

Participants' Gender and Theoretical Knowledge of Bystander Cardiopulmonary Resuscitation after Two Methods of CPR Training

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Abstract Introduction: Adequate information on influence of gender on CPR could help to adjust or improve future education in cardiopulmonary resuscitation. This study aimed at assessing the possible impact of gender on the post-training theoretical knowledge of bystander CPR involving both the conventional CPR group and the hands-only CPR group. **Materials and Method:** Using a quasi-experimental cohorts design, two cohorts of some University students were exposed to the conventional CPR and hands-only CPR techniques. Before CPR trainings, 140 copies of a self-administered questionnaire on the knowledge of cardiopulmonary resuscitation (CPR) were distributed to assess the pre-training CPR theoretical knowledge of the participants - 70 of them in each of the two cohorts. The participants were again served the same questionnaire in the post-training stage to respond to the same questions on CPR theoretical knowledge. The data was analysed with descriptive statistics and the ANOVA with the level of significance set at $P < 0.05$. **Results:** The male gender was found to have statistically significant association with post-training CPR knowledge in one of the questions in the hands-only CPR group and another one in the conventional CPR group ($P < 0.05$), while the female gender had statistically significant association with post-training CPR knowledge in one question in the conventional group ($P < 0.05$). **Conclusion:** Although statistically significant gender associations were found in three of the CPR knowledge questions, this study has revealed no consistent gender association with either of the genders with neither of the CPR training techniques.

Keywords Gender, CPR Knowledge, Hands-only and Conventional Techniques, Nigerian students

1. Introduction

Evaluation of factors that could influence the effective provision of bystander cardiopulmonary resuscitation (CPR) is crucial in realising the best possible outcomes in out-of-hospital cardiac arrest (OHCA) victims. The global public health challenge of OHCA has been on the increase [1-5].

Previous studies have provided conflicting reports on gender associations with cardiopulmonary resuscitation knowledge [6-9]. Cardiopulmonary resuscitation (CPR) is an emergency procedure performed as an attempt to restore spontaneous circulation by performing chest compressions with or without ventilations [10]. Studies have also shown that poor CPR knowledge has contributed to the fear and

reluctance to attempt bystander CPR for victims of OHCA [11-14]. Adequate information on influence of gender on CPR could help to adjust or improve future education in cardiopulmonary resuscitation. Amacher et al [15] reported that female gender was associated with a lower number of secure leadership statements. They concluded that future education of rescuers should take gender differences into account [15]. Wigginton et al [16] stated that they believed gender-and sex-related differences in resuscitation are important, and that research designed to both better understand and better treat these differences may significantly improve outcomes in the nearfuture.

Although there are few reports from Nigeria on theoretical knowledge of cardiopulmonary resuscitation [17-21], there is need to explore further any significant association of gender of the potential bystander CPR providers with the theoretical CPR knowledge. In addition, the previous related studies were based only on conventional CPR training of participants.

Therefore, this study aimed at assessing the possible impact of participants' gender on the post-training theoretical knowledge of bystander CPR involving both the

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conventional CPR group and the hands-only CPR group. We hypothesized that: (1) the gender of the participants would not have any significant association with the post-training theoretical CPR knowledge in the conventional CPR group; (2) the gender of the participants would not have any significant association with the post-training theoretical CPR knowledge in the hands-only CPR group; and (3) there would be no statistically significant gender differences in the post-training CPR knowledge acquired by the participants when the separate groups are compared.

2. Materials and Methods

2.1. Research Design

This study was carried out using a quasi-experimental cohorts design – one cohort was exposed to the conventional CPR training while the other cohort was taught hands-only CPR technique. However, both cohorts were taught together during the theoretical teaching before the different hands-on sessions.

2.2. Population of the Study

The two groups (cohorts) were part of the larger 200-Level students of the Department of Human Kinetics and Health Education in the Faculty of Education of the University of Port Harcourt. The students were admitted into the Department in 2016. Although not all the thirty six (36) States in Nigeria are represented in the sample, but due to the Admission Policy in all the Federal Universities in Nigeria which ensures that candidates from all the six (6) Geo-political Regions in the country are fairly admitted into every programme, the participants gave a very fair representation of the different States in Nigeria.

2.3. Stage 1 (Pre-training Phase)

Before CPR teaching and trainings, one hundred and forty (140) copies of a self-administered questionnaire on their knowledge of cardiopulmonary resuscitation (CPR) were distributed to assess the pre-training CPR theoretical knowledge of the participants - seventy (70) in the hands-only cohort and another seventy (70) in the conventional CPR group. Nine questions on bystander CPR were captured in the questionnaire (Appendix).

2.4. Stage 2 (Immediate Post-training Phase)

Immediately after the teaching and trainings on bystander CPR, another one hundred and forty (140) copies of the same questionnaire were given to the same participants to answer the same questions on CPR which they answered before the teaching and training sessions. All the participants in the two groups responded to the questions again.

2.5. Determination of Good and Poor CPR Theoretical Knowledge

For each of the nine (9) questions on CPR knowledge, a score of 50% was considered good while any score less than that was considered as poor CPR theoretical knowledge. (See the 9 questions on CPR knowledge in the attached Appendix).

The following null hypotheses were generated and tested:

Ho1: That the gender of the participants would not have any significant association with the post-training theoretical CPR knowledge in the conventional CPR group

Ho2: That the gender of the participants would not have any significant association with the post-training theoretical CPR knowledge in the hands-only CPR group

Ho3: That there would be no statistically significant gender differences in the post-training theoretical knowledge of the two cohorts compared.

2.6. Data Analysis

The Statistical Package for Social Sciences (SPSS Version 20) was used to analyse the data. In addition to descriptive statistics, the data was analyzed using the analysing of variance (ANOVA) at $P < 0.05$ level of significance.

3. Results

Both Hands-Only and Conventional CPR groups had 70 participants each with equal number of males and females: 54(77.1%) females and 16(22.9%) males in each group and mean ages of 21.26 ± 2.92 (SD) and 21.17 ± 2.59 (SD) for hands-only and conventional groups, respectively.

Table 1 below provides the post-training CPR knowledge of the two cohorts according to gender showing similar patterns.

Table 1. Post-training CPR knowledge of the participants according to gender for the two training techniques

	HANDS ONLY				CONVENTIONAL			
	FEMALE		MALE		FEMALE		MALE	
Q1	43(79.6%)	11(20.4%)	11 (68.8%)	5(31.3%)	38 (70.4%)	16(29.6%)	15(93.8%)	1(6.3%)
Q2	54(100%)	----	15(93.8%)	1(6.3%)	53(98.1%)	1(1.9%)	15(93.8%)	1(6.3%)
Q3	42(77.8 %)	12(22.2%)	13 (81.3%)	3(18.8%)	41(75.9%)	13(24.1%)	12 (75.0%)	4 (25%)
Q4	52(96.3%)	2(3.7%)	13 (81.3%)	3(18.8%)	50 (92.6%)	4 (7.4%)	15(93.8%)	1(6.3%)
Q5	40 (74.1%)	14(25.9 %)	12 (75.0%)	4 (25%)	37(68.5%)	17(31.5%)	16(100%)	---
Q6	40 (74.1%)	14(25.9 %)	13 (81.3%)	3(18.8%)	41(75.9%)	13(24.1%)	11 (68.8%)	5(31.3%)
Q7	39 (72.2%)	15(27.8%)	14 (87.5%)	2(12.5%)	47(87.0%)	7(13.0%)	10(62.5%)	6(37.5%)
Q8	50 (92.6%)	4 (7.4%)	13 (81.3%)	3(18.8%)	45(83.3%)	9(16.7%)	13 (81.3%)	3(18.8%)
Q9	54(100%)	----	15(93.8%)	1(6.3%)	52(96.3%)	2(3.7%)	16(100%)	---

Table 2. Analysis of Variance (ANOVA) of the post-training CPR knowledge of the participants in the hands-only CPR group with their gender

		Sum of Squares	Df	Mean Square	F	Sig.
HPOK1	Between Groups	.146	1	.146	.815	.370
	Within Groups	12.197	68	.179		
	Total	12.343	69			
HPOK2	Between Groups	.048	1	.048	3.497	.066
	Within Groups	.938	68	.014		
	Total	.986	69			
HPOK3	Between Groups	.015	1	.015	.086	.770
	Within Groups	11.771	68	.173		
	Total	11.786	69			
HPOK4	Between Groups	.279	1	.279	4.355	.041
	Within Groups	4.363	68	.064		
	Total	4.643	69			
HPOK5	Between Groups	.001	1	.001	.005	.942
	Within Groups	13.370	68	.197		
	Total	13.371	69			
HPOK6	Between Groups	.064	1	.064	.337	.563
	Within Groups	12.808	68	.188		
	Total	12.871	69			
HPOK7	Between Groups	.288	1	.288	1.557	.216
	Within Groups	12.583	68	.185		
	Total	12.871	69			
HPOK8	Between Groups	.159	1	.159	1.758	.189
	Within Groups	6.141	68	.090		
	Total	6.300	69			
HPOK9	Between Groups	.048	1	.048	3.497	.066
	Within Groups	.938	68	.014		
	Total	.986	69			

Note: HPOK1-HPOK9 stand for post Hands-only-training knowledge of questions 1-9

Table 3. Analysis of Variance (ANOVA) of the post-training knowledge of the participants in the conventional CPR group with their gender

		Sum of Squares	Df	MeanSquare	F	Sig.
CPOK1	Between Groups	.675	1	.675	3.761	.057
	Within Groups	12.197	68	.179		
	Total	12.871	69			
CPOK2	Between Groups	.024	1	.024	.846	.361
	Within Groups	1.919	68	.028		
	Total	1.943	69			
CPOK3	Between Groups	.001	1	.001	.006	.941
	Within Groups	12.870	68	.189		
	Total	12.871	69			
CPOK4	Between Groups	.002	1	.002	.024	.877
	Within Groups	4.641	68	.068		
	Total	4.643	69			
CPOK5	Between Groups	1.223	1	1.223	7.141	.009
	Within Groups	11.648	68	.171		
	Total	12.871	69			
CPOK6	Between Groups	.064	1	.064	.325	.571
	Within Groups	13.308	68	.196		

		Sum of Squares	Df	MeanSquare	F	Sig.
	Total	13.371	69			
CPOK7	Between Groups	.743	1	.743	5.134	.027
	Within Groups	9.843	68	.145		
	Total	10.586	69			
CPOK8	Between Groups	.005	1	.005	.037	.849
	Within Groups	9.938	68	.146		
	Total	9.943	69			
CPOK9	Between Groups	.017	1	.017	.598	.442
	Within Groups	1.926	68	.028		
	Total	1.943	69			

Note: CPOK1-CPOK9 stand for post Conventional training knowledge of questions 1-9

Table 4. Analysis of Variance (ANOVA) of the difference in post-training CPR knowledge in the hands-only CPR and the conventional CPR groups

		Sum of Squares	Df	Mean Square	F	Sig.
HCPOK1	Between Groups	.096	1	.096	.530	.468
	Within Groups	25.125	138	.182		
	Total	25.221	139			
HCPOK2	Between Groups	.070	1	.070	3.370	.069
	Within Groups	2.866	138	.021		
	Total	2.936	139			
HCPOK3	Between Groups	.004	1	.004	.022	.881
	Within Groups	24.682	138	.179		
	Total	24.686	139			
HCPOK4	Between Groups	.119	1	.119	1.792	.183
	Within Groups	9.167	138	.066		
	Total	9.286	139			
HCPOK5	Between Groups	.648	1	.648	3.494	.064
	Within Groups	25.602	138	.186		
	Total	26.250	139			
HCPOK6	Between Groups	.000	1	.000	.000	1.000
	Within Groups	26.250	138	.190		
	Total	26.250	139			
HCPOK7	Between Groups	.053	1	.053	.310	.578
	Within Groups	23.519	138	.170		
	Total	23.571	139			
HCPOK8	Between Groups	.111	1	.111	.941	.334
	Within Groups	16.310	138	.118		
	Total	16.421	139			
HCPOK9	Between Groups	.004	1	.004	.188	.665
	Within Groups	2.932	138	.021		
	Total	2.936	139			

Note: HCPOK1-HCPOK9 stand for post Hands-only and Conventional trainings knowledge of questions 1-9

The analysis of variance (ANOVA) of the post-training CPR knowledge of the participants in the hands-only CPR group with their gender is shown in Table 2 with the male gender giving a statistically significant better CPR knowledge than the female ($P = 0.041$) in question 3. This means the rejection of the first null hypothesis with respect to question 3 but accepted for the rest. Table 3 above shows the

analysis of variance (ANOVA) of the post-training knowledge of the participants in the conventional CPR group with their gender. Statistically significant gender differences were seen with respect to questions 5 and 7 with $P = 0.009$ and $P = 0.027$, respectively. This means the rejection of the second null hypothesis for questions 5 and 7 but accepted for the rest because the male gender had statistically significant

better CPR knowledge than the female gender in question 5 while the female gender had statistically significant better CPR knowledge with respect to question 7.

Analysis of Variance (ANOVA) of the difference in post-training CPR knowledge in the hands-only CPR and the conventional CPR groups is shown in Table 4 above. No statistically significant difference was detected with respect to the genders when the two cohorts were compared ($P > 0.05$). The third null hypothesis is hereby accepted.

4. Discussion

The present Nigerian study has generally shown that there was no consistent association of any gender with CPR knowledge, as well as no significant differences between the two cohorts. The current finding of this study is consistent with an earlier related Nigerian report [20].

This present finding of this Nigerian study is very much in line with the conflicting findings in the literature about gender and CPR knowledge as stated earlier [6-9]. The study by Alkandari et al [7] showed that gender significantly associated with CPR knowledge among dentists in Kuwait. Alsharari et al [8] did not find any statistical gender differences in the variables (questions) that were used to assess the CPR knowledge of their participants.

Alotaibi et al [9] reported higher CPR mean score by the female gender than their male counterparts in the study. Parnell et al [22] reported no general poor CPR knowledge among the studied students without any significant differences between the male and female participants. According to Amatya and Gorkhali [23], knowledge score did not correlate significantly with sex among the health personnel who generally had poor CPR knowledge.

Although they found comparable male and female CPR knowledge, Krammel et al [24] recommended that specially tailored programmes should be put in place to increase the awareness and willingness among both the female and elderly community for future educational intervention.

Their recommendation was occasioned by the general poor CPR knowledge with females and the elderly lacking the willingness to perform CPR among the Viennese population. In the study by Tsegaye et al [25], 83% of the male University undergraduate medical students had good CPR knowledge as against 10% of their female counterparts.

However, no significant association was found between sex and the CPR knowledge of the students but there was significant association between academic year, source of information of CPR and knowledge of CPR.

The Strengths and Limitations of this study

The study samples for the two cohorts were drawn from a fairly representative population of students admitted to a Federal Government University where candidates are uniformly selected from different states of the country. However, the male and female proportions were not even in this study which we could not influence as the female/male

ratio reflect the actual number of both genders in the entire class. In addition, the sample sizes for the two cohorts were not very large and as such the generalization of the results should be done with caution.

5. Conclusions

This study has revealed no consistent gender association with either of the genders for any of the CPR training techniques. However, statistically significant gender associations were found in three of the CPR knowledge questions only.

6. Recommendations

There is need to carry out more gender-specific cardiopulmonary resuscitation (CPR) studies with larger samples in Nigeria involving the body mass index (BMI) of the participants.

The Federal Government of Nigeria should without delay promote the introduction of CPR education in Nigerian schools (primary, secondary and higher institutions) so as to increase the number of bystander CPR providers in our communities.

Appendix

QUESTIONNAIRE ON CPR

Section A: Personal Data

Please tick as it applies to you

1. Gender :
Male: ☐
Female: ☐

2. Age in years:

3. Faculty: -----

Department: -----

Level: -----

Matriculation No: -----

Section B: Please honestly provide your answers to these questions on CPR

4. What is the first thing you should do if you come across a collapsed person

Call an ambulance

Try to get the person to respond to you

Check to see if the person is breathing normally

5. Why would you shake and shout at a collapsed person?

To open the airway

To restart the heart

To check for response.

6. The five steps in the Adult Chain of Survival include all of the following EXCEPT

Early CPR
To check for response
Advanced airway placement

7. What action would you use to open the person's airway?

Tilt the head back and lift the chin
Tilt the head and push the chin down
Tilt the head down and turn the chin to the right

8. If a victim has dentures, what should you do?

Remove the denture
Leave them in position as long as they are not obstructing the airway
Use the of nose

9. What is the first link in the "chain of survival" for cardiac arrest victims?

Early recognition of a cardiac arrest
Cardiopulmonary Resuscitation
Citizen Please Respond

10. When giving rescue breaths, for how long do you breathe into the person's mouth

1 second
5 seconds
10 seconds

11. Which of the following are signs of airway obstruction?

Poor air exchange
High-pitched noise while inhaling
Inability to speak
All of the above

12. How many chest compressions and rescue breaths would you give per cycle of CPR?

20 presses and one breathe
30 presses and two breaths
30 presses and three breaths

THANK YOU.

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