0.80 was a total of 52 people, 26 people in the control and training groups. This study did not use the sample selection method and aimed to reach out to the whole population of the study. Except for the staff who was on annual leave and members currently on duty elsewhere, 60 members of search and rescue teams participated in this study. Random pre-test - post-test control group pattern was used in this research. In the study, an experimental group (30 people) and a control group (30 people) were formed by using a computer sampling program (https://www.randomizer.org/) with simple random sampling method. Theoretical and practical BSL training was provided to the search and rescue staff in the experimental group. The participants of the training were divided into groups of five. Theoretical part of the training lasted for 135 minutes (3x45 min) and practice-based part of the training took 180 minutes (4x45 min). Theoretical training covered the evaluation of the site of the incident and the patient, diagnosis of cardiac and respiratory arrest, activation of the emergency health system and steps of CPR. The practical part of the training was conducted on Laerdal Resusci Anne® (Pediatric-Little Junior QCPR Adult-Little Anne QCPR) manikins.

Permits were collected from the Ethics Committee of the University of Amasya (permit No: E-76988455-050.01.04-82464) and the Municipality of Amasya (permit No: E-98128674-622.01-358) to conduct this study. In addition, the participants of this study were given information about the study and their oral and written informed consents were gathered.

Statistical analyses were performed using IBM SPSS Statistics 23.0 package program. The suitability of the variables to the normal distribution was examined by visual (histogram and probability graphs) and analytical methods (Kolmogorov/Smirnov Shapiro-Wilk tests).

Descriptive analyses were given with mean-standard deviation for continuous variables and number-percentage values were used for ordinal and nominal variables. In the instances where experiment group was compared to the control group based on demographic

features, Independent Samples t Test (age variant), Chi-Square Test and Fisher's Exact Test were utilized. The 2×2 mixed design ANOVA test was used to compare the pre-test and post-test data of the experimental and control groups. The cases with a 95% trust interval below p=0.05 were statistically significant results.

Data Collection Tools

Research data was collected by Personal Data Collection Form, The Basic Life Support Knowledge Level Form, Basic Life Support Assessment Scale and Laerdal Resusci Anne® CPR manikins.

Personal Data Collection Form

The "Personal Data Collection Form" was prepared by the researchers to determine some identifying information regarding Basic Life Support based on the sociodemographic characteristics of the participants. The form includes questions about the participant's age, educational and professional background. There are also questions on whether there was any need for the application of BLS and if yes, what kind of actions were taken.

Basic Life Support Knowledge Level Form

The Basic Life Support Knowledge Level Form was created based on the information contained in the European Resuscitation Council 2015 (ERC) guide prepared for the researchers looking for determining the participants' level of knowledge about Basic Life Support. The 30-item draft survey form was sent to 11 experts asking them to share their opinions. The objective was to create a survey of 20 questions in line with expert opinions. Once the survey that composed of 30 questions was sent for review by experts, Lawshe (1975) Scope Validity Index (SVI) for each question and the unity of the survey was calculated. The critical values of Scope Validity Index for 11 experts were taken from Ayre and Scally (2014). According to these researchers, the critical value was determined as 0.64. As a result of the scope validity analyses conducted, the SVI values of the survey consisting of 30 items vary between 0.81 and 1.00. In addition, the SVI value of the entire draft survey is calculated to be 0.96. Since the scope validity value of each item was above the critical value, the 20 items with the highest SVI value were selected for the final version of the survey.

The form is comprised of 20 questions regarding the application standards of adult and pediatric Basic Life Support. The correct answers on this Basic Life Support Knowledge Level Form are equal to "1" point and the wrong ones are equal to "0" points. The form was applied to the participants as a pre-test and post-test to evaluate the change in the knowledge level of the team members of search and rescue staff created upon training.

Basic Life Support Assessment Scale

A Basic Life Support Assessment Scale containing steps for the initial evaluation of the patient and the initiation process of BLS has been prepared by the researchers. The Scale allows the researchers to assess the BLS provider's accurate application of the following steps: evaluation of the site of the event/safe approach, checking of the patient's consciousness, asking/calling for help, unblocking the airway, evaluation of breathing and starting to perform the BLS. If all the skills are accurately performed, the participant scores 15 points. Participants were given a total of two minutes to evaluate the patient and start the BLS. Meanwhile, the attempts of the participants were simultaneously assessed by three different researchers based on the steps given on the Scale.

CPR Application

CPR pre-test and post-test application assessments were performed using Laerdal Resusci Anne® manikins. All pediatric and adult CPR assessments were performed separately on Laerdal Resusci Anne® (Little Junior QCPR, Little Anne QCPR) manikins connected to a tablet running the Laerdal QCPR Skill Reporting system. Laerdal QCPR is a real-time feedback software that can be connected wirelessly to a training manikin and measure the quality of CPR. The software recorded the following variants using the CPR mode: compression success rate (%), decompression success rate (%), cardiopulmonary resuscitation success rate (%), compression per minute success rate (%), press per minute success rate (%), ventilation success rate (%), CPR cycle success and CPR overall success rate (%), average compression depth (mm). The measurements adhered to the 2015 European Resuscitation Council guidelines. The software gives simultaneous feedback as the participant applies the procedure and their score is calculated once the procedure is complete. All the participants both in the training and the

control groups were asked to perform one-minute-long CPRs on manikins before the training. The training group redid the CPR after they received the training, and the control group was asked to re-perform the CPR independent of training and data regarding the quality of these CPRs were gathered. Figure 1-2 shows the CPR Application pre-test and post-test results of one of the participants in the experiment group.

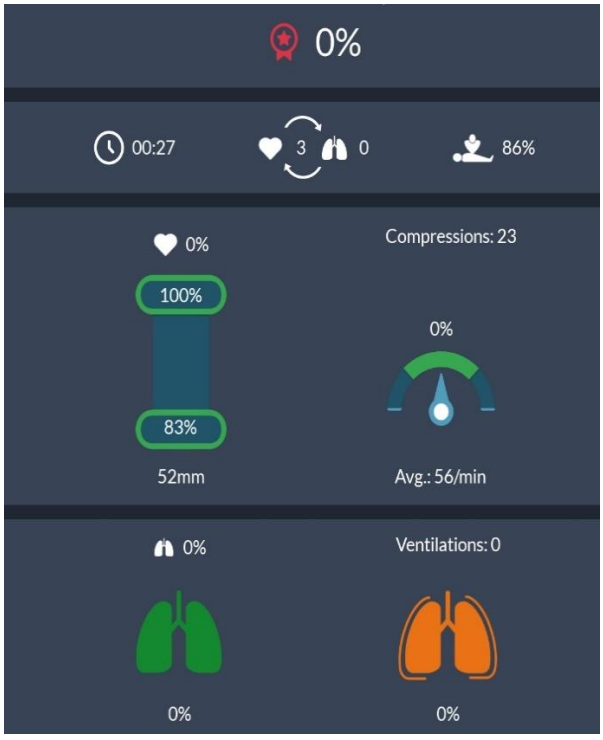


Fig. 1. CPR Application pre-test results

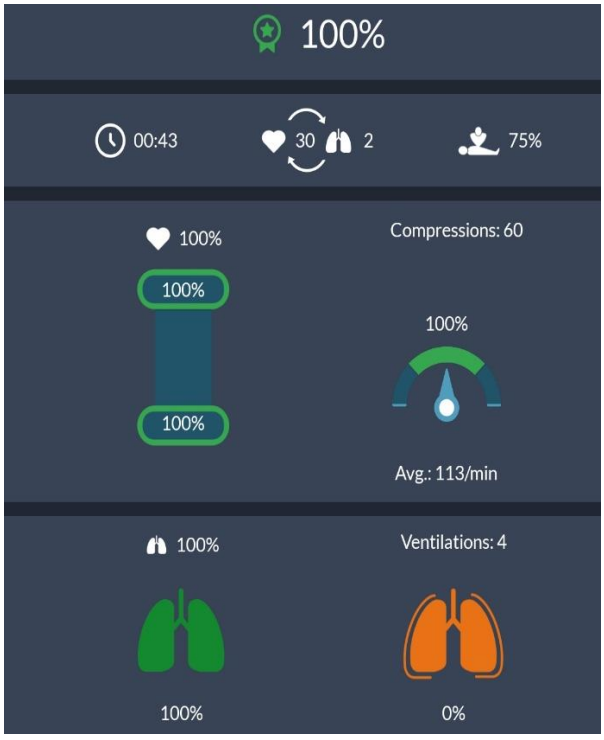


Fig. 2. CPR Application post-test results

RESULTS

A total of 60 male individuals participated in the study for the experiment (n=30) and control groups (n=30). There was no significant difference found between the individuals in the training group and control group in terms of demographic characteristics ($p>0.05$). The demographic information of the participants is given on Table 1.

Table 1 Demographic Characteristics of the Participants

	EXPERIMENT GROUP (n=30) n (%) or Mean (SD)	CONTROL GROUP (n=30) n (%) or Mean (SD)	p
Age	35.93 (11.04)	41.50 (11.33)	0.059[α]
Level of Education			
- Elementary School	7 (23.3%)	6 (20.0%)	
- High School	13 (43.3%)	8 (26.7%)	0.325[β]
- Associate degree	8 (26.7%)	10 (33.3%)	
- Bachelor's Degree	2 (6.7%)	6 (20.0%)	
Institution			
Fire Department of Amasya Municipality	21 (70%)	22 (73.3%)	0.774[¶]
Provincial AFAD of Amasya	9 (30%)	8 (26.7%)	
Profession			
- Search and Rescue Technician (Vocational school graduate)	8 (26.7%)	9 (30%)	
- Search and Rescue Technician (Associate degree graduate)	2 (6.7%)	-	
- Fireman	16 (53.3%)	21 (70%)	0.117[β]
- Fire Department Chief	2 (6.7%)	-	
- Manager	2 (6.7%)	-	
Years of Professional Experience			
- 1 - 5 years	15 (50%)	7 (23.3%)	0.091[¶]
- 6 - 10 years	7 (23.3%)	9 (30%)	
- 11 years and more	8 (26.7%)	14 (46.7%)	
BLS-trained			
- Yes (Training Providing Organization)			
o Formal Education	4 (13.3%)	3 (10%)	
o In-Service Training	6 (20%)	6 (20%)	
o City Directorate of Health	10 (33.3%)	15 (50%)	0.511[β]
o Formal Education+ Private Training Course	-	1 (3.3%)	
o In-service Training + Private Training Course	3 (10%)	-	
o In-service Training + City Directorate of Health	1 (3.3%)	1 (3.3%)	
- No	6 (20%)	4 (13.3%)	
Encounters with and Individual Needing CPR			
- Yes			
o I called 112 (Emergency line like 911)	5 (16.7%)	4 (13.3%)	
o I did CPR	2 (6.7%)	1 (3.3%)	
o I made no attempts	2 (6.7%)	1 (3.3%)	0.757[β]
o Rescue breathing +CPR	1 (3.3%)	1 (3.3%)	
o Rescue breathing + CPR + I called 112	2 (6.7%)	-	
o I called 112 + I did CPR	-	1 (3.3%)	
- No	18 (60%)	22 (73.3%)	
Having Knowledge and Skills About BLS.			0.869[β]
- Yes	8 (26.7%)	9 (30%)	

- No	3 (10%)	4 (13.3%)	
- Partly	19 (63.3%)	17 (56.7%)	
Willingness to Receive Training			
- Yes	30 (100%)	27 (90%)	0.237[β]
- No	-	3 (10%)	

p[α]: Independent samples t test, p[β]: Fisher's Exact Test, p[¶]: Chi-Square Test. Statistical significance was determined as $p<0.05$.

The 2x2 mixed design ANOVA test revealed a significant timexgroup interaction effect for knowledge of BLS (score), BLS assessment scale (score), decompression success rate (%), cardiopulmonary resuscitation success rate (%), ventilation success rate (%), CPR overall success rate (%), compression depth (mm) parameters in adults. The 2x2 mixed design ANOVA test revealed a significant timexgroup interaction effect for compression success rate (%), decompression success rate (%), cardiopulmonary resuscitation success rate (%), compression per minute success rate (%), number of compression (min), ventilation success rate (%), CPR overall success rate (%), compression depth (mm) parameters in children (Table 2).

Table 2 Comparison of pre-test and post-test data of experimental and control groups

		EXPERIMENTAL GROUP		p	CONTROL GROUP		p	Time Effect	Time×Group Effect
		Pre-Test	Post-test		Pre-Test	Post-test		p	p
		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)			
Knowledge of BLS (score)		10.50 (2.74)	16.67 (3.02)	**<0.001**	10.30 (2.17)	10.53 (2.27)	0.589	**<0.001**	**<0.001**
BLS Assessment Scale (score)		5.87 (3.53)	13.20 (2.28)	**<0.001**	5.27 (3.02)	5.73 (3.48)	0.440	**<0.001**	**<0.001**
ADULT	Compression Success Rate (%)	86.37 (27.10)	91.67 (12.28)	0.277	82.80 (32.39)	79.40 (33.21)	0.484	0.782	0.207
	Decompression Success Rate (%)	66.87 (41.85)	99.73 (0.83)	**<0.001**	74.50 (39.62)	84.43 (32.25)	0.144	**<0.001**	**0.019**
	Cardiopulmonary Resuscitation Success Rate (%)	43.03 (38.25)	92.73 (11.11)	**<0.001**	34.33 (37.37)	46.60 (40.76)	0.066	**<0.001**	**<0.001**
	Compression Per Minute Success Rate (%)	24.90 (33.03)	62.83 (37.98)	**<0.001**	14.80 (23.75)	33.17 (34.73)	**0.016**	**<0.001**	0.068
	Number of Compression (min)	99.73 (36.02)	107.90 (10.57)	0.178	98.07 (27.03)	106.87 (29.23)	0.147	0.050	0.941
	Ventilation Success Rate (%)	17.60 (29.10)	90.57 (16.20)	**<0.001**	19.47 (30.30)	32.27 (41.31)	0.069	**<0.001**	**<0.001**
	CPR Cycle Success	65.07 (25.29)	73.30 (7.38)	0.058	58.07 (29.10)	60.03 (23.43)	0.646	0.095	0.302
	CPR Overall Success Rate (%)	33.40 (27.84)	92.00 (7.83)	**<0.001**	26.93 (26.18)	37.23 (29.15)	**0.031**	**<0.001**	**<0.001**
	Compression Depth (mm)	45.20 (13.41)	53.33 (2.66)	**0.001**	44.13 (11.66)	43.97 (10.90)	0.942	**0.017**	**0.013**
CHILD	Compression Success Rate (%)	59.17 (41.23)	81.33 (22.66)	**0.001**	57.37 (41.60)	55.67 (42.71)	0.785	**0.023**	**0.009**
	Decompression Success Rate (%)	29.23 (39.43)	98.40 (6.74)	**<0.001**	30.67 (43.18)	53.83 (48.04)	**0.006**	**<0.001**	**<0.001**
	Cardiopulmonary Resuscitation Success Rate (%)	20.33 (30.21)	62.60 (44.39)	**<0.001**	18.97 (29.82)	20.37 (33.55)	0.844	**<0.001**	**<0.001**
	Compression Per Minute Success Rate (%)	18.40 (30.73)	61.47 (34.36)	**<0.001**	15.63 (27.90)	24.03 (32.94)	0.316	**<0.001**	**0.005**
	Number of Compression (min)	70.87 (41.52)	107.70 (11.75)	**<0.001**	77.43 (34.61)	90.10 (39.60)	0.073	**<0.001**	**0.017**
	Ventilation Success Rate (%)	25.27 (37.13)	87.57 (20.00)	**<0.001**	28.53 (38.13)	35.50 (41.38)	0.371	**<0.001**	**<0.001**
	CPR Cycle Success	63.97 (25.79)	65.77 (11.21)	0.669	55.37 (26.77)	49.73 (22.85)	0.183	0.520	0.214
	CPR Overall Success Rate (%)	20.10 (21.72)	87.00 (15.18)	**<0.001**	16.30 (18.18)	20.10 (21.57)	0.337	**<0.001**	**<0.001**
	Compression Depth (mm)	42.80 (7.50)	48.13 (5.85)	**0.011**	42.20 (6.49)	39.97 (11.16)	0.278	0.286	**0.011**

SD: Standard deviation min: minute, mm: millimeter, BLS Basic Life Support, CPR Cardiopulmonary Resuscitation. Significant different to timexgroup effect p<0.05. Statistical significance was determined as p<0.05.

It was observed that BLS level of knowledge and BLS assessment scale post-test scores were significantly higher than the pre-test scores ($p<0.001$). Individuals included in the BLS training group were found to have significantly higher post-test scores of adult decompression success rate, cardiopulmonary resuscitation success rate, compression per minute success rate, ventilation success rate, and CPR overall success rate parameters than pre-test scores ($p<0.001$). The individuals who received basic life support training in the experiment group has significantly higher adult compression depth parameter post-test scores compared to their pre-tests ($p=0.001$). Individuals included in the experiment group were found to have significantly higher post-test scores of pediatric decompression success rate, cardiopulmonary resuscitation success rate, number of compressions, compression per minute success rate, ventilation success rate, and CPR overall success rate parameters than pre-test scores ($p<0.001$). Pediatric post-test scores of compression success rate ($p=0.001$) and compression depth ($p=0.011$) parameters of the individuals in the experimental group were found to be significantly higher than the pre-test scores of the same parameters. There was no significant difference detected between the post-test and pre-test scores of adult compression success rate, number of compressions, and adult and pediatric CPR cycle success parameters ($p>0.05$) (Table 2, Fig. 3-4).

Fig. 3. Rate and depth of chest compressions in adults

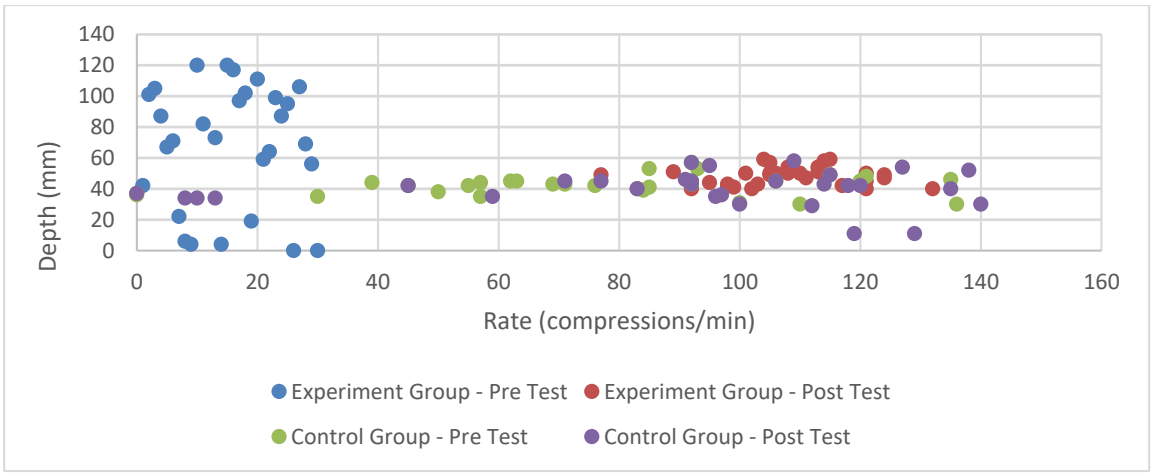
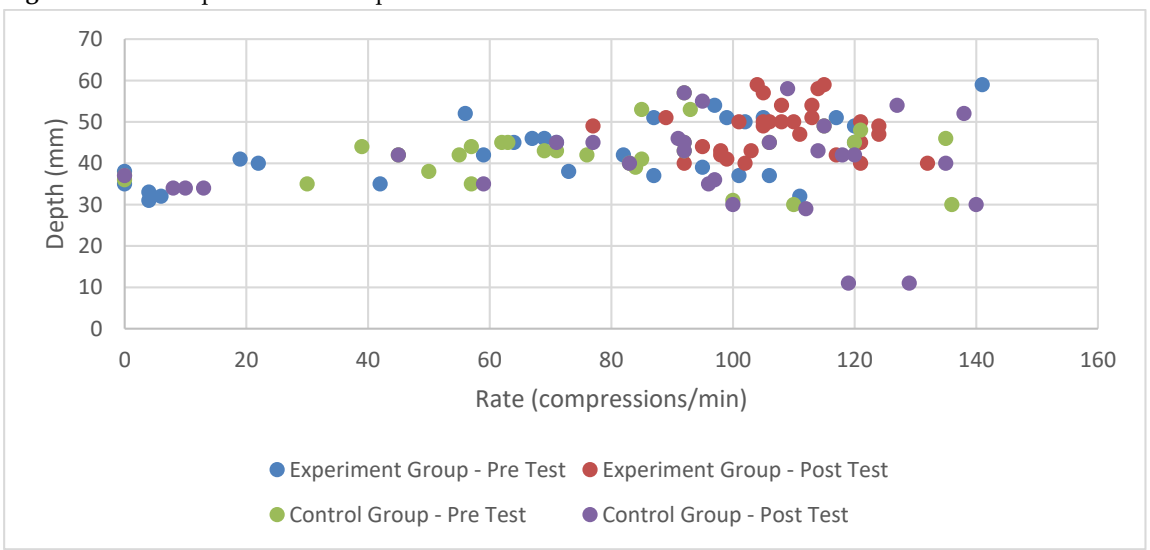


Fig. 4. Rate and depth of chest compressions in children



There was no significant difference between the pre and post test scores of the BLS knowledge level and BLS assessment scale of the individuals in the control group ($p>0.05$). Compression per minute success rate ($p=0.016$), CPR overall success rate ($p=0.031$) in adults and pediatric decompression success rate ($p=0.006$) parameters of control group have significantly higher post-test scores compared to their pre-test scores. The other CPR application parameters of individuals in the control group did not show any significant difference between pre and post-test scores ($p>0.05$) (Table 2, Fig. 3-4).

DISCUSSION

Due to the magnitude of the destruction caused by disasters, resources may be left insufficient. In disasters where many injuries occur, early and accurate first aid interventions to the injured are among the factors that increase survival rates. Search and rescue teams are one of the professional teams that play a role in the first intervention efforts right after disasters and therefore, their correct and fast first aid actions are vital. Even though search and rescue staff are not a part of the professional medical staff, they encounter with a lot of injured at the site of the incident as a first intervention team and that is why they have a high probability of applying BLS procedures (21). First aid procedure is also among the procedures that search, and rescue teams need to execute (22). However, due to the lack of information regarding the BLS procedures which play a significant role in first aid procedures or its misapplication, unfortunately the rate of survival upon a cardiac arrest outside a hospital is low (23–25). To increase the rate of survival upon a cardiac arrest outside a hospital, the BLS knowledge and skills of individuals have to be developed (26-27). And to develop these, the interaction between the trainer and trainees during a BLS training play a crucial role in creating behavioral change (28). Learning and maintaining the CPR skills are crucial for it affects the survival rates of cardiac arrest patients (29). To be successful in a BLS performance that encompasses CPR, it is very important to train the related professions. BLS training is an essential parameter contributing to the development of skills and increasing the knowledge levels of individuals. In our research, there has been a significant rise in the knowledge and skill levels of the experiment group which got BLS training. The studies show that the fire department staff who were trained on BLS can performs CPRs as good as a paramedic working in an ambulance (30).

Previous research show that search and rescue teams are among the professional groups that have lower levels of information regarding BLS (21). The result of this research show that search and rescue staff's pre-test knowledge and skill levels regarding BLS are low. The majority of participants had low pre-test scores even though they had previous BLS training. We think that the reason for this is that these pieces of training did not include any practice sessions. Participants frequently stated that their training was only theory based. This research proves that participants observe a rise in their BLS knowledge and skill levels upon training on CPR manikins. The use of CPR training manikins and supporting the BLS training with practice sessions increases the knowledge and skill levels of participants. In the study done by Davies and Gould with nurses (2000), the experiment group which practiced on manikins had significantly higher post-test scores ($p<0.05$) than the control group which did not do any practice on manikins. In a study carried out by Özzeybek and their colleagues (2002) with medical faculty students, upon training on CPR manikins, students' written exam scores rose from 6.6±5.7 to 53.8±11.2 and their scores for application/practice on manikins rose from 31.9±14.06 to 95.2±4.7. In a similar study of López (2018) done with teachers being trained on BLS using manikins, the participants' success rate of BLS went from 1.2% to 46%. In another study done on medical students, there were two groups and one of them had a standard CPR training whereas the other group went through a simulative training. And the second group's skill levels were higher than the group which got the traditional training (34). As a result of this research and these other studies within the field, it is defined that supporting theory-based BLS training with practice-based sessions increases the knowledge and skill levels of participants. The practice sessions contribute to the permanence of the newly acquired skill. In a study conducted before, two different groups which were trained through the traditional method and a practice-based chest compression method was called in again to remeasure their skill levels three months post-

training and the group which applied the methods demonstrated higher levels of skillfulness (18)].

Another reason for the participants having low pre-test scores even though they had prior training is thought to be the lack of constant repetition after training. During this research, the participants stated that they took the BLS training only once in their lives, and it was not covered in depth among other first-aid training pieces. The pieces of training having a repetitive, on-going nature can have an increasing effect on the success of its application. In a study done by Anderson and their colleagues, monthly training done on a manikin with a real-time visual feedback mechanism proved to be much more effective compared to training done every three, six or twelve months (35); whereas other studies suggest that BLS training should be repeated every 6 or 7 months (36-37). Staff who is not a part of a medical team is expected to have much more positive outcomes on their CPR and OED performance in case they get repetitive training within one-year interval rather than they only receive a single piece of training once and for all (38). In Cho and Kim's study with police officers, it was determined that traditional CPR training with only chest compression demonstration offered to two different groups provided an increase in CPR quality in both groups, but the level of CPR success decreased for both groups three months after this training (18).

As a result of the theoretical and practical training given to the experimental group in the research, there was a significant difference in the knowledge and skill levels of the search and rescue staff in this group compared to the control group. BLS training given in line with the results of this research and other studies of the literature is expected to contribute to the increase in knowledge and skill levels of individuals which in turn will increase the survival rates.

Limitations

This research includes the search and rescue staff working in the city center of Amasya. Therefore, all the data gathered in this study cannot be generalized to all search and rescue teams. The early defibrillation process done with an automatic external defibrillator (OED) which is one of the steps of BLS procedure could not be included in the research because there were no available devices to use.

CONCLUSION

Our results reveal that the theoretical and manikin-supported training given to the search and rescue staff who encounters and treats many injured people lead to an increase in their knowledge and skill levels. Within the framework of these results, it is believed that by ensuring the continuity of BLS training and making them a mandatory part of in-service training, the staff will be better prepared with an increase in the knowledge and skill levels, and this will contribute to the resilience to emergencies and disasters. In future studies, it is thought that research should be conducted to reveal the permanence of BLS skills with repetitive trainings.

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Author contribution

The study was conceived by Sevda Demiröz Yıldırım; funding acquisition and project administration, Sevda Demiröz Yıldırım; data collecting; Sevda Demiröz Yıldırım, Kader Demiröz; analyzing data, Sevda Demiröz Yıldırım, Mustafa Cem Türkmen; writing—original draft, Sevda Demiröz Yıldırım, Kader Demiröz; writing—review & editing, Sevda Demiröz Yıldırım, Mustafa Cem Türkmen, Kader Demiröz. All authors read and approved the final manuscript.

Ethics statement

Permits were collected from the Ethics Committee of the University of Amasya (permit No: E-76988455-050.01.04-82464) and the Municipality of Amasya (permit No: E-98128674-622.01-358) to conduct this study. In addition, the participants of this study were given information about the study and their oral and written informed consents were gathered.

Credit authorship contribution statement

Sevda Demiröz Yıldırım: funding acquisition, investigation, writing – original draft, Methodology, Investigation, Formal analysis, data curation, conceptualization, writing – review and editing. Mustafa Cem Türkmen: analyzing data, writing – original draft, validation. Kader Demiröz: data curation, investigation, analyzing data.

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