Knowledge and Attitude of Basic Life Support among Medical Students at King Abdul-Aziz University

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ABSTRACT
Aim of the work: basic life support (BLS) refers to the skills that require few tools to save lives of the victims of cardiac or respiratory arrests. All healthcare providers are required to master these skills in order to maximize the care to those who experience such emergencies. This study aimed to assess the knowledge and attitude toward BLS in King Abdul-Aziz University among 3rd to 6th year medical students.
Methods: this is a retrospective cross-sectional study conducted in King Abdul-Aziz University, College of Medicine in Jeddah-Saudi Arabia among the medical students, from June to October 2016 lasting for a period of 4 months. Data were gathered by using electronic Google forms questionnaires that were distributed to 3rd, 4th, 5th and 6th years medical students. Data analysis was done by using SPSS version 17 in July 2017
Results: 370 medical students at King Abdul-Aziz University (KAU) were participated to evaluate their knowledge and attitude toward Basic Life Support (BLS). 190 of the students were male students. 43% and 38.5% of female and male students scored all the right answers respectively. Both the total mean of correct answers of knowledge and attitude toward BLS were 40% for both variables. Students who had BLS courses other than the mandatory ones scored 41.5% of the correct answers, while the students who had only mandatory BLS courses scored 39% of the correct answers.
Conclusions: among KAU medical students, the data showed poor essential knowledge toward BLS. Overall attitude towards BLS was negative. However, the data also showed slight improvement when students had BLS courses other than the mandatory ones. Therefore, more focus may be placed for strengthening BLS skills. In addition, it is recommended to have an annual BLS simulation for all medical students to consolidate their skills and knowledge. We also recommend adding active learning to all medical students.
Keywords: basic life support, students, knowledge, attitude, Saudi Arabia

INTRODUCTION

Coronary artery disease (CAD) is the most common cause of sudden cardiac arrest and it is a major cause of death in both USA and Europe [1, 2]. According to WHO in 2014, 46% of overall mortality were due to CAD in Saudi Arabia. Basic life support (BLS) refers to the skills that almost require no or few tools to save lives of the victims of cardiac or respiratory arrest.

BLS included Cardiopulmonary Resuscitation (CPR), using an automated external defibrillator (AED) and clearing an obstructed airway by foreign body for people of all ages. All healthcare providers are required to master these skills in order to maximize the care to those who experience such emergencies.

BLS skills are not only mean for the healthcare providers in fact anyone in the community can learn simply by attending BLS courses [3].

When the heart stops pumping oxygenated blood especially to the high metabolic vital organs such as brain, irreversible damage may occur and therefore CPR works the work of the heart by compressing the chest to allow blood flow to the brain and heart muscles and lungs by giving the patient positive-pressure ventilation until advanced medical treatment takes over.

With an excellent BLS skills and CPR done, minimum damage to the tissues can occur and the patients' survival rate highly increases, therefore mastering the CPR is a must especially

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in the healthcare providers [1]. The knowledge and attitude towards achieving an excellent basic life support was not paid that much attention in medical schools, therefore it is expected to see some graduated physicians that cannot perform a proper CPR [4]. Studies were conducted in Saudi Arabia in various universities among students to assess their knowledge and attitude toward BLS. In **2006** in a study conducted in king Saud University and included 15 colleges and 2250 students participated in it. The study revealed that the participant's attitude towards CPR was positive, but the knowledge was inadequate and more attention had to be focused on CPR improvement [5]. Another study took place in King Saud University in 2014 and this time it was conducted in the College of Applied Medical Sciences and College of Medicine. 245 students participated and the results showed that students lacked BLS awareness. From that study it was recommended to add more BLS courses and integrated them as part of the main curriculum [6].

In 2014 another study was conducted in Qassim University. The study targeted students and health providers in Medicine, Pharmacy, Dentistry, and Allied Health Science Colleges. 139 individuals were participated. The study found poor knowledge among the students with a great need for improvement [7]. Another study which was conducted in 2016 in Tabuk University found the same result of inadequate awareness towards BLS and improvement was also required [8]. In KAU, medical students take one BLS course in the emergency (ER) module at the end of the second academic year, therefore our study aimed to include all students from 3rd year to 6th year academic years.

The objective of this study was to assess the knowledge and attitude toward BLS in King Abdul-Aziz University among medical students from the 3rd year to the 6th year.

MATERIALS AND METHODS

This study was carried out across sectional study from June to October 2016 at King Abdul-Aziz University, College of Medicine in Jeddah -Saudi Arabia. This study targeted medical students from the 3rd, 4th, 5th and 6th academic year. The 2nd year students and intern were excluded from the study. The Ethical approval was obtained from the biomedical research ethics committee and Faculty of Medicine at King Abdul-Aziz University in Jeddah Saudi Arabia.

The purpose of this research was explained to the participant and we ensured confidently. The questionnaire was distributed after obtaining consents.
Data collection was done by an electronic questionnaire using Google forums.

The study used a structured 24 items questionnaire; the first 4 questions included personal information (Age, gender, academic year, any pervious BLS courses other than the mandatory ones taken in the 2nd year). The other 20 questions assessed the knowledge and attitude toward adult and children BLS, the questions were obtained from a validated questionnaire from an Indian journal of anesthesia released in 2010 [9] by **Chandrasekaran** .
Data analysis was done through SPSS version 17.
The study was done after approval of ethical board of King Abdulaziz university.

RESULTS

400 students received electronic questionnaires. A total of 370 medical students responded and participated in this study. The data were analyzed according to different factors. These factors included: gender, academic level, courses other than the mandatory one and the difference of knowledge and attitude toward adult and children CPR.

190 of our responders were male and 180 were female students. The distribution among academic years was represented as 97, 111, 106 and 56 students from the 3rd, 4th, 5th and 6th respectively. The overall mean percentage of total correct answers was 38.5% for males and 43% for females. 6th year medical students scored the highest mean of total correct answers in general 47.5% in comparison with the 3rd, 4th and 5th which scored 38.5%, 39.5% and 38% respectively(**Figure1).**
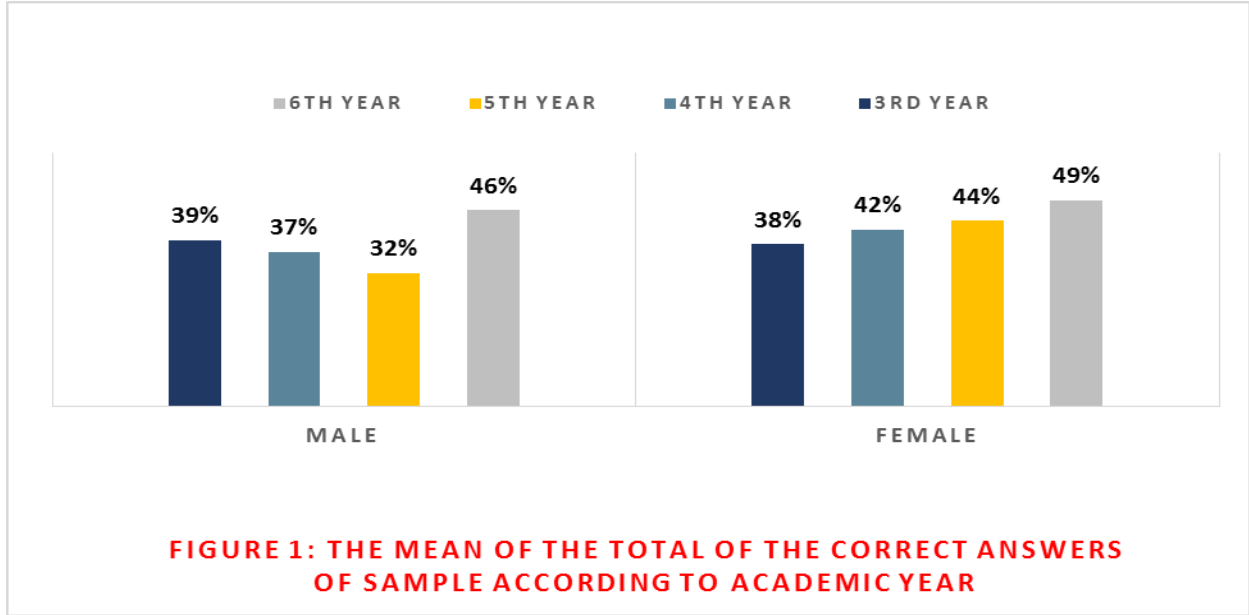
FIGURE 1: THE MEAN OF THE TOTAL OF THE CORRECT ANSWERS OF SAMPLE ACCORDING TO ACADEMIC YEAR
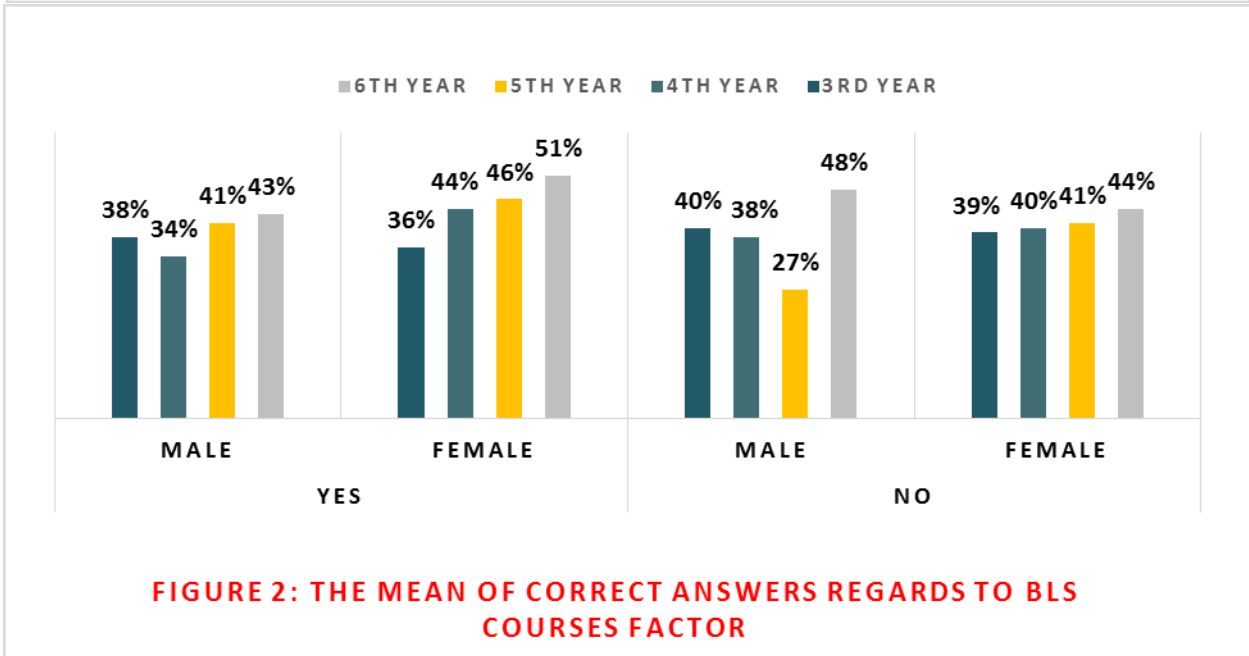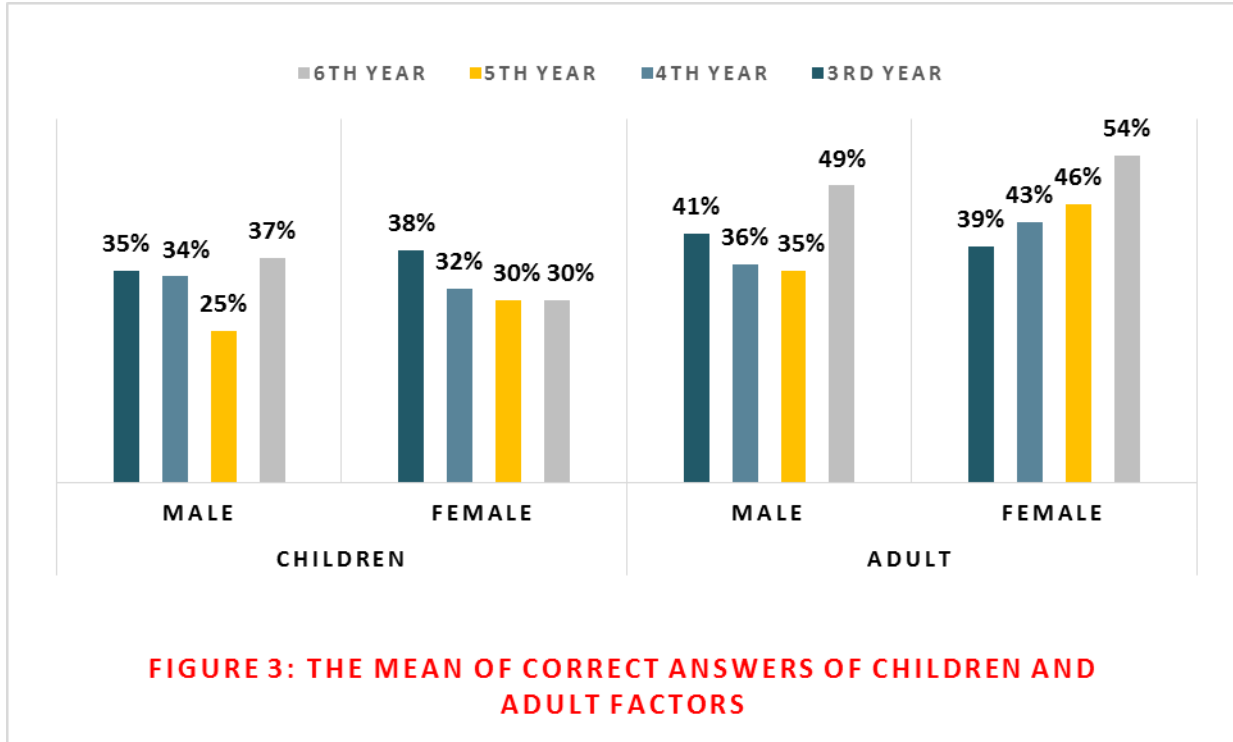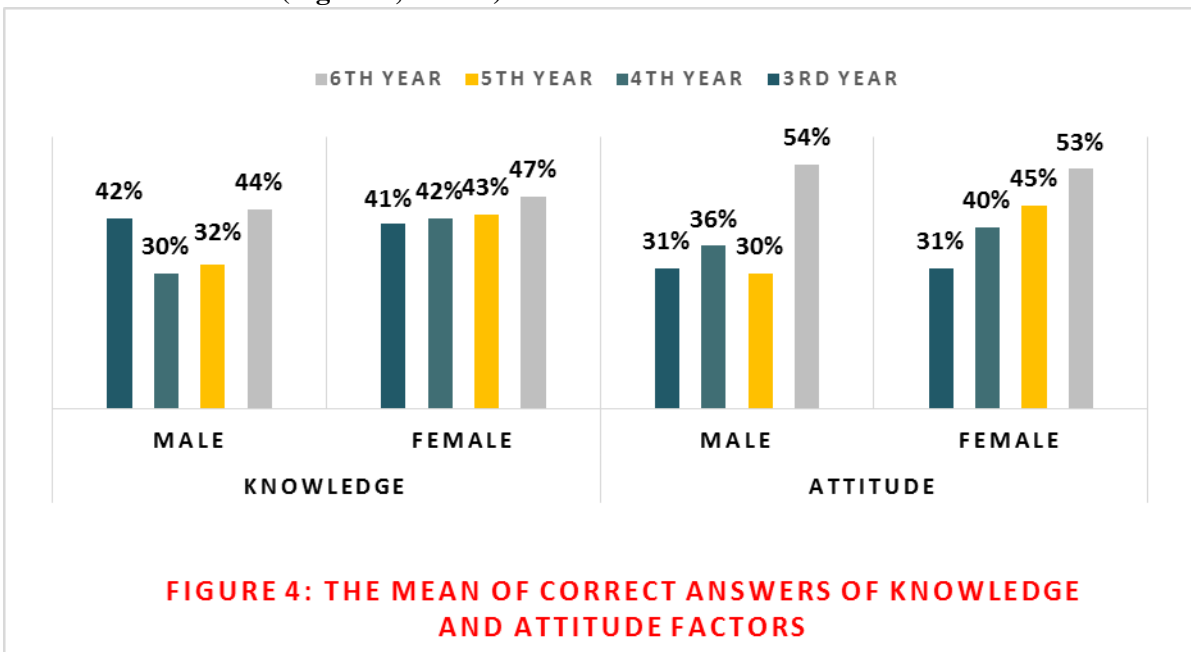

FIGURE 2: THE MEAN OF CORRECT ANSWERS REGARDS TO BLS COURSES FACTOR

41% of the students have had courses other than the mandatory ones scored 41.5% mean of correct answers while 59% students had only the 2nd year mandatory course and scored 39%. Females who had courses other than mandatory scored a better mean of correct answers 44% than males who also had courses other than mandatory 39%. For the responders who had only the mandatory courses, females also scored a higher mean 41% while males scored 38% mean of total correct answers **(Figure 2, table 2).** In Adult CPR questions the overall participants scored 43% mean of correct answers which was higher than children CPR 33% with a ten percent difference. For the adult variables when comparing males and females performance, they both scored almost the same mean of correct answers percentages were 33%, 32.5% respectively. On the contrary, children variables mean of correct answers were 45.5%% for females and 40% for males **(Figure 3, table 2).**

Knowledge and attitude scored the same overall mean of correct answers 40%. For the knowledge variables, female students scored a better mean of correct answers 43%, while males scored 37%, on the other hand female students also scored a better mean of correct answers for the attitude variables 42% and males scored 38% mean **(Figure 4, table 2)**.

FIGURE 4: THE MEAN OF CORRECT ANSWERS OF KNOWLEDGE AND ATTITUDE FACTORS

89.5% of the responders identified the correct abbreviations of BLS with a percentage higher in female than male 96% and 83%

respectively and in comparison between the academic level 6th year student scored the highest mean 96.5% followed by 4th year and 3rd

year scoring 95%, 86.5%respectively with the 5th year scoring the lowest mean 79.5% (Table1).

For the question about the first step in BLS, almost 65% of our responders identified it correctly, female students scored higher than male with a percentage of 73.5% and 56% respectively. Fourth and third year students scored the highest mean 74% and 71.5% respectively, while lowest mean was scored by the sixth and fifth year students 56% and 57.5% respectively (Table1).

Only 16% of our sample were able to correctly identified (activating EMS) as an immediate action when facing an unresponsive individual, the mean of correct answer was higher in male than female responders 21% and 11% respectively, the mean of correct answers was the highest among 6th year students 24% and the lowest in 4th year students 10% with 5th and 3rd scoring in between 12% and 17% respectively. (Table1)

Overall 63% of the students identified the correct location of chest compression in adult BLS, males scored a mean of 54.5%, while female scored 71.5% mean of correct answer.The 6th year participants scored the highest 72% followed by the 5th year with 68%.The 3rd and 4th years participants had a mean lower than their seniors 56.5% and 55.5% respectively **(Table1).**

When asked about the location of chest compression in infants, only 36% of the responders answered correctly, males scored 34% while female scored 37.5%. third year responders had the highest score, followed by sixth and fourth year responders 35.5% and 35% respectively while 5th year responders had the lowest mean with 32% mean of correct answer **(Table1).**

56% of the students were able to identify the correct alternative to mouth to mouth rescue, female scored higher than male with mean of 64.5% and 47% respectively, 6th year student had the best mean with score of 67% followed by 4th and 3rd years with 58% and 50.5% scores

respectively, while 4th year student scored 48% total mean of correct answers **(Table1).**

For the question about the rescue breathing technique in infants, our responders scored only 30% of the total mean of correct answer, males scored 32% while female score was 28.5%, the 6th year responders scored the highest mean 33.5% followed by the 4th year with 31%, while the 5th and 3rd years scored 27.5% and 28.5% respectively **(Table1).**

Furthermore, only 14.5% of our sample identified the correct depth of chest compression in adult, males scored 20% and females scored 9%. 5th year student had relatively the best mean of correct answers was 16% while, the 4th and 3rd years student scored 14% and 15.5% respectively. On the other hand, the 6thyear students scored the lowest mean in comparison with other years 13.5**% (Table1).**

When we asked about the depth of chest compression in children, the mean of correct answer in general was 29% with almost the same scores in both males and female 29% and 28.5%. The 6th and 4th years responders had the highest total mean of correct answer (34.5%, 34%) followed by the 3rd year responders(29% meanwhile), the 5th year responders scored the lowest mean regarding the depth of CPR in children **(Table1).**

In comparison between the depth of compression in children and neonate questions scores, the mean of correct answers in neonates was significantly higher in than that in children with a total mean of 46% with males scoring 47% and females scoring 45%. The 3rd year students had the best mean of correct answer59.5% followed by 6th, 5th and 3rd year's students 46%, 40%, and 39% respectively **(Table1).**

Overall 31% of our sample identified correctly the rate of chest compression in adult and children CPR. The mean of correct answers was slightly higher in females than males 34% and 29% respectively. The 3rd year responders had the highest mean 45.5% with almost 15% difference to the 5th year followed by the 4th and 6th years 27.5% and 22.5% respectively **(Table1).**

When we asked about the ratio of CPR for single rescuer the overall mean of correct answer was 48.5%. 57% of the female and 40% of the male students answered correctly. The mean was the highest among 6th year students 75.5% with significant difference of almost 29% than the following years 47%, 35.5%, 36.5% **respectively (Table1).**

In comparison with the adult and children CPR ratio, the neonatal CPR ratio had a lower score in general 22%. Only 20.5% of the male's and 24% of the female's identified correctly the answer, the 4th year responders had a mean of 25% followed by the 3rd and 5th years 24% and 22% respectively, while the 6th year had the lowest mean with 17.5% **(Table1) .**

Only 20% of our sample identified the correct meaning of the abbreviation AED, the females scored a higher percentage than the males 27% and 17% respectively. 6th year student had the best mean of correct answer 31% followed by 5th year 20.5% and 3rd year with 19.5%, while the lowest percentage was scored by the 4th year students. (Table1)

Regarding the EMS abbreviation, 49% of the total responders identified the correct meaning with 50% mean of correct answer for male and 48.5% for female, the 6th year responders had the highest mean 57.5% followed by the 3rd and 4th years responders 47% for both of them and 45% for the 5th year **(Table1).**

For the scenario about choking attack in adult only 23% of the total participants were able to identify the first step in managing such a case, male scored higher mean of correct answer 27.5% while female scored 19% mean of correct answer. The highest mean was observed among 6th year students 33% followed by 25% among 5th year students, on the other hand the lowest was observed among 4th and 3rd years students 17.5% and 18% respectively **(Table1).**

In comparison to the previous scenario related to first response when facing choking

attack in adult, another scenario was included in our questionnaire regarding the response to choking in children, but the scores was better overall with 52% mean of correct answer, females had better mean 61.5% while males had a mean of 43%. 4th year student scored superiorly than their collogues with a mean of 65% of the total correct answer followed by the 6th and 5th years 59.5% and 50% respectively, while the 3rd year students had the lowest mean 34% for this question **(Table1)** .

Another scenario was assessed about facing unresponsive submerged individual; only 28% of our participants were able to give an appropriate first response, with an insignificant difference in the mean of correct answer between male and female 29% and 27.5% respectively. 6th year responders had the best mean of correct answer for this particular scenario among our sample46% , although the 4th year responders had lowest best mean with 15% of the total correct answers, while the 5th and 3rd year responders were in between with a mean of 26% and 24.5% respectively **(Table1) .**

30% was the mean of correct answer among our sample for the question about the next step to do when you notice somebody with sudden slurred speech and right upper limb weakness. Males scored better mean than females students 34.5% and 26% respectively, the 6th year students had the best score 46% followed by the 5th and 3rd years 31.5% and 31%, while the lowest mean was among 4th year 26% **(Table1)**.

The last question in our questioner was about 50 years old with retrosternal chest discomfort and perfuse sweating and vomiting, overall the total mean of correct next step was 63% with female scoring better mean 71% than male with 55% mean of correct answer, the 6th year students had the best mean of correct answer 82.5% with a significant difference than their juniors in the 4th (67%) ,5th (55%) years, while the lowest mean was among the 3rd year students 47% **(Table1).**

Questions	Male					Female				
Table 1: the mean percentage of the total of the correct answers for each question										
	3rd year	4th year	5th year	6th year	Overall	3rd year	4th year	5th year	6th year	Overall
What is the abbreviation of BLS?	81%	98%	59%	93%	83%	92%	92%	100%	100%	96%
When you find someone unresponsive in the middle of the road, what will be your first response?	70%	63%	43%	48%	56%	73%	85%	69%	67%	73.5%
If you confirm somebody is not responding to you even after shaking and shouting at him, what will be your immediate action?	22%	12%	17%	32%	21%	2%	8%	17%	17%	11%
What is the location for chest compression?	51%	41%	65%	61%	54.5%	62%	70%	71%	83%	71.5%
What is the location for chest compression in infants?	43%	33%	31%	29%	34%	38%	37%	33%	42%	37.5%
If you do not want to give mouth-to-mouth CPR, the following can be done *EXCEPT?*	49%	53%	28%	59%	47%	52%	63%	68%	75%	64.5%
How do you give rescue breathing in infants?	32%	39%	24%	34%	32%	25%	23%	31%	33%	28.5%
Depth of compression in adults during CPR?	24%	6%	24%	27%	20%	7%	22%	8%	0%	9%
Depth of compression in Children during CPR?	30%	31%	12%	43%	29%	28%	38%	23%	25%	28.5%
Depth of compression in neonates during CPR?	54%	45%	40%	50%	47%	65%	33%	40%	42%	45%

Question										
Rate of chest compression in adult and Children during CPR?	51%	23%	22%	20%	29%	40%	32%	40%	25%	34%
Ratio of CPR, single rescuer in adult is?	35%	31%	36%	59%	40%	38%	40%	58%	92%	57%
In a new born the chest compression and ventilation ratio is?	16%	20%	19%	27%	20.5%	32%	30%	25%	8%	24%
What does abbreviation AED stands for?	16%	8%	24%	20%	17%	23%	13%	17%	42%	24%
What does abbreviation EMS stands for?	57%	47%	38%	57%	50%	37%	47%	52%	58%	48.5%
If you and your friend are having food in a canteen and suddenly your friend starts expressing symptoms of choking, what will be your first response?	16%	22%	31%	41%	27.5%	20%	13%	19%	25%	19%
You are witnessing an infant who suddenly started choking while he was playing with the toy, you have confirmed that he is unable to cry (or) cough, what will be your first response?	35%	63%	21%	52%	43%	33%	67%	79%	67%	61.5%
You are witnessing an adult unresponsive victim who has been submerged in fresh water and just removed from it. He has spontaneous breathing, but he is unresponsive. What is the first step?	27%	14%	31%	43%	29%	22%	17%	21%	50%	27.5%

You noticed that your colleague has suddenly developed slurring of speech and weakness of right upper limb. Which one of the following can be done?	32%	20%	36%	50%	34.5%	30%	32%	27%	42%	26%
A 50-year-old gentleman with retrosternal chest discomfort, profuse sweating and vomiting. What is next?	46%	61%	31%	82%	55%	48%	73%	79%	83%	71%
Total Mean	39%	37%	32%	46%	38.5%	38%	42%	44%	49%	43%

Table 2: the mean percentage of correct answers according to the different variables										
	Male					**Female**				
Variables	**3rd year**	**4th year**	**5th year**	**6th year**	**Overall**	**3rd year**	**4th year**	**5th year**	**6th year**	**Overall**
Children CPR	35%	34%	25%	37%	33%	38%	32%	30%	30%	32.5%
Adult CPR	41%	36%	35%	49%	40%	39%	43%	46%	54%	45.5%
Knowledge Questions	42%	30%	32%	44%	37%	41%	42%	43%	47%	43%
Attitude Questions	31%	36%	30%	54%	38%	31%	40%	45%	53%	42%
Yes variable	38%	34%	41%	43%	39%	36%	44%	46%	51%	44%
No variable	40%	38%	27%	48%	38%	39%	40%	41%	44%	41%

DISCUSSION

This study focused on the assessment of medical students of King Abdul-Aziz University (KAU), one of the oldest medical faculties in the Kingdom of Saudi Arabia. Out of 370 medical students who were participated in this study 41% received BLS training more than once, while 59% received only a mandatory BLS course during their second academic year. None of the participants answered all the questions correctly. Although the students who received more than one BLS training scored higher (41.5% correct answers) than the students who only had the mandatory class (39.5% mean correct answers) yet the difference in the scores is narrow, and both showed a mean less than 50%, which was unsatisfactory.

Majority of the students did not succeed in the BLS exam after 1 year as the retention of information deteriorates during this time period [11]. **Lorraine *et al.*** [11]conducted a study in 2013 to assess the retention of CPR skills among

medical students found that there was a significant drop in CPR skill 1 year post-training and deterioration into unacceptable level 2-years post-training. In our study, the results are in consistent with the previous literature, we noticed a decrease in knowledge and attitude in the third-year student (38.5% mean correct answers), fourth-year (39.5% mean correct answers) and fifth-year (38% mean correct answers). With exception of the sixth-year students who showed a slight improvement (47.5% mean correct answers) as the course is retaken by some students to complete internship pre-requisites.

Pediatric age-group resuscitation knowledge and attitude among the responders were significantly low (32.75%) in comparison to adult age-group (42.75%). This finding is in alignment of what was proposed by **Shaffner et al.** where he stated that pediatric residents poorly comply to the American Heart Association (AHA) guidelines regarding CPR and the quality of their skills is generally poor [13].

For improvement of pediatric resuscitative skills among the medical students, **Pierre and Marie** in the Medical College in Paris added a course based on 3-hours simulation, and used a 23-minutes video. This was assessed and the findings were compared to only 1-hour traditional lecture given to the students. Students who attended the new course scored higher level with more compliance to the guidelines after 12 months when compared to the other group [12].

Unfortunately, lack of proper knowledge and attitude toward BLS skills is very evident among KAU medical students; this was evident when almost all of the questions throughout different academic years showed less than 50% percentage of correct answers. Although female students scored slightly higher, no significant difference was found between males and females students. It is believed that an implantation of a new BLS teaching method is a necessity. In 2016 **Wang et al.** conducted a study that compared two different teaching methods where the sequence of information introduction to students can make a difference in

both performance and leadership abilities. The first teaching method (Method A) was to show a video followed by a CPR simulation where the second teaching method (method B) was to start with the CPR simulation, then followed by the video. Students showed better results when the video proceeded the simulation.(By the fact that KAU have the first accredited simulation center in Saudi Arabia, we recommend to add more BLS simulations annually to all academic medical years in order to retain the information that the course provided with different teaching methods collaborated with the curriculum of medical years [13].

Another study implemented medical student teaching BLS to school children; medical students attitude and knowledge were improved with their participation in such form of active learning. [14] .Therefore we recommend applying active learning by making medical students participate and teach non-medical students.

CONCLUSION

Among KAU medical students, this study showed poor essential knowledge toward BLS awareness. Overall attitude evaluation was negative. However, the data showed slight Improvement for those who had BLS courses other than the mandatory 2nd year course. Therefore, more focus should be placed on the strengthening the BLS skills. In addition, we recommended annual mandatory BLS courses for all medical students to consolidate their skills and knowledge. We also recommend applying a new active learning by making the medical students participate in teaching BLS to non-medical students in schools and other students in various colleges.

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