

Background:

The updated 2015 Advanced Cardiac Life Support (ACLS) guidelines by American Heart Association (AHA) strongly recommends high-quality chest compressions during cardiopulmonary resuscitation (CPR). AHA changed the definitions for appropriate compression rate, depth of compression and recoil to improve the chest compression quality. The use of backboard during CPR is a controversy. Some studies state that backboards can improve chest compressions and others conclude that placing a backboard lead to delays in initiating chest compressions. AHA currently recommends the placement of a backboard before starting chest compressions only if the action serves to improve chest compression performance. There are no studies that evaluates the impact of backboard placement before CPR on improving the three major components of chest compressions: compression depth, recoil depths and compression frequency.

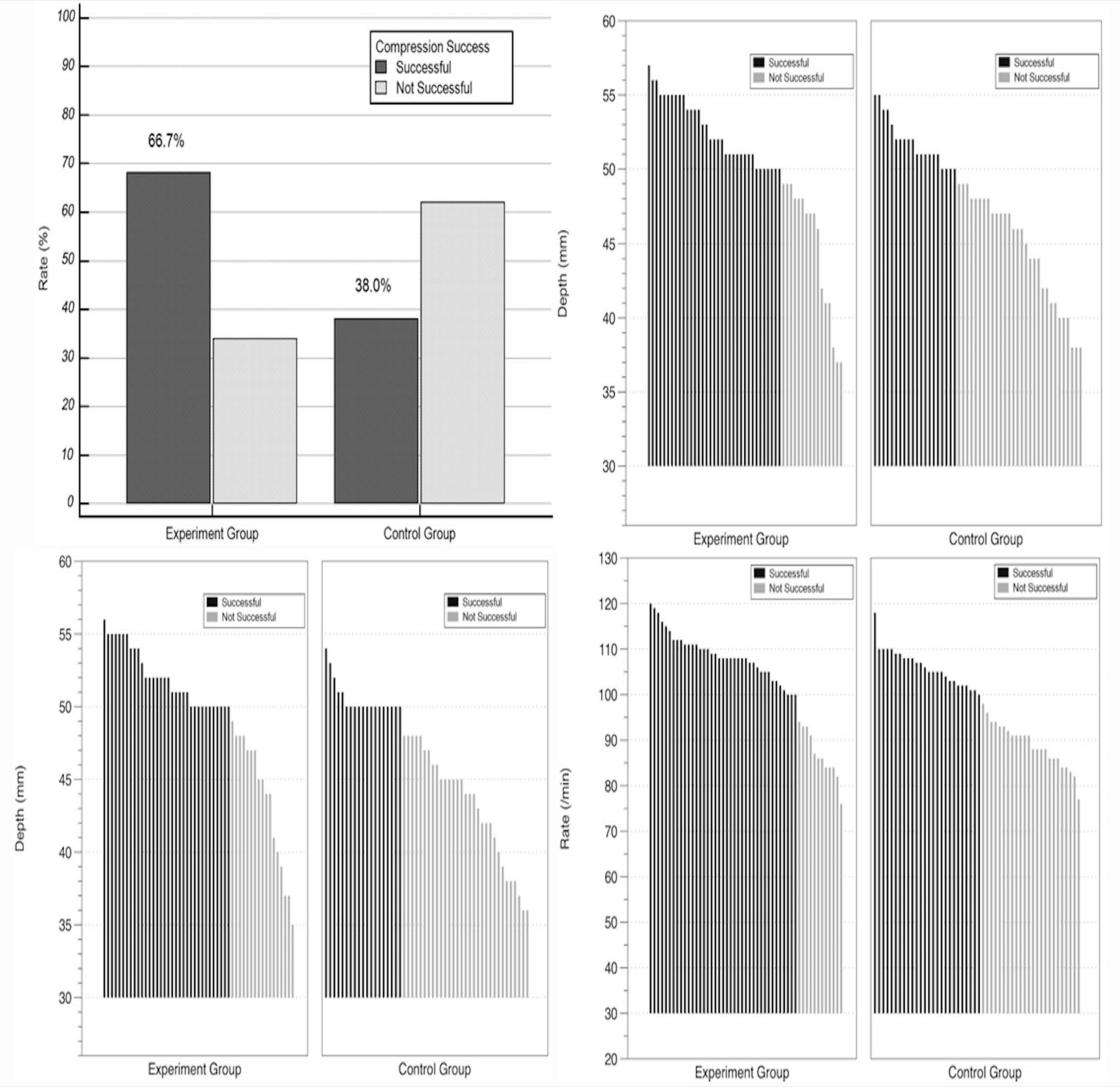
In this study, we aim to evaluate the impact of backboard placement before CPR on improving the compression depths, recoil depths and compression frequencies.

Methods :

We performed a randomized, controlled, single-blinded study using a high-fidelity simulation mannequin in a simulation centre. We compared the mean compression depths, recoil depths and compression frequencies achieved by subjects during 2 minutes of CPR between two randomized groups: experimental group (backboard placed under the simulation mannequin) and a control group (no backboard). One hundred and one 6th grade medical school students in Marmara University, were enrolled in the study after signing informed consent. Categorical data were presented as number and proportions within each group with the difference of proportions between groups and their 95% confidence intervals (CI). Statistical significance of the difference between means was evaluated by t-test. MedCalc Statistical Software v17 was used for all analysis.

Results:

Fifty-one of all subjects (50.5%) were female, and the mean age was 23.9 ± 1.01 years. Both groups were similar with regard to baseline demographic characteristics. The mean value of compression depth in the experimental group was significantly higher than the control group (50.1 ± 4.8 , 47.5 ± 4.7 , $p=.0064$). The mean value of recoil depth in the experimental group was significantly higher than the control group (49.2 ± 5.0 , 46.0 ± 4.7 , $p=.0014$). The mean compression frequency of experiment group was also significantly higher than the control group (103.5 ± 10.6 , 97.8 ± 9.7 , $p=.0067$). The number and the proportion of successful chest compressions were significantly higher in experimental group (34, 66.7%) when compared to the control group (19, 38%) ($p=.0041$).



Discussion:

Over the last decade, the AHA has placed an increased focus on achieving high-quality chest compressions during CPR by improving compression depth, recoil depth, and compression frequency. Sato et al. and Anderson et al. stated that using backboard can improve chest compression quality. Perkins et al., on the other hand, reported that using backboards during CPR cause adverse outcomes by delaying compressions.

Index,	Experiment Group (n=51)	Control Group (n=50)	Total (n=101)	P
Age (years), mean $\pm$ SD (95% CI)	23.8 $\pm$ 1.0 (23.5-24.1)	24.1 $\pm$ 1.0 (23.8-24.4)	23.9 $\pm$ 1.0 (23.7-24.1)	.2052
Female, n (%)	27 (52.9)	24 (48.0)	51 (50.5)	.2441
Compression Depth (mm), mean $\pm$ SD (95% CI)	50.1 $\pm$ 4.8 (48.8-51.5)	47.5 $\pm$ 4.7 (46.1-48.8)	48.8 $\pm$ 4.9 (47.8-49.8)	.0064
Recoil Depth (mm), mean $\pm$ SD (95% CI)	49.2 $\pm$ 5.0 (47.8-50.6)	46.0 $\pm$ 4.7 (44.7-47.4)	47.6 $\pm$ 5.1 (46.6-48.6)	.0014
Compression Frequency (/min), mean $\pm$ SD (95% CI)	103.5 $\pm$ 10.6 (100.5-106.5)	97.8 $\pm$ 9.7 (95.1-100.6)	100.7 $\pm$ 10.5 (98.6-102.7)	.0067
Successful CC, n (%)	34 (66.7)	19 (38.0)	53 (52.5)	.0041

Table 1. Characteristics of the Subjects in Experiment and Control Groups

Conclusion

In our prospective randomized study, we found that using backboard during CPR significantly improves the quality of chest compressions regarding compression depth, recoil depth, and compression frequency. Backboard placement before CPR should be considered in emergency settings since the impact of using backboard on chest compressions is considerable.