Original Research Article

Nigerian Athletes' Previous Training, Practice and Current Knowledge of Bystander Cardiopulmonary Resuscitation

Abstract

Background /Aim: The public health burden of out-of-hospital cardiac arrest (OHCA) and the need to increase the rates of bystander cardiopulmonary resuscitation (CPR) in communities including the world of sports cannot be overemphasized. The study aimed at assessing the level of previous training, practice and present knowledge of bystander CPR among Nigerian athletes. **Methods**: A national cross-sectional questionnaire-based survey of Nigerian athletes was carried out involving 25 different sporting events. The participants at the 21st National Sports Festival that held at Delta State, Nigeria filled the questionnaire, which was continued after the festival at some of their various states. The final data was analysed with the SPSS Version 25, using both descriptive and chi-square statistics, as well as one-sample t-test. The significance level was set at $P < .05$. **Results**: In all, 419 athletes participated in the study - 278 (66.3%) males and 141(33.7%) females with age range of 11-49 years and mean age of 23.43 $\pm$ 5.66 (SD). On average, 67.86% of the athletes had never had any previous bystander CPR training while 55.73% never practiced the procedure. Significantly more of the athletes never had CPR bystander training before this study ($P = .000$), as well as no previous practice ($P = .0000$), which did not significantly differ between contact and non-contact sports athletes. Significantly more of them had poor bystander CPR theoretical knowledge ($P = .000$) that did not vary significantly between contact and non-contact sports athletes, with average of only 27.23% of the athletes giving correct answers. **Conclusion/Recommendation**: The study has revealed significantly low previous training, practice and poor knowledge of bystander CPR among Nigerian athletes. There is urgent need for organised, sustainable bystander CPR training facilities for Nigerian athletes.

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Keywords: Bystander Cardiopulmonary Resuscitation, Training, Practice, Knowledge, Nigerian Athletes

1. Introduction

There has been growing global attention on Bystander Cardiopulmonary Resuscitation (CPR) due to the increasing public health burden of sudden cardiac arrest [1-16]. Considering the importance of sports in global development and friendship and the pain often associated with the sudden death of an athlete, the importance of bystander CPR in sports generally has received global concern [17-29].

According to Creswell [30], successful treatment of athletes who suffer sudden cardiac arrest (SCA) depends on prompt recognition that cardiac arrest has occurred, early bystander CPR, early defibrillation, and early advanced life support provided by the emergency medical

services. All of these components are necessary in order to save the life of an athlete who suffers cardiac arrest [30].

There is limited literature available on bystander CPR among Nigerian athletes [31, 32]. Meanwhile, it has been documented that developing economies could be burdened by sudden cardiac death (SCD) as much as in the developed parts of the globe[33-37]. In fact, the study by Chen et al [33], which is the largest study showing an association between socioeconomic status and survival, and the first study showing an association with bystander CPR,suggested targeting CPR training among the lower socioeconomic groups.

To further affirm the importance of bystander CPR in sports, the world football came to a halt on Saturday when Danish playmaker Christian Eriksen collapsed while in action for Denmark against Finland in the ongoing Euro 2020 tournament.While many of the world football lovers feared for the worst at Eriksen's sudden collapse, his team captain Simon Kjaer was able to clear his team-mate's airways and start the life-saving CPR technique, which was continued with the aid of a defibrillator and professional medical staff. Thankfully, Kjaer's first aid skills proved vital and Eriksen is now recovering in hospital and considered to be out of danger.Though CPR is quite easy to learn and it can be the difference between life and death before emergency medical services can arrive to help out, but many players have been left unfortunate and were unable to survive similar cardiac arrest related issue.Notable amongst them were these Nigerian players:August 12, 1989 brought a dark day in Nigerian football when Samuel Okwaraji collapsed and died in the 77th minute while playing for Nigeria in a World Cup Qualifier against Angola in Lagos.A further autopsy showed that the 24-year-old had an enlarged heart and high blood pressure.Okwaraji's death was so painful in the hearts of many because he was great personality with an accomplished carrier outside football. He was also a qualified lawyer who had masters in international law from the Pontifical Lateran University of Rome [38].

The Nigerian National Sports Festival is a biennial multi-sport event organized by the Federal Government of Nigeria through the National Sports Commission for athletes from the 36 States of Nigeria including the Federal Capital Territory, Abuja. It was started in 1973 at the National Stadium, Surulere in Lagos, the game was originally conceived as a 'unifying tool' with the main purpose of promoting peace and cross-cultural affiliation in Nigeria after the Nigerian Civil War in 1970. The game also serves as a development and training event to aid athletes prepare for continental and international meets. The objectives of the National Sports Festival are to build a robust talent pool of athletes, enhance and elevate sports at grassroots level, establish a standard programme for athletes' succession, enhance and elevate sports at grassroots level, curb age cheating in sports, encourage early participation in sports, engage young athletes in the Olympic Movement, skill development and social responsibility, enhance cultural and educational development, and to promote National unity [39].

In our effort to step up our advocacy for every Nigerian athlete to be trained in bystander cardiopulmonary resuscitation, the present Nigerian study aimed at assessing the level of Nigerian athletes' previous training and practice of bystander cardiopulmonary resuscitation (CPR, as well as their present theoretical knowledge. It was hypothesized that the athletes would not have significantly had previous training and practice of bystander CPR, as well as good theoretical knowledge.

2. Materials and Methods

2.1. Study Design

Targeting the 21st National Sports Festival (NSF) in Nigeria that took place in Delta State between November 28 and December 10, 2022, a national self-administered questionnaire-based cross-sectional survey of Nigerian athletes was carried out. The 14-day sporting event had not less than 14, 000 athletes from the 36 States of the country including the Federal Capital Territory (FCT), Abuja, who participated in the festival [38].The National Sports Festival (NSF), otherwise known as 'Nigerian Olympics, 'started in 1973 as a way of uniting the country after the Nigerian civil war that ended in 1970 [38].

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2.2. Sampling / Data Collection

The busy schedule of the athletes during the Sports Festival did not allow many of them to fill the questionnaire while at the venue of the event, but some of them were followed up in their States where they filled and returned the questionnaire. Twenty-five(25) sporting activities were covered in the final sample collected. In all, four hundred and nineteen (419) athletes participated in the survey out of about fourteen thousand (14, 000) athletes who took part in the Sports Festival. The questionnaire is provided as an Appendix.

2.3. Weighting of the Responses in the Questionnaire

For knowledge, the responses were weighted as follows: Correct Answer - 5, Not Sure 3, Incorrect Answer 2.The responses for previous training and practice of bystander resuscitation (CPR) by the athletes were 5 for 'Yes', 2 for 'No' while 'No response' was given 3.

2.4. Null Hypotheses

The following null hypotheses were generated and tested:

Ho1 - that the athletes would not have significantly had previous training in bystander cardiopulmonary resuscitation (CPR)

Ho2- that there would not be any significant difference in the previous training of contact and non-contact sports athletes in bystander cardiopulmonary resuscitation (CPR)

Ho3–that the athletes would not have significantly practiced bystander cardiopulmonary resuscitation (CPR) before this study

Ho4 – that there would not be any significant difference in the previous practice of bystander cardiopulmonary resuscitation (CPR) between the contact and non-contact sports athletes

Ho5 - that the present knowledge of bystander cardiopulmonary resuscitation (CPR)by the athletes would not be significantly good

Ho6 –that there would not be any significant difference in the present knowledge of bystander cardiopulmonary resuscitation between the contact and non-contact sports athletes

Data Analysis

The data was analyzed with the SPSS version 25. In addition to the descriptive statistics, chi-square statistics and one-sample t-test were employed to test the hypotheses. The significance level was set at $P < .05$.

3. Results

Table 1 shows the descriptive and chi-square statistics of the previous bystander cardiopulmonary resuscitation training of all the athletes with average of 67.86% of them not having any previous bystander CPR training and significantly more of them had no previous training , which is an acceptance of the first null hypothesis of this study.

Table 1:Descriptive and Chi-square Statistics of Previous Training of the Athletes

	Questions	YES	NO	No response	Mean	SD	Chi-Square	df	Asymp.Sig
	Q1	173 (41.3%)	230(54.9%)	16(3.8%)	3.27	1.46	175.881[a]	2	.000
	Q2	56(13.4%)	332(79.2%)	31(7.4%)	2.47	1.03	399.527[a]	2	.000
	Q3	71(16.9%)	313(74.7%)	35(16.9%)	2.59	1.12	327.313[a]	2	.000
	Q4	109(26.0%)	278(66.3%)	32(7.6%)	2.85	1.29	226.745[a]	2	.000
	Q5	114(27.2%)	269(64.2%)	36(8.6%)	2.90	1.31	201.427[a]	2	.000

Note: Q1 - I have had CPR training before; Q2- Learnt CPR training through film; Q3 – Through television; Q4 – Through Online; Q5 – Through Instructor organized setting

One - sample T test of the contact and non-contact sports athletes' previous CPR training is presented in Table 2 with statistically significant differences found only in questions 1 ($P = .014$) and 3 ($P = .001$).

Table 2: One - Sample T test of the Contact and Non-Contact Sports Athletes' Previous CPR training

	Test variable and Test Value	**95% Confidence Interval of the Difference**		**Mean Diff**	**df**	**Sig.(2-tailed)**	**T**
		Lower	Upper				
	CT1-NCT1	.0463	.4118	.22905	251	.014	2.468
	CT2- NCT2	-.0097	.2574	.12381	251	.069	1.826
	CT3- NCT3	.0991	.3939	.24651	251	.001	3.294

	CT4-NCT4	-.1988	.1213	-.03873	251	.634	-.477
	CT5- NCT5	-.1628	.1745	.00587	251	.945	.069

Note: CT = Previous training in CPR by athletes involved in contact sports; NCT = Previous training in CPR by athletes involved in non-contact sports

Table 3 below provides the descriptive and chi-square statistics of previous bystander CPR practice of the all the athletes, and average of 55.73% of them had not practiced bystander CPR before. This table shows that they significantly did not have previous practice of bystander CPR before the present survey (P = .000).

Table 3: Descriptive and Chi-square Statistics of Previous CPR Practice of the Athletes

Descriptive and Chi-Square Statistics of Previous CPR Practice of all Athletes

	No	YES	NO	NS	Mean	SD	Chi-Square	df	Asymp. Sig
P1	419	259(61.8%)	146(34.8%)	14(3.3%)	3.88	1.43	215.317[a]	2	.000
P2	419	122 (29.1%)	252(60.1%)	45(10.7%)	2.98	1.33	156.749[a]	2	.000
P3	419	71(16.9%)	303(72.3%)	45(10.7%)	2.61	1.12	288.936[a]	2	.000

Note: P1 = Have you ever witnessed victim of sudden cardiac arrest that needed CPR? ; P2 = I had performed CPR chest compression only on victims in the past; P3 = I had performed mouth to mouth and chest compression on victims in the past

One-sample T test of the contact and non-contact sports athletes' previous practice of bystander cardiopulmonary resuscitation (CPR) is shown in Table 4, which confirms that there is no significant difference in the previous practice of bystander CPR between contact and non-contact sports athletes (P > .05).

Table 4: One -Sample T test of the Contact and Non-Contact Sports Athletes' Previous Bystander CPR Practice

Test variable and Test Value	**T**	**df**	**Sig.(2-tailed)**	**Mean Diff**	**95% Confidence Interval of the Difference**	
					Lower	Upper
CP1 vs NCP1	.345	251	.731	.03079	-.1451	.2067
CP2 vs NCP2	.424	251	.672	.03587	-.1306	.2023
CP3 vs NCP3	2.40	251	.017	.17651	.0316	.3214

Note: CP = Previous practice of CPR by athletes involved in contact sports; NCT = Previous practice of CPR by athletes involved in non-contact sports

Descriptive and chi-square statistics on the current bystander CPR knowledge of all the athletes are provided in Table 5 showing that average of only 27.23% of them were able to

provide correct answers to the questions on theoretical knowledge of bystander CPR.The table confirmstheir significantly poor knowledge of bystander CPR (P = .000).

Table 5: Descriptive and Chi-square Statistics on Current CPR Knowledge of all the Athletes

	Correct Answer	Incorrect Answer	Not Sure	Mean	SD	Chi-Square	df	Asymp.Sig
KQ6	120(28.6%)	221 (52.7%)	78(18.6%)	3.0453	1.29421	77.360[a]	2	.000
KQ7	152(36.3%)	78(18.6%)	189(45.1%)	3.5394	1.16169	45.742[a]	2	.000
KQ8	54(12.9%)	223(53.2%)	142 (33.9%)	2.7255	.98728	102.305[a]	2	.000
KQ9	99(23.6%)	57(13.6%)	263(62.8%)	3.3365	.98500	169.680[a]	2	.000
KQ10	203(48.4%)	42(10.0%)	174(41.5%)	3.8687	1.13426	105.456[a]	2	.000
KQ11	280(66.8%)	36(8.6%)	103(24.6%)	4.2506	1.09445	227.575[a]	2	.000
Q12	49(11.7%)	166(39.6%)	204(48.7%)	2.8377	.91631	93.456[a]	2	.000
KQ13	47(11.2%)	167(39.9%)	205(48.9%)	2.8282	.90668	265.630[b]	2	.000
KQ14	59(14.1%)	186(44.4%)	174(41.5%)	2.8377	.99155	70.401[a]	2	.000
KQ15	95(22.7%)	66(15.8%)	258(61.6%)	3.2959	.98954	153.399[a]	2	.000
KQ16	97(23.2%)	51(12.2%)	271(64.7%)	3.3413	.96617	192.821[a]	2	.000

Note: KQ6: The first thing to do for a collapsed individual is to call for an ambulance; KQ7: The first thing to do for a collapsed individual is to get the person's response; KQ8: I will press the collapsed person's mouth to open the airway; KQ9: Chest compression ranges from 80-120; KQ10: I will tilt the head back and lift the chin to open the airway; KQ11: Chest compression is performed with the heel of the palm of the hands; KQ12: Each rescue breathe should last over 5seconds; QK13: Each rescue breathe should last only for 1 second; KQ14: I'll remove victim's denture from the mouth before performing CPR. KQ15:A cycle of CPR is 30 chest compressions and 2 rescue breaths; KQ16: A cycle of CPR is 20 chest compressions and 4 rescue breaths

Table 6 is the one -sampleT Test of the contact and non-contact sports athletes' current bystanderCPR knowledge that has shown that shown significant differences between the two groups only with respect to questions 8, 9 and 14.

Table 6: One-Sample T Test of the Contact and Non-C0ntact Sports Athletes' Current CPR Knowledge

Test variable and Test Value	T	df	Sig.(2-tailed)	Mean Diff	95% Confidence Interval of the Difference	
					Lower	Upper
CKQ6- NCKQ6	-671	251	.503	.05546	-.1073	.2182
CKQ7-NCKQ7	1.199	251	.232	.09040	-.0581	.2389
CKQ8-NCKQ8	2.412	251	.017	.16098	.0295	.2925
CKQ9- NCKQ9	2.457	251	.015	.16129	.0320	.2906
CKQ10- NCKQ10	1.255	251	.211	.09036	-.0514	.2321

CKQ11-NCKQ11	.851	251	.396	.05821	-.0765	.1930
CKQ12-NCKQ12	.644	251	.520	.03877	-.0799	.1574
CKQ13- NCKQ13	1.812	251	.071	.11252	-0098	.2348
CKQ14-NCKQ14	3.113	251	.002	.20803	.0764	.3396
CKQ15- NCKQ15	.841	251	.401	.05396	-.0725	.1804
CKQ16- NCKQ16	.157	251	.876	.00994	-.1151	.1350

Note: CK stands for CPR knowledge by contact sports athletes; NCK stands for CPR knowledge by non-contact sports athletes

5. Discussion

The present Nigerian study on the previous training, practice and current knowledge of bystander cardiopulmonary resuscitation (CPR) among athletes has revealed significantly low previous bystander CPR training with largely no significant difference between athletes involved in contact and non-contact sports. It has also shown that the athletes had significantly low previous practice of this life-saving technique, which largely was soirrespective of whether involved in contact or non-contact sports.In addition, this study has revealed significantly general poor knowledge of bystander cardiopulmonary resuscitation (CPR) among the athletes. Again, the bystander CPR knowledge largely did not differ whether they are contact or non-contact sports athletes.

A database search for randomised controlled trials that compared classroom-based to non-classroom-based training in bystanders (non-medical professionals) was performed in Medline and Embase [40]. From the available evidence, non-classroom-based training appears at least as effective as classroom-based training for CPR. This could have significant implications for delivery of CPR training nationally, especially in remote and rural areas [40]. This suggests that training athletes in non-classroom-basedsttings should be encouraged, especially by non-medical professionals to increase rates of bystander in African environment so as to protect our athletes and other members of the African communities. This has the potential of changing the current poor trend in the number of Nigerian bystander CPR-untrained athletes, as well as in other African countries. In a recent related study [41], 21.9% of the participants (teachers and parents) claimed to have had previous bystander CPR

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trainings but most of them were supposed to have gone for re-training after two years of initial trainings.They concluded that a sizable portion of the contributors expressed a lack of proficiency in the fundamental CPR training knowledge and skills, pointing to an alarming public concern in Saudi Arabia.

Out-of-hospital cardiac arrest (OHCA) is a major public health concern accounting for a substantial number of deaths worldwide. Each year, over 700,000 people in Europe and the USA suffer from OHCA. The survival to hospital discharge rate following OHCA remains low, ranging from 5 to 10% [42]. Significant progress in cardiopulmonary resuscitation knowledge and skills has always been noted after training implementation [42-45]. Analysis of the focus groups [42] yielded two themes: (a) the effects of cardiopulmonary resuscitation training on schoolchildren, and (b) the systemic responsibility of the school system and professional bodies. It must be emphasized here that in addition to bystander CPR training in primary, secondary and tertiary institutions, professional bodies like the athletic bodies should increase the awareness and knowledge on bystander CPR, which will definitely make the needed impact on increasing the number of potential bystander CPR providers in any community. For eample, the National Sports Commission (NSC) could be significant impact in this direction. The present Nigerian study has affirmed the urgent need for an intentional approach in this direction.Even the coaches must be involved in this crusade and should be equally trained to be able to help their athletes in times of OHCA during sports events.

According to Dibia [38], on October 29, 1995 Nigerian football witnessed yet another sad moment when Amir Angwe who played for Julius Berger and had previously represented the national team died following a heart attack in an African Cup Winners' Cup match against Mozambique side Maxaquene.Sadly again, on May 26, 2009 OrobosanAdun of Warri Wolves FC who was earlier assaulted before an away match by thugs suspected to be fans of the opposition Enugu Rangers team died during a training session three days later as a result of internal haemorrhage.The pain of Nigerian players heart related deaths continued when Emmanuel Ogoli on December 12, 2010 collapsed on the pitch while playing for Ocean Boys, and died later in hospital.Ogoli had earlier received a "horror injury" in a match on November 14, 2010. Strangely, both the Nigeria Premier League and the Nigeria Football Federation announced separate investigations into his death [38]. The list of such victims of sudden cardiac arrest while in active sport activities continues. There is no doubt that sports directors especially in Nigeria have seen from Eriksen's recent situation what it means to have swift, efficient and competent medical equipment and personnel around us at such delicate moments with efforts to comply [38]. Of much more effective in any of these mentioned situations could have been to have a good number of the other athletes or some members of the coaching crew as trained and effective bystander cardiopulmonary resuscitation (CPR) providers. The need and urgency of training athletes in bystander cardiopulmonary resuscitation (CPR) cannot be overemphasized.

The Strength and Weakness of this study

The national outlook of the study sample makes it more representative and gives a better reflection of the previous bystander CPR training, practice and present knowledge of Nigerian athletes, and could form a fair baseline study for future related studies in nigerian, as well as a good guide for formulation of policies in this direction for Nigerian athletes.

However, it suffers a little setback because the whole sample could not be collected completely at the venue of the last National Sports Festival (NSF).

Conclusion

- The participants (athletes) in this Nigerian study have shown significant poor previous bystander CPR training that did not vary based on contact and non-contact sports
- The athletes' previous practice of bystander cardiopulmonary resuscitation (CPR) has been found to be significantly poor, which did not depend on whether the athletes are involved in contact and non-contact sporting events
- The bystander cardiopulmonary resuscitation (CPR) knowledge of the athletes has been found to be significantly poor, which did not vary irrespective of whether the athletes are involved in contact or non-contact sports.

Recommendation

There is urgent need for organized intentional training programmes for Nigerian athletes on bystander cardiopulmonary resuscitation (CPR), as a demonstration of the importance the Federal and sub-national governments in Nigeria attach to the lives of these young men and women, as well as the national value of sports in the unity of the country.

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APPENDIX

QUESTIONNAIRE ON BYSTANDER CADIOPULMONARY RESUSCITATION (CPR)

Dear Respondent,

This questionnaire is basically to assess the awareness, knowledge, attitude and practise of Cardiopulmonary Resuscitation (CPR) among athletes. It is expected that the findings of this survey will help to plan better for the safety of athletes. Please answer the following questions as sincere as possible.

Thank you and God bless.

Section A: Personal Data. Please tick as it applies to you

1. Gender: Male: Female:

2. Age in Years: ----------
3. Type of Sport: ----------
4. Number of years as an Athlete: ----------

Section B: Please indicate either 'Yes' or 'No' for each of these statements as it applies to you or 'Not sure' if you are not certain

		Yes	No	Not Sure
5	I have had CPR training before now			
5a	If yes, the mode of my CPR training was through film			
5b	If yes, the mode of my CPR training was through television			
5c	If yes, the mode of my CPR training was through on-line			
5d	If yes, I was trained by a CPR instructor in an organized setting			
6	The first thing to do for a collapsed individual is to call for an			

	ambulance			
7	The first thing to do for a collapsed individual is to get the person's response			
8	I will press the collapsed person's mouth to open the airway			
9	Chest compression ranges from 80-120			
10	I will tilt the head back and lift the chin to open the airway			
11	Chest compression is performed with the heel of the palm of the hands			
12	Each rescue breathe should last over 5seconds			
13	Each rescue breathe should last only for 1 second			
14	I'll remove victim's denture from the mouth before performing CPR			
15	A cycle of CPR is 30 chest compressions and 2 rescue breaths			
16	A cycle of CPR is 20 chest compressions and 4 rescue breaths			
17	Have you ever witnessed a victim of sudden cardiac arrest that needed CPR?			
18	I had performed CPR chest compression only on victims in the past			
19	I had performed mouth to mouth and chest compression on victims in the past			