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Awareness of Saudi population about sudden cardiac death in Arar, Northern Saudi Arabia

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ABSTRACT

Background: Sudden cardiac death (SCD) is death due to cardiovascular reasons in an individual with or free from foregoing cardiac disease. *Objective:* To explore the public awareness concerning the reasons, risk factors, and management of sudden cardiac arrest (SC) in Arar city, Northern Saudi Arabia. *Methods*: A cross-sectional study design was assumed. The study was conducted on the general population of Arar city, Saudi Arabia in the period from 15 January to 30 June 2021. Data was collected by using an online pre-designed self-administered questionnaire distributed via social media network. *Results:* Most of the participants (90.8%) had heard of sudden cardiac arrest, 78.3% reported that any age group can suffer from sudden cardiac arrest, 41.9% think that life style and dietary habits may predispose to sudden cardiac arrest and the majority 84.8% agreed that there is a difference between sudden cardiac arrest and heart attack. Regarding the symptoms; 55.1% reported chest tightness followed by 51.2% reported chest pain, 47.8% palpitations and 38.5% decreased conscious. About the cause of SCD, 35% of them thought its cardiomyopathies and 11.8% thought its congenital heart diseases. Regarding the CPR; 63.3% had heard of PCR but only 27.4% had ability to perform it skillfully, 49.5% stated that they should carry out CPR before calling emergency and 42.8% reported that they would call emergency before performing CPR. About the barriers to performing CPR; 45.4% reported feeling unconfident of their CPR skills and 13.6% reported fear of legal responsibility. There was no familiarity with the term "AED" that only 15.7% of the participants had heard of automated external defibrillator (AED) and only 7.2% of them knew that AED packages is available in public places of the city. *Conclusion*: In our study, most of the Arar population have heard about SCA and knew that SCA and heart attacks are two different conditions but only about quarter of them can perform CPR skillfully.

Keywords: Awareness, Saudi general population, Sudden Cardiac Death, CPR.

1. INTRODUCTION

Sudden cardiac death (SCD) is death due to a cardiovascular cause in a patient with or without preexisting heart disease that occurs within one hour of the onset of generalized symptoms (Lopshire & Zipes, 2006). Further, sudden cardiac arrest (SCA) is the unexpected stoppage of cardiac activity in order that the sufferer will become unresponsive, without a regular respiration and no any signs of circulation. If curative measures are not taken rapidly, the blood flow to the brain slows to essentially zero and eventually leading to death (Kuller, 1980). Despite major advances in management and prevention in high-risk patients, SCD remains a major public health problem estimated to account for over 50% of coronary heart disease (CHD) deaths and 15–20% of all deaths (Gillum, 1990). The global annual incidence of out-of-hospital SCA is much lower in Asia (52.5 per 100,000 person/year) as compared to Europe (86.4 per 100,000 person/year), North America (98.1 per 100,000 person/year), and Australia (111.9 per 100,000 person/year) (Berdowski et al., 2010).

In Saudi Arabia, Nofal et al., (2011) retrospectively investigated 1,273 deaths among 1273 deaths, reporting 223 sudden deaths and 59.6% of them died of cardiovascular coditions. CHD is known as the most common pathology of SCD, which accounts for up to 80% of all cases, then cardiomyopathy, hereditary arrhythmia syndrome, and valvular heart disorders. Men are more likely to suffer from SCA (Hayashi et al., 2015). Warning symptoms like blackouts could go before a heart attack. Nonetheless, these symptoms are usually ignored by the individual. Approximately 50% of SCA patients show asystole, and 19% to 23% have pulseless electrical activity (PEA) as the first identifiable rhythm (Marijon et al., 2016). Treatment for SCA should be received immediately by lay people or emergency medical services, including using of cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) if available. CPR provides enough oxygen to the brain till a stable electrical rhythm can be established, and AED puts on electricity which stops the arrhythmia, permitting the heart to re-establish an effective rhythm. The overall survival for out-of-hospital SCA is around 7% (Patel & Hipskind, 2020).

Survival from SCA largely depends on bystander awareness and their intervention with CPR and automated external defibrillators (AEDs), so the public awareness of SCA is vital. While several public awareness studies have been conducted, up to our knowledge, there are no previous studies about awareness of the public about sudden cardiac death in Saudi Arabia.

Objective

To investigate the public awareness regarding the causes, risk factors, and management of sudden cardiac arrest (SC) in Arar, Saudi Arabia

2. METHODOLOGY

Study design

A cross-sectional study design was adopted.

Study area & period

The study was conducted in Arar city, Saudi Arabia in the period from 15 January to 30 June 2021.

Study population

The general population in Arar are eligible for inclusion in the study.

Inclusion criteria: The study included all Saudis aged 18 years or more.

Exclusion criteria: Saudis younger than 18 years and non-Saudi residents were excluded from the study.

Sample size

Sample size wascalculated by using sample size equation through the following formula ($N=(Z\alpha)2 \times ([p(1-p)]/d2$)

Where:

n = estimated sample size.

$Z\alpha$ at 5% level of significance = 1.96

d = level of precision and is estimated to be 0.05

p = High awareness levels in two previous studies (30%).

Actual sample size = (Primary sample size × design effect (estimated to be 1.5) considering target population more than 10 000, and study power 95%.

In our study the included sample was 420 individuals.

Data collection

Data was collected by using an online pre-designed self-administered questionnaire distributed via social media network. Sociodemographic and awareness data was obtained.

The questionnaire included questions about sociodemographic characters of participants such as (age, marital status, educational level, working status), questions about the awareness about sudden cardiac death such as (hearing about sudden cardiac death, knowing the difference between sudden cardiac arrest and heart attacks, symptoms of sudden cardiac arrest) and questions about the family history and management such as (family history of sudden and unexpected death, screening of cardiac disease among families with history of sudden death, and knowing how to perform CPR).

Pilot study

A pilot study was conducted on 20 respondents before the beginning of the study period to determine the applicability and adequacy of the questionnaire, further additional modifications was done after testing, and the questionnaire was re-administered.

Data management

Data was analyzed by using the SPSS, (version 23) and results will be presented by tabular and graphical presentation according to the study objectives.

Ethical Considerations

An ethical approval to conduct this study was obtained from the research ethics committee of the Northern Border University in Arar city, Saudi Arabia, with approval number (31/42/H). The questionnaire contains a brief introduction to explain the purpose of the research to the participants. An informed consent form wasuploaded with the questionnaire. No names were recorded on the questionnaires. All questionnaires were kept safe.

3. RESULTS

The current study included 12.1% males and 87.9% females and almost half of them (54.1%) were between 21 and 30 years old. Most of our participants (73.5%) were highly educated (Table 1). According to awareness of the participants towards sudden cardiac death, our study indicated that the majority of participants 90.8% had heard of sudden cardiac arrest, 78.3% said that any age group can suffer from sudden cardiac arrest, 70.2% of cases agreed that sudden cardiac arrest is more prevalent in older age than in young age. Almost half of our participants 55.9% think that SCA affects the brain, 41.9% think that life style and dietary habits may predispose to SCA and the majority 84.8% agreed that there is a difference between SCA and heart attack (Table 2).

Table 1 Socio-demographic characteristics of the participants, Arar, KSA, 2021 (N=762).

	Variables	Frequency (N=762)	Percent
Sex	Male	92	12.1
	Female	670	87.9
Age groups	20 years or less	95	12.5
	21 – 30 years	412	54.1
	31 – 40 years	160	21.0
	More than 40 years	95	12.5
Educational level	Primary	9	1.1
	Preparatory	15	2.0
	Secondary	178	23.4
	University degree	560	73.5
Marital status	Single	361	47.4
	Married	374	49.1
	Divorced/Widowed	27	3.5
Employment	Employed	204	26.8
	Unemployed	558	73.2

*Suffering from any chronic disease	Hypertension	32	4.2%
	Diabetes	28	3.7%
	Obesity	83	10.9%
	Coronary Heart Disease	5	0.7%
	Atherosclerosis	4	0.5%
	None	632	82.9%

*=There is overlapping.

Table 2 Awareness of the participants towards sudden cardiac death, KSA, 2020 (N=762).

Item	True	False	I do not know
Having heard of sudden cardiac arrest.	692	70	0.0
	90.8%	9.2%	0.0
Any age group can suffer from sudden cardiac arrest.	597	60	105
	78.3%	7.9%	13.8%
Sudden cardiac arrest is more prevalent in older age than in young age.	535	75	152
	70.2%	9.8%	19.9%
Sudden cardiac arrest affects the brain.	426	73	263
	55.9%	9.6%	34.5%
Life style and dietary habits may predispose to sudden cardiac arrest.	319	443	0.0
	41.9%	58.1%	
There is a difference between sudden cardiac arrest and heart attack.	3653	168	488
	84.8%	3.9%	11.3%
Heart dysrhythmias always lead to sudden cardiac arrest	143	271	348
	18.8%	35.6%	45.7%
Heart attack is more dangerous than sudden cardiac arrest.	110	652	0
	14.4	86.6	0.0
Sudden cardiac arrest always causes death.	298	464	0
	39.1	60.9	0.0
Sudden cardiac arrest causes loss of consciousness and pulse, while heart attack does not.	354	408	0
	46.5	53.5	0.0

Regarding the knowledge of the participants about warning symptoms of sudden cardiac arrest; the majority 55.1% reported chest tightness followed by 51.2% reported chest pain, 47.8% palpitations and 38.5% for decreased conscious level, Other symptoms were also reported; tiredness, fainting and vomiting. Moreover, there were immediate symptoms of SCA was mentioned by the participants such as cessation of pulse reported by nearly half (52.1%) of participants followed by loss of consciousness, sudden collapse and cessation of breathing. In the current study 36.6% of our participants didn't know the cause of SCD, 35% of them thought its cardiomyopathies and only 11.8% thought its congenital heart diseases. Regarding to knowledge of participants about CPR; 63.3% had heard of PCR but only, 27.4% had ability to perform CPR skillfully (figure 1). When we asked the participants

about the right action to do if they saw someone unconscious, 49.5% of our participants started that CPR should be carried out before calling emergency, 42.8% said that they would call emergency before performing CPR and only 7.7% said that they would wake him up. The reasons that motive to performing CPR on a SCA victim in this study was; humanity duty in most of participants, knowing that CPR can double a victim's survival chances was reported as the second motive when only 8.4% reported the victim is someone I love as a reason motivate them to performing CPR on a SCA victim.

However we also reported some barriers to performing CPR on a SCA victim as many participants (45.4%) reported feeling unconfident of their CPR skills to help; 40.9% were worry about hurting the victim and 13.6% reported fear of legal responsibility. Our study reported that, there was no familiarity with the term "AED" that only 15.7% of the participants had heard of automated external defibrillator (AED) and only 7.2% of them knew that AED packages is available in public places of the city (figure 2 & Table 3).

Table 3 Knowledge about causes, signs, symptoms, screening and management of sudden cardiac arrest in the participants, KSA, 2020 (N=4309).

Variables	Variables	Frequency (N=4309)	Percent (%)
*What are the warning symptoms of sudden cardiac arrest?	Tiredness	154	20.2%
	Fainting	225	29.5%
	Decreased conscious level	293	38.5%
	Chest pain	390	51.2%
	Chest tightness	420	55.1%
	Palpitations	364	47.8%
	Vomiting	53	7%
*What are the immediate symptoms of sudden cardiac arrest?	Sudden collapse	189	24.8%
	Cessation of pulse	397	52.1%
	Cessation of breathing	166	21.8%
	Loss of consciousness	348	45.7%
*What are the causes of sudden cardiac arrest?	Cardiomyopathies	267	35.0%
	Coronary heart disease	228	29.9%
	Congenital heart diseases	90	11.8%
	Arrhythmias	175	23.0%
	Do not know	280	36.7%
Family history of sudden death younger than 50 years old	Yes	106	13.9%
	No	656	86.1%
If the answer is yes, other family members screening for heart diseases (N=106)	Yes	34	32.1%
	No	72	67.9%
Having heard of CPR	Yes	482	63.3%
	No	280	36.7%
Ability to perform CPR skilfully	Yes	209	27.4%
	No	553	72.6%
Right action if you see someone unconscious and has no pulse	Performing CPR before calling emergency	377	49.5
	Calling emergency before performing CPR	326	42.8
	Waking him up	59	7.7
*Motive to performing CPR on a SCA victim	The victim is someone I love	64	8.4%
	Knowing that CPR can double a victim's survival chances	325	42.7%

	CPR training is free of charge in my community	71	9.3%
	Humanity duty	558	73.2%
Barriers to performing CPR on a SCA victim	Concerns about hurting the victim	312	40.9%
	Fear of legal responsibility	104	13.6%
	Feeling unconfident of my CPR skills to help	346	45.4%
Knowing about AED device	Yes	120	15.7%
	No	642	84.3%
AED packages availability in public places of the city	Yes	55	7.2%
	No	151	19.8%
	I do not know	556	73.0%

*=There is overlapping

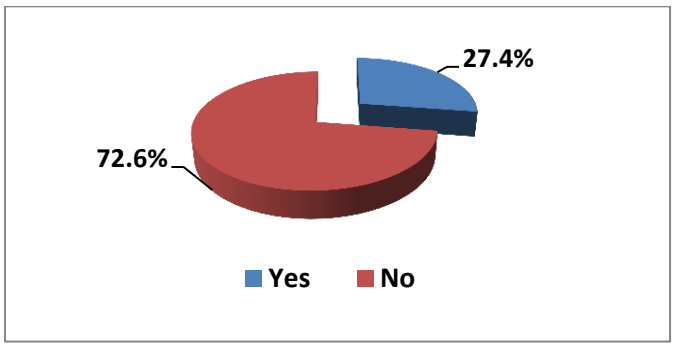

Figure 1 Ability of the participants to perform CPR skilfully

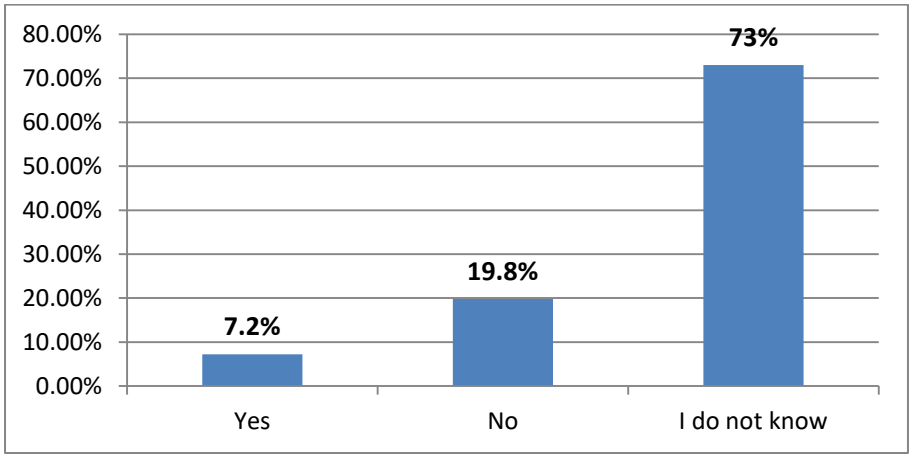

Figure 2 responses of the participants as regards the AED packages availability in public places of the city

4. DISCUSSION

SCD is considered as an important public-health problem, largely because it occurs in individuals without previously diagnosed heart disease who do not meet the high-risk criteria defined by clinical trials and cohort studies, and death usually occurs within one hour of the onset of symptoms when the heart stops beating or is not beating sufficiently to maintain perfusion and life (Myerburg et al., 2009; Yow et al., 2020). Survival rates of SCD vary across regions depending on several key predictors. Deaths from SCA are still very common globally (Özbilgin et al., 2015; Puttgen et al., 2009). Cardiac arrest leads to 350,000 mortalities every year in Europe (Berdowski et al., 2010). In the United States, the death rate due to cardiac arrest constitutes more than 90% (Benjamin et al., 2017).

Awareness of SCD among the population is critical to early intervention programs. Knowledge of key outcomes for SCA can likely improve overall survival rates; however, there is no enough published data about the prevalence of SCD and knowledge level

of the population about such important subject in Arar, KSA. This is across sectional study was conducted among 762 participants, Arar, KSA. The study aimed to determine awareness and knowledge about sudden cardiac death. The current study included 12.1% males and 87.9% females and almost half of them (54.1%) were between 21 and 30 years old. Most of our participants (73.5%) were highly educated.

According to awareness of the participants towards sudden cardiac death, our study indicated that the majority of participants 90.8% had heard of sudden cardiac arrest, 78.3% said that any age group can suffer from sudden cardiac arrest, 70.2% of cases agreed that sudden cardiac arrest is more prevalent in older age than in young age. Another previous study supported that cardiac arrest could happen to anyone regardless of age and sex (Shams et al., 2016). Almost half of our participants 55.9% think that sudden cardiac arrest affects the brain, 41.9% think that life style and dietary habits may predispose to sudden cardiac arrest and the majority 84.8% agreed that there is a difference between sudden cardiac arrest and heart attack. This is in contrast with another study reported that most participants also differentiated between the terms "Cardiac arrest" and "Heart attack" (Shams et al., 2016). This is almost similar to the results of the report published by Aldawood et al., (2020) on the awareness of the population of KSA about sudden cardiac death.

Muller et al., (2006) dispatched physicians with SCA emergency teams in Germany to interview survivors or bystanders for antecedent events or symptoms. Additional study settled that SCA is "not equally sudden as classically defined", as there are many warning symptoms and signs for SCD which, if promptly recognized, could greatly hasten first-response (Narayan et al., 2019). Regarding the knowledge of the participants about warning symptoms of SCA; the majority 55.1% reported chest tightness followed by 51.2% reported chest pain, 47.8% palpitations and 38.5% for decreased conscious level, while in Aldawood et al., (2020) it was reported that the majority 63.1% reported chest pain as the most common sign predisposing SCD followed by 57% for chest tightness, 46.2% palpitations and 36.9% for decreased conscious level. Another study reported that the highest rates for the signs of cardiac arrest were for chest pain (43%), respiratory stand still (39.7%), loss of consciousness (38%) and difficulty breathing (35.7%) (Jarrah et al., 2018). Also, Shams et al., (2016) in their study reported; about half of contributors were talented to recognize all the donating signs of cardiac arrest comprising fainting, atypical respiration, and lack of responses.

Other symptoms were also reported; tiredness, fainting and vomiting. Moreover, there were immediate symptoms of SCA was mentioned by the participants such as cessation of pulse reported by nearly half (52.1%) of participants followed by loss of consciousness, sudden collapse and cessation of breathing. These figures are almost similar to figures reported by Aldawood et al., (2020) from their participants. The causes for SCA are roughly defined, however, Coronary artery disease was previously reported to be the commonestreason of SCD, accounting for up to 80% of all cases and Cardiomyopathies and genetic channelopathies account for the remaining causes (Yow et al., 2020).

In the current study 36.6% of our participants didn't know the cause of SCD, 35% of them thought its cardiomyopathies and only 11.8% thought its congenital heart diseases. In accordance to this Aldawood et al., (2020) study reported that 35.6% think that cardiomyopathies as a cause of sudden cardiac death followed by coronary heart disease 34.4%, arrhythmias 23.8% and congenital heart diseases reported by 14% of participants. Despite SCD considered an emergency problem, CPR is considered as the most important first aid for such cases and CPR knowledge is very essential to be taught to the public. Regarding to knowledge of participants about CPR; 63.3% had heard of PCR but only, 27.4% had ability to perform CPR skillfully, which is less than the results found by Aldawood et al., (2020) who found that the majority 75.2% had heard of PCR but only, 34.1% had ability to perform CPR skillfully.

When we asked the participants about the right action to do if they saw someone unconscious, 49.5% of our participants said that they should carry out CPR before calling emergency, 42.8% said that they would Call emergency before performing CPR and only 7.7% said that they would wake him up, this results differs than Aldawood et al., (2020) who reported that more than half of subjects 54.4% reported that they will do the CPR before calling emergency as a right action if they see someone unconscious and has no pulse, 39.5% said that they will call emergency before performing CPR and only 6.1% will wake the patients up. Results from another study showed that only 37% of the respondents knew how to do chest pressure if they face a SCA and 74.3% reported that they should do chest compression and ventilation alternatively, among participants had faced a SCA case, 42.8% asked the ambulance, 10% did the CPR, 10% gave mouth-to-mouth breathing and 8.6% didn't do any thing (Jarrah et al., 2018).

The reasons that motive to performing CPR on a SCA victim in this study was; humanity duty in most of participants, knowing that CPR can double a victim's survival chances was reported as the second motive when only 8.4% reported the victim is someone I love as a reason motivate them to performing CPR on a SCA victim. However we also reported some barriers to performing CPR on a SCA victim as many participants (45.4%) reported feeling unconfident of their CPR skills to help, 40.9% was worry about hurting the victim and 13.6% reported fear of legal responsibility. Another study found that top motivators to learn CPR were that they knew that SCA can happen to anyone, anywhere, anytime including a loved one (55%), immediate CPR can double or triple

survival (52%), and availability of convenient and free CPR training options (49%) when the barriers to action which reported compriseworry about aching the patient (42%), deficiency of self-assurance/ capability (40%), responsibility worries (34%), and confidence other somebody would be more experienced (34%), (Newman et al., 2016).

Our study reported that, there was no awarenessof using the term "AED" that only 15.7% of the participants had heard of automated external defibrillator (AED) and only 7.2% of them knew that AED packages is available in public places of the city. Differs to our results another studies reported the use of AED with 33.9% identifying what AED really describe and 16.3% feel relaxed and proficient of using an AED to a heart arrest cases (Shams et al., 2016). Unlike the results of Aldawood et al., (2020) who reported that 21.6% had heard of AED and more than half of their participants reported that AED packages not available in public places of the city.

5. CONCLUSION AND RECOMMENDATIONS

In our study, most of the respondents have heard about SCA and knew that there is a difference between SCA and heart attacks, but only 27.4% can perform CPR skillfully. So, we recommend decision makers to hold more health education sessions to increase the public awareness about the success performance of the CBR. Also, more detailed large-scale research is needed to know more about the causes, risk factors and good management of the cases of this catastrophe.

Author's contribution

All the authors contributed in the selection of the idea, proposal writing, data collection, data entry and analysis, results and discussion writing and final revision of the article.

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Conflict of interest

The authors declare no conflict of interest.

Data and materials availability

All data associated with this study are present in the paper.

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