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OUTCOMES OF CARDIOPULMONARY RESUSCITATION (CPR) IN EMERGENCY DEPARTMENT OF AFIC & NIHD. OUT-OF-HOSPITAL VERSUS WITNESSED-CARDIAC ARREST: A COMPARATIVE STUDY

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ABSTRACT

Objective: To compare the clinical characteristics and outcome of cardiopulmonary resuscitation (CPR)in patients with out-of-hospital cardiac arrest and witnessed-cardiac arrest in Emergency Department of AFIC & NIHD.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Emergency Department of Armed Forces Institute of Cardiology & National Institute of Heart Diseases Rawalpindi, from 1st November 2016 till 31st January 2017.

Material and Methods: All the patients, presented with out-of-hospital cardiac arrest and witnessed-cardiac arrest, in emergency department during our study time period were included. Center of disease studies (CDC) registry for CPR was modified and modified / adapted as a data collection tool.

Results: A total number of 163 patients were recruited in our study, upon which CPR were performed in the emergency department. The mean age of the patients was 61.7±10.3 years. Mean duration of CPR was 32.1±2.3 minutes. Total number of CPR performed for witnessed cardiac arrest (in hospital) were 61(37.4%) while CPR performed upon the patients with out-of-hospital cardiac arrest were 102(62.5%).Reasons for CPR were found to be VT, VF, asystole, heart block, cardiac and respiratory arrest (p=0.03). The most common underlying disease was acute left ventricular failure (LVF), in 22(21.5%) patients, followed by dilated cardiomyopathy (DCM) 19(18.6%) and acute myocardial infarction in 17(16.6%) patients (p=0.01). About 59(96.7%) patients revived out of 63 patients, who were given CPR after witnessed-cardiac arrest while 71(69.6%) patients revived out of 102 patients, who were given CPR after out-of-hospital cardiac arrest and the result was statistically significant (p=0.01).

Conclusion: Our study results yielded that witnessed-cardiac arrest patients have more survival as compared to out-of-hospital cardiac arrest patients.

Keywords: Asystole, Cardiopulmonary resuscitation, Out-of-hospital cardiac arrest, Witnessed-cardiac arrest.

INTRODUCTION

Cardiac arrest is defined as a clinical condition characterized by the simultaneous absence of pulse, breath and consciousness. There are four initial ECG rhythms of cardiac arrest: the Ventricular Fibrillation (VF), pulse less Ventricular Tachycardia (VT), PEA (Pulse less Electrical Activities) and Asystole[1,2]. The out-of-hospital cardiac arrest is often associated with an initial rhythm of VF/VT. In the hospital settings (witnessed-cardiac arrest), patients who suffer a cardiac arrest often have significant co-morbidities and then present more often rhythms such as PEA and Asystole[3]. In these cases it is important to set strategies to prevent the arrest. The main cause for the arrest is represented by coronary heart disease which is often the result of some chronic diseases such as hypertension, diabetes and hyperlipidemia[4]. The age at which cardiac arrest occurs more frequently is between 45 and 75 years, this is in relation to the increased incidence of cardiovascular disease in this period of life[5,6]. The male gender is mostly affected[7]. In fact, the World Health Organization (WHO) has estimated an incidence of 1.9 cases per thousand in men and 0.6 cases per thousand in women[8].

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Ischemic heart disease is the leading cause of death worldwide and the only cardiac arrest is responsible for about 60% of deaths from ischemic heart disease[2,9]. Despite the achievements and advances in medicine that worldwide[10]. A very important factor to improve survival is the time. It must take action as early as possible to get an increase in long-term survival and, above all, a satisfactory recovery of neurological function in those afflicted[11]. In fact,

Table: Comparison between CPR for witnessed-cardiac arrest patients and out-of-hospital cardiac arrest patients using Chi-square test.

Variables	CPR for Witnessed-Cardiac Arrest (n=61)	CPR for Out-of-Hospital Cardiac Arrest (n=102)	*p*-value
Demographics			
Gender			
Male	36 (59.0%)	70 (68.6%)	0.02
Female	25 (40.9%)	32 (31.3%)	
Reason for CPR			
VT	3(4.9%)	26(25.4%)	
VF	2(3.2%)	15(14.7%)	0.03
Asystole	3(4.9%)	32(31.3%)	
Other Reasons			
Cardiac Arrest	-	6(5.8%)	
Respiratory Arrest	1(1.6%)	2(1.9%)	
Heart Block	-	4(3.9%)	
Underlying Diseases			
Acute LVF	-	22(21.5%)	0.06
Acute MI	2(3.2%)	17(16.6%)	0.02
Dilated Cardiomyopathy	3(4.9%)	19(18.6%)	<0.01
TVCAD	-	11(10.7%)	0.15
Septicemia	1(1.6%)	3(2.9%)	1.00
Breast Carcinoma	-	2(1.9%)	0.85
Pulmonary Embolism	-	3(2.9%)	0.09
Valvular Heart Disease	5(8.1%)	-	1.34
COPD	-	7(6.8%)	0.45
Infective Endocarditis	2(3.2%)	1(0.9%)	0.80
Clinical Investigations			
Blood Sugar Level			0.03
<67mg/dl (Hypoglycemia)	8(13.1%)	16(15.6%)	
>67mg/dl Hyperglycemia)	23(37.7%)	86(84.3%)	
Hypoxia			
O2 Sat <85%	19 (31.1%)	44 (43.1%)	0.45
O2 Sat >85%	30 (49.1%)	58 (34.3%)	
ECG Changes			
ST Segment Elevation	1 (1.6%)	8 (7.8%)	0.02
ST Segment Depression	-	6 (5.8%)	
Old Ischemic Changes	8 (13.1%)	32 (31.3%)	
Outcome			
Revived after CPR	59 (96.7%)	71 (69.6%)	<0.01

have led to a reduction in mortality from cardiovascular diseases, cardiac arrest is still one of the most important health problems for every minute that passes since the onset of the arrhythmia to the provision of electric shock, the

chances of successful resuscitation decreases by 7-10%[12-14].

The incidence of out-of-hospital cardiac arrest and witnessed-cardiacarrests (in-hospital) assessed by emergency medical services (EMS) in the United States in 2013 was estimated to be 424,000 and 209,000, respectively[10]. Following a cardiac arrest, each minute without treatment decreases the likelihood of surviving without disability and survival rates depend greatly on where the cardiac arrest has occurred[11].Decreasing the time between cardiac arrest onset and the first chest compression is critical. The likelihood of surviving decreases by 10% with every passing minute between collapse and return of spontaneous circulation[12]. Without defibrillation, mortality from VT, VF, or both increases by approximately 10% per minute[9,12]. The American Heart Association and European Society of Cardiology have published revised resuscitation guidelines in 2010, highlighting the importance of professional healthcare rescue teams performing multiple tasks during CPR such as establishing an airway or delivering advanced cardiac life support drugs[5,13].

MATERIAL AND METHODS

A comparative cross sectional study was carried out in the Emergency Department of Armed Forces Institute of Cardiology and National Institute of Heart Diseases, Rawalpindi.Study population was the patients who presented in Emergency Department of AFIC & NIHD, with cardiopulmonary arrest. Study was completed over a period of three months, from 1st November, 2016 till 30th January, 2017.Purposive convenient sampling was used for the collection of data. Center of Disease Studies (CDC) registry for CPR was modified as data collection tool. SPSS version 21 was used for data entry and data analysis.

RESULTS

A total number of 163 patients were recruited in our study, upon which CPR were performed in the emergency department. The mean age of the patients was 61.7±10.3 years with minimum age of 5 years and maximum age of 94 years. Mean duration of CPR was 32.1±2.3 minutes. Total number of CPR performed for witnessed cardiac arrest (in hospital) were 61(37.4%) while CPR performed upon the patients with out-of-hospital cardiac arrest were 102(62.5%). In out-of-hospital cardiac arrest group, male patients were more in number 70(68.6%) as compared to female patients 32(31.3%) with statistically significant *p*-value(*p*=0.02). Reasons for CPR were found to be VT (ventricular tachycardia), VF (ventricular fibrillation), asystole, heart block, cardiac and respiratory arrest (*p*=0.03). The most common underlying disease was acute left ventricular failure (LVF), in 22(21.5%) patients, followed by dilated cardiomyopathy (DCM) 19(18.6%) and acute myocardial infarction in 17(16.6%) patients (*p*<0.01). Co-morbid of the patients were found to be diabetes, hypertension, ischemic heart disease, asthma and COPD (fig). Fifty nine (96.7%) patients revived out of 63 patients, whowere given CPR after witnessed-cardiac arrest while 71(69.6%) patients revived out of 102 patients, who were given CPR after out-of-hospital cardiac

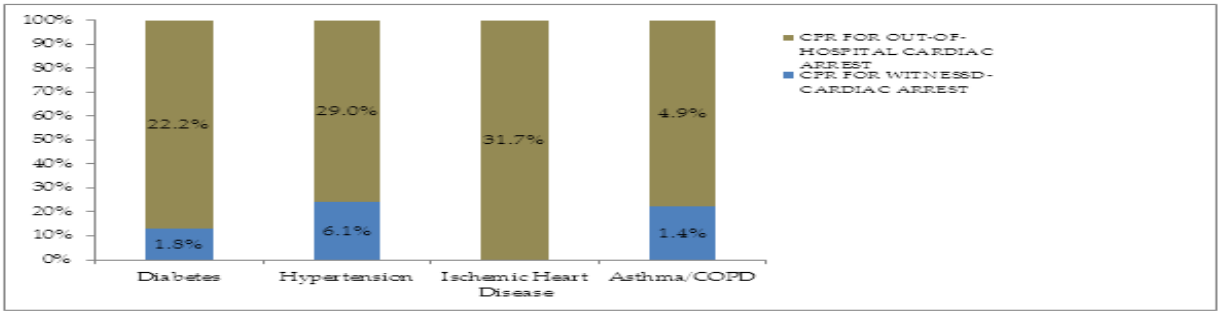

Figure: Co-morbids of patients with out-of-hospital cardiac arrest and witnessed-cardiac arrest.

arrest and the result was statistically significant (p<0.01) as shown in the table.

DISCUSSION

Dealing patients with cardiopulmonary arrest in emergency department is a persistent challenge. The American Heart Association (AHA) and the European Resuscitation Council (ERC) state that cardiac arrest affects average one person in a thousand every year[4]. The European Resuscitation Council in 2010 estimated that in Europe the cardiac arrest affects 500,000 people each year. According to the same estimates in Italy there are 60,000 new cases each year. The U.S. data is provided by the American Heart Association, in 2010, estimated that each year 785,000 Americans are victims of cardiac arrest[2,5]. In our study out-of-hospital cardiac arrests were more in number as compared to witnessed-cardiac arrest and this was in consistent with the findings of previous litrature[5,7,11]. A systematic review including 67 peer-reviewed studies published from 1990 to 2008 concludes that the incidence of emergency medical service (EMS) attended out-of-hospital cardiac arrests in Europe is 86.4 per 100,000 inhabitants per year[14]. Mean age of the patients in our study was 61.7±10.3 years with very wide range from 5 years to 94 years. Male gender was statistically significant (p=0.02). Ventricular tachycardia and asystole were the most common reasons for CPR (p=0.03). Factors positively associated with out-of-hospital cardiac arrests described in two systematic reviews were: olderage, male gender, witnessed cardiac arrest and early start of cardiopulmonary resuscitation (CPR)[13,15]. Underlying causes, with which patients presented with cardiac arrest in our study were noted to be acute LVF, acute MI, Dilated cardiomyopathy, Triple vessel coronary artery disease (TVCAD), septicemia, breast carcinoma, pulmonary embolism, valvular heart diseases, COPD and infective endocarditis. In our study co-morbid diseases of the patients of out-of-hospital cardiac arrest were found to be diabetes (22.8%), hypertension (29.0%), ischemic heart disease (31.7%), and asthma/COPD (4.9%). These findings were closely related with previous international studies[9,15]. The most interesting finding of our study was the outcome of the patients. The revival after CPR in patients with witnessed-cardiac arrest was 96.7% while the revival of out-of-hospital cardiac arrest patients was 69.6%. This showed that time factor is very important for the survival of the patient. Out-of-hospital cardiac arrest is found to be one of the main causes of death in Europe 10 and the value of early cardiopulmonary resuscitation (CPR) has been proven in many community-based studies[11,14].

CONCLUSION

Our study results yielded that witnessed-cardiac arrest patients have more survival as compared to out-of-hospital cardiac arrest patients.

Although breakthroughs in understanding and treating cardiac arrest are promising and the ability to deliver timely interventions and high-quality care is inconsistent; but cardiac arrest treatment is a community issue, requiring a wide range of people to be prepared to act, including bystanders, family members, first responders, emergency medical personnel, and health care providers.

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CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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