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Assessment of Awareness and Knowledge Levels of Individuals Over the Age of 18 Regarding Automated External Defibrillator

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ABSTRACT

Purpose: This study aimed to assess the levels of awareness and knowledge pertaining to automated external defibrillator (AED) devices among individuals aged 18 and older.

Methods: The population of this descriptive study consisted of all individuals over the age of 18 and the sample consisted of literate individuals who volunteered to participate in the study and had internet access. The sample size was determined as 185 people with G*Power 3.1 programme. 217 people participated in the study. Data were collected between November and December 2021 using the 'Data Collection Form' and 'Information Form about OED'. These forms were sent to individuals via a link created on surveey.com. Written permission was obtained from the Human Research Ethics Committee of a university (Protocol No: 2021/426).

Results: The mean age of the study participants was 31.92±10.9 years. Of the participants, 65.9% (n:143) were employed in fields unrelated to healthcare, and 10.6% (n:23) held first-aid certifications. Findings revealed that 47.0% (n:102) of the participants had prior knowledge of AEDs, while 57.6% (n:125) were unaware of AED locations. A total of 53.0% (n:115) were uncertain about who could operate an AED, 84.3% (n:183) lacked knowledge about AED operation, and 79.7% (n:173) expressed a desire for AED device and usage training. Importantly, participants with first-aid training exhibited higher levels of AED-related knowledge.

Conclusion: Despite the relatively low baseline knowledge and awareness of AEDs among participants, there is a clear willingness to receive education on this life-saving device.

Keywords: Automated external defibrillator, emergency, cardiac arrest

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ÖZET

Amaç: Bu çalışmada 18 yaş üstü bireylerin OED cihazına ilişkin farkındalık ve bilgi düzeylerinin incelenmesi amaçlanmıştır.

Yöntem: Tanımlayıcı türde olan bu çalışmanın evrenini 18 yaş üstü olan tüm bireyler, örneklemini ise okuryazar, çalışmaya katılmaya gönüllü ve internet erişimi olan kişiler oluşturdu. G*Power 3.1 programı ile örneklem büyüklüğü 185 kişi olarak belirlendi. Çalışmaya 217 kişi katıldı. Veriler Kasım-Aralık 2021 tarihleri arasında, 'Veri Toplama Formu' ve 'OED Hakkında Bilgi Formu' kullanılarak toplandı. Bu formlar surveey.com üzerinden oluşturulan bir link ile bireylere gönderildi. Araştırmanın yapılabilmesi için bir üniversitenin İnsan Araştırmaları Etik Kurulu'ndan (Protokol No:2021/426) yazılı izin alındı.

Bulgular: Çalışmaya katılanların yaş ortalamalarının 31.92±10.9 olduğu, %65.9 (n:143)'sinin sağlık dışında başka bir alanda çalıştığı, %10.6 (n:23)'sının ilk yardım sertifikası aldığı görüldü. Katılımcıların %47.0 (n:102)'si OED ifadesini daha önce duyduğunu, %57.6 (n:125)'sı OED'nin nerelerde bulunabileceğini bilmediğini, %53.0 (n:115)'ü OED'yi kimlerin kullanabileceğini bilmediğini, %84.3 (n:183)'ü OED'nin nasıl kullanılacağını bilmediği ve % 79.7 (n:173)'si ise OED cihazı ve kullanımı hakkında eğitim almak istediğini belirtti. İlk yardım ile ilgili eğitim alanların OED ile ilgili bilgi düzeylerinin, almayanlara oranla daha yüksek olduğu saptandı.

Sonuç: Çalışmaya katılanların OED ile ilgili bilgi ve farkındalıklarının düşük olmasına karşın eğitim almaya istekli oldukları görüldü.

Anahtar Kelimeler: Otomatik eksternal defibrilatör, acil, kardiyak arrest

In contemporary times, the occurrences of disasters, earthquakes, and similar events necessitate the formulation of emergency plans and the cultivation of awareness (1). One of the most prevalent and critical situations requiring immediate intervention in such emergencies is cardiac arrest. The utilization of an automatic external defibrillator in first aid procedures is of paramount importance in order to enhance survival rates in cases of cardiac arrest. An automated external defibrillator (AED) is a compact, lightweight, and portable medical device designed for the purpose of saving lives in the event of sudden cardiac arrest. It operates by delivering an electric shock to an individual's heart in order to restore its normal rhythm as swiftly as possible. Sudden cardiac arrest is a critical medical emergency where the heart's electrical activity becomes irregular, potentially leading to a life-threatening condition. AEDs are equipped with user-friendly features and clear instructions that enable both trained and untrained individuals to administer the necessary electric shock to the affected person's chest (2–4). AEDs are commonly found in public places, workplaces, and healthcare facilities, providing a crucial means of intervention during a cardiac crisis. Early defibrillation plays a critical role in treating certain arrhythmias, highlighting the significance of raising awareness about Automated External Defibrillators (AEDs). Many countries have incorporated AED usage into pre-hospital procedures and Basic Life Support (BLS) guidelines, making AEDs readily available in public places such as airports, train stations, shopping malls, sports facilities, and large buildings to enhance the response to sudden cardiac emergencies (5,6). The timely and accurate application of Basic Life Support (BLS) is paramount for increasing survival rates, especially in the critical first 4 minutes after cardiac arrest. If this window extends beyond 8 minutes, it can result in irreversible damage to the individual's brain functions. The American Heart Association's (AHA) 2020 Cardiopulmonary Resuscitation (CPR) guidelines emphasize the importance of implementing the 'Life-Saving Chain' for effective CPR, consisting of five vital components: immediate recognition of cardiac arrest and activation of the emergency response system, early CPR, rapid defibrillation, effective advanced life support, and integrated post-cardiac arrest care. These CPR steps, encompassing the first three links in the chain, can also be administered by trained laypersons. It is crucial that these steps are carried out in a sequential and prompt manner to achieve successful BLS (7,8).

In cases of cardiac arrest occurring outside the hospital environment, it is disheartening to note that the survival rate of patients remains below 10%, despite ongoing efforts to advance resuscitative techniques within healthcare facilities (9). A study conducted by Berdowski et al. revealed that ventricular fibrillation (VF) was the initial rhythm in 27% of all out-of-hospital cardiac arrest cases, with an average survival rate of 7% among adults (10). In out-of-hospital cardiac arrest situations, it is crucial to maintain high-quality CPR until the arrival of the emergency medical team. Notably, in densely populated areas, the application of Automated External Defibrillators (AEDs) nearly doubles the survival rate in these cases. Encouragingly, individuals with access to AEDs should prioritize early defibrillation, as this combined with early CPR significantly enhances the likelihood of a positive outcome (11–13). AEDs can be operated not only by individuals with medical training but also by those with certified first aid training. In numerous countries, the inclusion of CPR and AED training has been made compulsory as part of general training at various levels (13).

While there are a limited number of studies assessing the public's awareness and knowledge of CPR, several studies have focused on the AED device and its usage. This study aims to evaluate the awareness and knowledge levels of individuals aged 18 and above regarding the AED device.

Materials and Methods

This descriptive and cross-sectional study was conducted during the period of November to December 2021.

Universe and Sample:

The study encompassed individuals aged 18 and above as its target population. A non-probabilistic sampling method, specifically an easy sampling approach, was employed for sample selection. The sample size of 217 people was determined using the G*Power 3.1 program, considering an effect size of 0.25 based on prior research findings. The study included individuals who were over 18, literate, willing to participate, and possessed internet access. This study included individuals residing in several provinces, such as Ankara, Adana, Aksaray, Balıkesir, Bartın, Batman, Bolu, Bursa, Canakkale, Corum, Diyarbakır, Düzce, Eskişehir, Gaziantep, Giresun, Isparta, Istanbul, Izmir, Kahramanmaraş, Karabük, Kastamonu, Kayseri, Kocaeli, Konya, Manisa, Mardin, Ordu, Sakarya, Samsun, Sanlıurfa, Sırnak, Tekirdag, Tokat, Trabzon, and Zonguldak In Turkey.

Data Collection Tools:

Data were collected using a two-part data collection form developed by the researchers after reviewing relevant literature. The first part of the form gathered information about participants' sociodemographic characteristics and their first aid background, including whether they had received first aid training or worked in the healthcare sector. The second part of the form included 23 questions designed to assess participants' knowledge about Automated External Defibrillators (AEDs). Participants were required to respond to these questions by selecting "True," "False," or "I Don't Know." The data collection form was administered to participants through a link created on the "www.surveey.com" platform, with each participant spending approximately 15-20 minutes to complete it.

Data Analysis:

The collected data were analyzed using computer software, with statistical measures such as numbers, percentages, means, and chi-square analyses employed. Skewness and kurtosis values were used to assess the normality of the data distribution, where values typically fall within the range of -2 to +2 for normally distributed data (14). Significance testing was conducted, with a p-value less than 0.05 indicating a significant difference between groups, while a p-value greater than 0.05 indicated no significant difference.

Ethical Considerations:

For the execution of this study, a work permit was obtained from the Human Research Ethics Committee under protocol number 2021/426. Before commencing the study, all participants were provided with information regarding the study's purpose and the confidentiality of their data, assuring them that the data would only be used for scientific purposes. Participants were also asked for their consent to participate. Those who voluntarily agreed to participate were included in the study.

Results

The study revealed that the mean age of the participants was 31.92±10.9 years, with 71.9% (n:156) of them being female. Additionally, 48.8% (n:106) were university graduates, 30.5% (n:65) were married, 26.3% (n:57) had children, and 70.5% (n:153) resided in urban centers.

Among the participants, 65.9% (n:143) were employed in fields unrelated to healthcare, and 10.6% (n:23) possessed a first aid certificate (Table 1).

Table 1. Defining features		
Defining Features		
31,92±10.9(18-65)	**Mean±sd(min-max)**	
Age	31,92±10.9(18-65)	
	(n)	**(%)**
Gender		
Female	156	71.9
Male	61	28.1
Marital status		
Married	65	30.0
Single	152	70.0
Education		
Primary-secondary school	9	4.2
High school	79	36.4
License	706	48.8
Graduate	23	10.6
Status of having children		
Yes	57	26.3
No	160	73.7
Living place		
Province	153	70.5
Town	50	23.0
Village	14	6.5
Status of being a health worker		
Yes	*-Nurse*	38	17.5
	-Nursing Students	19	8.8
	-Other health workers (paramedic, anestesia technician, midwife, etc.)	17	7.8
	Total	74	34.1
No	143	65.9
Status of receiving first aid training		
Yes	151	69.6
No	66	30.4
Status of receiving first aid certificate		
Yes	23	10.6
No	194	89.4

As detailed in Table 2, 47.0% (n:102) of the participants reported prior awareness of AED, with a notably higher awareness rate among women (36.9%; n:80) than men (10.1; n:22) (Chi-square:4,076; p≤0.05). Among those who were aware of AED, 41% (n:50) mentioned having encountered the term during first aid courses at university, 27% (n:33) had heard of it through their involvement in healthcare, and 19.7% (n:24) had acquired this knowledge via the internet or television. Others cited occupational health and safety training at work or having family members in healthcare as sources of their awareness about AED.

Table 2. Information status for the AED				
	Yes		**No**	
Questions	**(n)**	**(%)**	**(n)**	**(%)**
Have you heard the phrase "Automatic External Defibrillator (AED)"?	102	47.0	115	53.0
Do you know where the AED is/can be found?	92	42.4	125	57.6
Do you know who can use AED?	102	47.0	115	53.0
Do you know how to use AED?	34	15.7	183	84.3
Do you know what sudden cardiac arrest means?	174	80.2	43	19.8
Have you ever encountered an individual who developed sudden cardiac arrest?	48	22.1	169	77.9
Do you know that rapid use of AED can improve survival?	115	53.0	102	47.0
Do you know that AED gives an audible alert?	71	32.7	146	67.3
Would you like to receive training about the AED device and its use?	173	79.7	44	20.3

In this study, 57.6% (n:125) of the participants were uncertain about the locations of AED devices, 53.0% (n:115) were unsure about who could operate AEDs, 84.3% (n:183) were unfamiliar with how to use AEDs, 80.2% (n:174) understood the meaning of sudden cardiac arrest, 22.1% (n:48) didn't know anyone who had experienced sudden cardiac arrest, 47.0% were unaware of the potential survival benefits of rapid AED usage, and 79.7% (n:173) expressed their interest in receiving training on AED devices and their use.

Among individuals with first aid training, 58.6% (n:85) correctly identified that AEDs are used to restore a stopped heart, while 4.1% (n:6) believed it to be a device supporting breathing, and 29.0% (n:42) thought it could only be operated by healthcare professionals (Table 3). Furthermore, 20.7% (n:30) of those with first aid training claimed they knew how to use AED devices. The overall AED utilization rate among all participants was 14.3% (n:30). Notably, 80% (n:168) of the participants could recognize signs of cardiac arrest, with significantly higher rates in areas where training was provided (p≤0.05). Surprisingly, 79.5% (n:167) of the participants expressed their desire to receive AED training despite having undergone first aid training.

Table 3. Information status for AED use						
	True		**False**		**I do not know**	
Statements for the use of AED	**(n)**	**(%)**	**(n)**	**(%)**	**(n)**	**(%)**
AED is used to apply electric shock to the patient as soon as possible during sudden cardiac arrest.	138	63.6	4	1.8	75	34.6
AEDs are lightweight and portable devices.	101	46.5	22	10.1	94	43.3
AED gives the user an audible alert.	116	53.5	0	0.0	101	46.5
AED is used only by medical personnel.	63	29.0	64	29.5	90	41.5
AED analyzes the heart rhythm.	88	40.6	22	10.1	107	49.3
AED is contained in a protective box in crowded environments (such as airports, airplanes, and shopping malls).	97	44.7	7	3.2	113	52.1
Anyone who has received AED-certified first aid training can use it.	84	38.7	22	10.1	111	51.2
A universal sign is used to indicate the presence of AED in the environment.	84	38.7	5	2.3	128	59.0
AED is used only for adult persons.	18	8.3	82	37.8	117	53.9
During AED use, the user does not need to know the current rhythm.	28	12.9	69	31.8	120	55.3
When using AED, the device's directions must be applied with caution.	138	63.6	4	1.8	75	34.6
Standard AED is available to anyone over the age of 8.	49	22.6	19	8.8	149	68.7

Table 4. Comparison of the responses of people who received first aid training and those who did not receive it according to their responses to the AED						
		Those who receive first aid training (n: 151)		Those who have not received first aid training (n:69)		Statistical analysis*
		n	%	n	%	
Gender						
Female		111	51.2	45	20.7	p:0.26
Male		40	18.4	21	9.7	
Age						
18-24		88	40.6	31	14.3	
25-29		18	8.3	6	2.8	p:0.12
30 and up		45	20.7	29	13.4	
Marital status						
Married		42	19.4	23	10.6	p:0.18
Single		109	50.2	43	19.8	
Education						
Primary-secondary school		5	22.3	4	4.1	
High school		49	22.6	30	13.8	p: 0.10
License		79	36.4	27	12.4	
Graduate		18	8.3	5	2.3	
Place to live						
Province		108	49.8	45	20.7	
Town		32	14.7	18	8.3	p: 0.51
Village		11	5.1	3	1.4	
Have you heard the AED phrase before?	Yes	87	40.1	15	6.9	p: 0.0001*
	No	64	29.5	51	23.5	
Do you know where the AED is/can be found?	Yes	76	35.0	16	7.4	p: 0.0001*
	No	75	34.6	50	23.0	
Do you know who can use AED?	Yes	86	39.6	18	8.3	p: 0.0001*
	No	65	30.0	48	22.1	
Do you know how to use the AED?	Yes	31	14.3	3	1.4	p: 0.001*
	No	120	55.3	63	29.0	
Do you know what sudden cardiac arrest means?	Yes	133	61.3	41	18.9	p: 0.0001*
	No	18	8.3	25	11.5	
Have you ever encountered an individual who developed sudden cardiac arrest?	Yes	43	19.8	5	2.3	p: 0.0001*
	No	108	49.8	61	28.1	
Do you know that rapid use of AED can improve survival?	Yes	96	44.2	19	8.8	p: 0.0001*
	No	55	25.3	47	21.7	
Do you know that AED gives an audible alert?	Yes	62	28.6	9	4.1	p: 0.0001*
	No	89	41.0	57	26.3	
Would you like to receive training about the AED device and its use?	Yes	121	55.8	52	24.0	p: 0.47
	No	30	13.8	14	6.5	
*Level of significance:p≤0.05						

It was observed that 69.6% (n:151) of the participants had received first aid training. When comparing study participants based on their first aid training status in terms of gender, age, marital status, education level, and place of residence, no significant differences were identified (p≥0.05). Additionally, those who had received first aid training displayed higher levels of knowledge about AED compared to those who had not. Regardless of their awareness, both those with and without first aid training expressed a willingness to undergo AED device and usage training (Table 4).

Acıbadem Univ. Sağlık Bilim. Derg. 2025; 16 (2) 225-232

229

Discussion

In cases of out-of-hospital cardiac arrest, the survival rate experiences a significant boost when early defibrillation is combined with prompt cardiopulmonary resuscitation (CPR) efforts(10–12). Therefore, it is imperative to encourage the use of Automated External Defibrillators (AEDs), especially in densely populated areas, as they offer the potential for early defibrillation by trained first aid providers.

While there is limited research focusing on public awareness and knowledge of Basic Life Support (BLS) in our country, there is a scarcity of studies examining AED awareness and usage. A study assessing the readiness of healthcare professionals to administer BLS revealed that nurses often possess inadequate knowledge and may lack up-to-date information on the topic (15). Similarly, Aygin et al. (2018) noted that nurses' knowledge levels about providing BLS were at a moderate level, suggesting the need for regular updates (16). A study involving college students, despite half of them having received CPR education, indicated insufficient knowledge about the subject (17). Çelikli et al. reported that emergency medical technicians, paramedics, nurses, and other healthcare personnel exhibited low levels of knowledge regarding BLS application, with few participants identifying AED as part of CPR practices (18). Consequently, these studies collectively underscore the notion that individuals receiving CPR training, even within the healthcare sector, may have inadequate knowledge levels in this domain. In this study, it was observed that approximately 69.6% of participants had received first aid training. However, it is worth noting that while a considerable number had undergone first aid training, many were not certified in first aid, and these individuals generally lacked the know-how to operate AEDs. A closer examination of their knowledge regarding AED usage revealed a clear insufficiency in this regard.

Notably, a study conducted in sports facilities in Italy highlighted that a significant portion of participants believed that only those with substantial training should operate AEDs, even though they themselves lacked training in this area. Furthermore, this study revealed that participants generally possessed inadequate knowledge and skills related to the use, operation, and maintenance of AEDs (19). Similarly, research conducted in Australian sports facilities found that a significant number of participants, including healthcare workers, had witnessed sudden cardiac arrests but had not received prior AED training(20). Another study in South Korea reported that although KPR training was regularly provided to various first responders, including ambulance drivers, bus drivers, police officers, flight and train attendants, sports instructors, and tour guides, the use of AEDs did not conform to the guidelines established by the European Research Council (ERC) and the American Heart Association (AHA) (21). This discrepancy may be attributed to a lack of training from certified institutions. It is important to emphasize that AEDs can be operated not only by individuals with medical backgrounds but also by those with certified first aid training, as CPR and AED training have been mandatory components of general education at different levels in many countries (13). After the first aid trainings given in our country, people are subjected to the practical and written exams. The practical implementation of exams and trainings in this way increases their effectiveness. Trainings should be renewed at fixed intervals.

In a study on CPR conducted in our country, more than half of the participants reported never having heard of AED, and the majority were unaware of the locations of AED devices (22). Similarly, an overseas study found that over half of the participants had no knowledge of AED and lacked adequate understanding of AED usage (23). Consistent with these findings, our study indicated that while approximately half of the participants had heard of AED before, a substantial percentage remained unfamiliar with the correct operation of AEDs. Additionally, individuals who had previously completed first aid courses at university exhibited a higher awareness of AED. This discrepancy may be attributed to the educational background, with approximately half of the participants in our study having obtained a bachelor's degree. Interestingly, our research found that those who had undergone first aid training demonstrated better knowledge of AED compared to those who had not received such training. Furthermore, over half of the participants recognized the potential survival benefits associated with rapid AED use. Studies have demonstrated the greater effectiveness of early defibrillation compared to early CPR (11,12), as AED application significantly enhances survival rates, particularly in out-of-hospital cardiac arrest situations (10). Given the urgency of cardiac arrest and the importance of timely intervention, it is crucial to direct individuals towards certified first aid training.

Furthermore, our study showed a strong willingness among participants to receive education on AED devices

and their usage. Additionally, both those who had received first aid training and those who had not expressed a high interest in obtaining AED training. This suggests that individuals who attended first aid training or courses prior to changes in first aid regulations may not have received comprehensive instruction, but an awareness has been raised regarding AED usage. The revised first aid regulations now require compulsory AED training at certificate-issuing first aid centers.

Consequently, it can be inferred that individuals who have not undergone first aid training but are willing to receive AED training are open to personal development and are cognizant of the importance of saving lives. It is expected that technological advancements and the emphasis on first aid, AED devices, and related topics through the internet, media, and social media have contributed to raising public awareness.

Study Limitations:

This study was limited by the accessibility to participants with internet access and higher educational levels. Furthermore, given the diverse provinces in our country, the fact that participants were selected from only 35 provinces represents another limitation of this research.

Conclusion

Early defibrillation, along with prompt recognition of sudden cardiac arrest and the activation of emergency medical teams, is critical for improving survival rates. However, it is essential to have widespread AED deployment and ensure public awareness regarding the location, use, and purpose of AED devices. Although the awareness and knowledge levels of the participants in this study about AED were found to be low, their willingness to receive education was apparent. Given the potential impact of early defibrillation on survival rates, it is recommended to enhance AED training and utilization, incorporating it into curricula at all educational levels and conducting comparative studies with larger sample groups in this domain.

Conflict of interest

The authors declare that they have no conflict of interest.

Data availability

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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Acıbadem Univ. Sağlık Bilim. Derg. 2025; 16 (2) 225-232

231

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