

## Knowledge and Practices of Engineering Students about First Aid at Assiut University

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### Abstract:

A basic knowledge and practices of first aid is very important for engineers and workers in engineering sector to be able to provide emergency care in the event of an accident, possibly saving lives and minimizing injury **Aim:** To assess engineering students' knowledge and practice about first aid at Assiut University. **Subjects and Methods:** A descriptive research design and the systematic random sample were used in this study. The current study included 85 engineering students at Assiut University. Three tools were used in the study: self-administered questionnaire concerning the socio-demographic characteristics of the studied student, their knowledge about first aid, and observational checklist for student's practices about first aid **Results:** The study revealed that 61.2% of students had poor knowledge score about first aid while 85.9% of them had poor practice score about first aid. There were no statistically significant differences between socio-demographic data and mean knowledge and practices score among engineering students except regarding sex variable there was statistically significant difference found ( $p=0.000$ ,  $p=0.001$ ). **Conclusion:** The engineering students show poor knowledge and practices about first aid. There was positive correlation between total score of knowledge and total score of practices with statistical significant was found. **Recommendation:** Educational programs should be developed for engineering students regarding first aid and prevention of engineering occupational hazards.

**Keywords:** *Engineering, First Aid, Knowledge & Practice.*

### Introduction

The first aid is an essential first step in delivering an effective and rapid intervention that can help reduce injury, suffering and improve the possibility of survival. First aid refers to the provision of initial and prompt care for an illness or injury by a trained person till medical treatment can be accessed. Immediate first aid when provided to patients who require emergency intervention makes a significant difference in the outcome (Chandrachood & Acharya, 2019 & El-Sayed et al., 2020).

A first aid provider should be able to respond quickly and calmly to life-threatening situations outside the supported environment of a hospital. The aims of a first aid provider include preserving life, alleviating suffering, preventing further illness or injury, and promoting recovery (Alsayali et al., 2019).

In the era of industrial and technological development, engineering plays an essential role in the production process and economic cycle of countries. Engineering is a profession with a very broad scope. So; engineers are scientists, inventors, designers, builders and great thinkers. They are most important factors in production, development and services but, always threatened by work-related accidents (Samimi, 2021).

The environment of engineering work is hazardous and characterized by multiple simultaneous chemical, physical and mechanical hazards exposure. Unsafe working environment address the presence of hazards during a usual working day e.g. exposure to mechanical trauma and injury, high or low temperatures, electrocution, changes in pressure, radiation, loud noise, vibrations from hand tools or machinery, breathing in vapors, fumes, dust, chemical and dangerous substances (Mgonja, 2017).

The engineers worked and trained at construction sites, in factories, and in resolving electrical issues. So, they face many potentially dangerous situations such as falling from heights, being struck by heavy objects which caused fractures, or being caught in machinery. In addition, accidental cuts, lacerations or puncture wounds from sharp objects (Canberra Institute of Technology, 2017). Engineering work covers various activities such as groundwork, demolition works, working at heights, manual handling, lifting activities, and confined space work. These all activities involve risks and are very hazardous in nature (Lu, 2021).

Training on construction projects and machinery and electrical materials are not only important on the final levels of the engineering study, but it is necessary

from the early years to improve students' education and understanding of the various engineering courses and subjects ( **Ahmad et al., 2020**).

According to statistics, engineering and vocational students are being at high risk of injury. Students at vocational training institutions are frequently exposed to a variety of hazards as a result of their activities; many of these activities are carried out in workshops, which contain equipment, tools, and a variety of materials (**Lecours & Therriault, 2018**).

Sunstroke has become a serious problem in summer of warm weather regions because staying in a warm climate lead to a great risk for heat exhaustion and at last heatstroke. Engineering field workers exposed to hot environments or extreme sun heat can be at risk of heat-stroke illnesses and injuries. About 70% of occupational sunstroke fatalities occur in the construction industry when the body temperature rises abnormally due to high temperature and humidity (**Hifumi et al., 2018**).

Fall work-related injuries accounting for 20% to 40% of disabling occupational injuries. Workplace accident may cause a fractured bone, usually, happens when a bone is impacted by more tension or force than it can sustain. Causes of fractures include work accidents as falls, direct strike to one's body (**Varacallo & Knoblauch, 2021**).

Burn is commonly occurring among engineering workers which cause significant morbidity and mortality. Electrical injury, a certain type of burn, is the fourth most common cause of admission in burn units worldwide (**Elloso & Cruz, 2017**).

Engineers, electricians, and other professionals work with electricity directly, including working on overhead lines, cable harnesses, and circuit assemblies may also be exposed to electrical hazards of electric current as electrocution (**Islam, 2022**).

Community health nursing is a specialized practice that focuses on promoting health, as well as preventing and restoring health in a safe and healthy environment. It provides occupational and environmental health and safety services for workers and community group. Hence, the nurse works in a greater number of work environment areas; works with primary prevention and provides post-accident assistance. The community health nurse's role can make an active contribution to the development and expansion of accident prevention activities, and promote cooperation between occupational health & safety and employees (**Ogunnaike & Akinwaare, 2020**).

### Significance of the Study

According to International Labor Organization (ILO) statistics, worldwide more than one million work related accidents occur daily and 2.3 million people

die annually as a result of these accidents (**Movahedi, 2021**).

In Egypt construction sites are among the hazardous places where injuries and fatalities workplace of workers commonly happen. The average number of accidents was 16.03, and the proportion of accident occurrences concerning the total number of people was 62.8 percent (**Muhammad, 2022**).

The engineering students are highly predisposed to traumatic events during practicum training and during work in the future (**Kapoor et al., 2017**).

### Aim of the Study

To assess engineering students' knowledge and practice about first aid at Assiut University

### Specific objectives:

- To assess engineering students' knowledge about first aid at Assiut University.
- To assess engineering students' practices about first aid at Assiut University.

### Research Questions

- Are engineering students having good knowledge about first aid?
- Are engineering students having good practice toward first aid?

### Subjects and Methods

#### Research Design:

A descriptive research design was utilized in this study

#### Setting:

The study was conducted at Engineering Faculty - Assiut University.

#### Sample:

The systematic random sample was taken from preparatory year of engineering students by selecting every 8th person on a list of the students. (Because the preparatory year includes students from all engineering departments).

#### Sample Size:

The total number of engineering preparatory year students is 703. Sample size was calculated by OpenEpi, Version 3, to have confidence level 95%. The total number of study sample was 85 engineering students.

#### Tools of the Study

Three tools were used to collect data of the study:-

#### Tool (I): Engineering students' socio-demographic data: it included two parts:

**Part (1):** Includes engineering students' personal data such as: name, age, and sex ...etc.

**Part (2):** Includes Elgilany scale which used to assess the socioeconomic status of the Egyptian family. This scale includes 7 domains education & cultural (score = 30), occupation (score = 10), family (score = 10), family possessions (score = 12), economic (score = 5), home sanitation (score = 12), and health care

domain (score = 5). This scale has a total score 84 and levels of socioeconomic status were categorized as following:

- <42 = very low level of socioeconomic status.
- 42 < 63 = low level of socioeconomic status.
- 63 < 71.4 = middle level of socioeconomic status.
- 71.4-84 = high level of socioeconomic status (El-Gilany et al., 2012).

**Tool (II): Engineering students' knowledge about first aid:**

This tool was used to assess the engineering students' knowledge about first aid which included the following questions: basic concepts of first aid and the definitions, causes, signs and symptoms, prevention, and first aid of fainting, sunstroke, bleeding, wound, fractures, burn, and electrocution. This tool consists of (47) questions covering the theoretical aspects of first aid, it is divided into nine main parts: included multiple-choice questions: source of information (two questions), basic concepts of first aid (six questions), fainting (five questions), sunstroke (four questions), bleeding (four questions), wound (six questions), fractures (five questions), burn (eleven questions), and electrocution (four questions).

**Scoring system:** Each correct answer had (1), incorrect had (0). Total scoring (137 graded) was be classified into three levels as follows: poor knowledge if the score was less than 60% (<82.2), fair knowledge if the score was 60% to less than 75% (82.2 - <102.8), and good knowledge if the score was 75% and above (102.8 -137) (Abdullah et al., 2022).

**Tool (III): Observational checklist to assess the engineering students' practices about first aid:**

This tool consists of (61) items divided into seven main parts: first aid practice about: fainting (five items), sunstroke (seven items), bleeding (eight items), wound (eight items), fractures (eleven items), burn (sixteen items), and first aid practice about electrocution (six items).

**Scoring system:** The score of each item was allotted as "done" which took (1) grade and not done took (0) grade. Total scoring (61 graded) was be classified into three levels as follows: poor practice if the score was less than 60%, (<36.6), fair practice if the score was 60% to less than 75% (36.6-<45.8), and good practice if the score was 75% and above (45.8-61) (Abdullah et al., 2022).

**Validity:** The evaluation of data collection tools was done by five academic experts from Nursing Faculty at Assiut University to measure the validity of the tools.

**Reliability:** The reliability was analyzed by Cronbach's alphas coefficient test for knowledge questionnaire, an observational checklist of engineering student's practices. It were found to be (0.88 and 0.90) respectively.

**Methods of data collection:**

**Administrative phase:** Official permission to collect data was obtained from the Dean of the Faculty of Nursing, Assiut University, to Dean of Faculty of Engineering at Assiut University.

**A pilot Study:** Was carried out before data collection on 9 persons (10%) of engineering students from total study sample to test the clarity, applicability, and the time required to fill out the form of study tools. No modifications were done and included in the studied sample.

**Field of Work:** Data of the current study were collected during the period from beginning October 2021 till the end of November 2021, two days every week. An explanation of the purpose of the research was done to engineering students to gain their cooperation before starting data collection. A self-administered knowledge questionnaire was filled out by engineering students after clarifying the instruction. The average of time taken for completing each self-administered questionnaire sheet was around 20-25 minutes.

After data was obtained, the researchers reviewed it, removed incomplete or missed responses. Observational checklist of their practice was done by the researchers. They were still observing the practice of engineering students when they were applying the first aid measures through role play and demonstration. About five to six sheets were finished per day. Each item was marked as done if followed or not done if not followed.

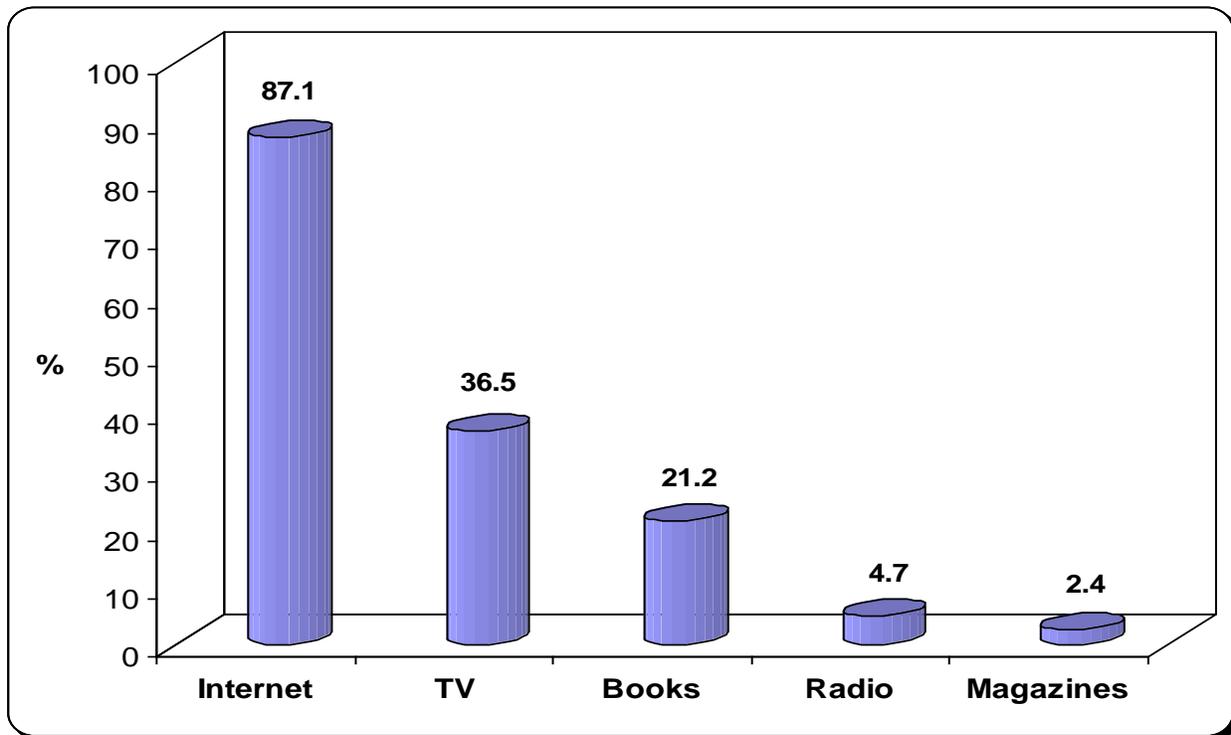
**Ethical consideration:** Research proposal was approved from Ethical Committee in the Faculty of Nursing. The study was followed common ethical principles in research. There is no risk for study subject during application of the research. Oral consent was obtained from engineering students that are willing to participate in the study, after explaining purpose of the study. Study subject have the right to refuse to participate and /or withdraw from the study at any time. Study subject privacy was considered during collection of data. Confidentiality of obtained data was maintained and ensure for every studied samples before starting data collection.

**Statistical design:** Data entry and data analysis were done using SPSS version 22 (Statistical Package for Social Science). The data were presented as numbers, percentage, mean, and standard deviation. An independent sample t-test was used to compare quantitative variables between two groups and ANOVA test was used for more than two groups. Pearson correlation coefficient was used to measure the correlation between quantitative variables. P – Value considered statistically significant when p – value < 0.05.

**Results**

**Table (1): Distribution of engineering students related to their socio-demographic data (n=85).**

Variables	No. (85)	%
<b>Age: (years)</b>		
< 20	65	76.5%
≥ 20	20	23.5%
<b>Sex:</b>		
Male	57	67.1%
Female	28	32.9%
<b>Father education:</b>		
Less than secondary	8	9.4%
Secondary/ Technical institute	21	24.7%
University/ Postgraduate	56	65.9%
<b>Mother education:</b>		
Less than secondary	16	18.8%
Secondary/ Technical institute	29	34.1%
University/ Postgraduate	40	47.1%
<b>Residence:</b>		
Rural	32	37.6%
Urban	53	62.4%
<b>Attending training course:</b>		
Yes	4	4.7%
No	81	95.3%
<b>Social class:</b>		
Very low	21	24.7%
Low	31	36.5%
Middle	19	22.3%
High	14	16.5%



# The participants allow selecting more than one answer

**Figure (1): Distribution of engineering students according to their source of information about first aid.**

**Table (2): Knowledge scores about work accidents and first aid among engineering students at Assiut University (n=85).**

Variables	(n=85)					
	Poor		Fair		Good	
	No	%	No	%	No	%
Basic concepts of first aid	57	67.1	19	22.4	9	10.6
Fainting	67	78.8	9	10.6	9	10.6
Sunstroke	51	60.0	21	24.7	13	15.3
Bleeding	72	84.7	10	11.8	3	3.5
Wounds	58	68.2	11	12.9	16	18.8
Fractures	67	78.8	12	14.1	6	7.1
Burns	55	64.7	16	18.8	14	16.5
Electrocution	54	63.5	10	11.8	21	24.7
<b>Total Knowledge</b>		<b>61.2</b>		<b>23.5</b>		<b>15.3</b>

**Table (3): Practice scores about first aid among engineering students at Assiut University (n=85).**

Variables	(n=85)					
	Poor		Fair		Good	
	No	%	No	%	No	%
Fainting	82	96.5	2	2.4	1	1.2
Sunstroke	85	100.0	0	0.0	0	0.0
Bleeding	83	97.6	2	2.4	0	0.0
Wounds	81	95.3	4	4.7	0	0.0
Fractures	83	97.6	2	2.4	0	0.0
Burns	85	100.0	0	0.0	0	0.0
Electrocution	77	90.6	8	9.4	0	0.0
<b>Total Practice</b>		<b>85.9</b>		<b>14.1</b>		<b>0</b>

**Table (4): The Relation between socio-demographic data and mean Knowledge scores among engineering students at Assiut University (n=85).**

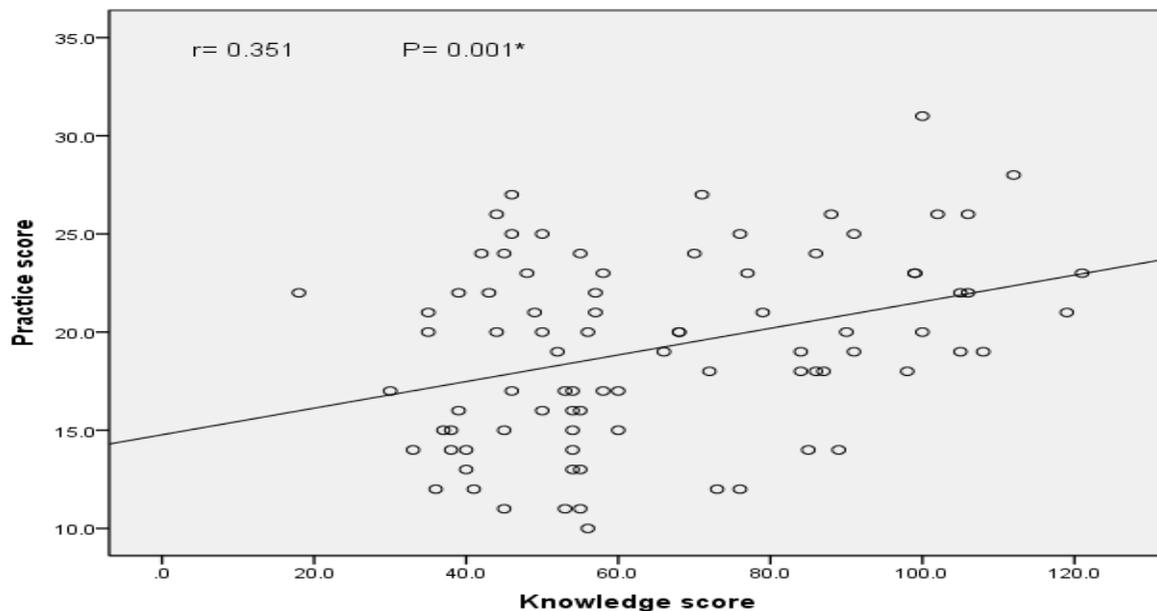
Variables	Knowledge score Mean $\pm$ SD
<b>Age: (years)</b>	
< 20	65.29 $\pm$ 25.65
$\geq$ 20	64.75 $\pm$ 20.46
<b>P-value</b>	<b>0.931</b>
<b>Sex:</b>	
Male	58.88 $\pm$ 20.72
Female	77.96 $\pm$ 26.65
<b>P-value</b>	<b>0.000**</b>
<b>Father education:</b>	
Less than secondary	61.75 $\pm$ 23.94
Secondary/ Technical institute	58.90 $\pm$ 19.43
University/ Postgraduate	68.00 $\pm$ 25.98
<b>P-value</b>	<b>0.321</b>
<b>Mother education:</b>	
Less than secondary	56.50 $\pm$ 23.59
Secondary/ Technical institute	70.34 $\pm$ 25.09
University/ Postgraduate	64.87 $\pm$ 23.80
<b>P-value</b>	<b>0.191</b>
<b>Residence:</b>	
Rural	60.69 $\pm$ 23.12
Urban	67.87 $\pm$ 24.98
<b>P-value</b>	<b>0.191</b>
<b>Social class:</b>	
Very low	58.81 $\pm$ 22.25
Low	65.19 $\pm$ 25.18
Middle	69.37 $\pm$ 26.72
High	68.93 $\pm$ 23.02
<b>P-value</b>	<b>0.516</b>

\* ANOVA test    \* Independent sample t-test    \* Statistically significant correlation ( $p < 0.05$ )

Table (5): The Relation between socio-demographic data and mean Practice scores among engineering students at Assiut University (n=85).

Variables	Practice score
	Mean ± SD
<b>Age: (years)</b>	
< 20	19.66 ± 4.78
≥ 20	17.65 ± 4.22
<b>P-value</b>	<b>0.095</b>
<b>Sex:</b>	
Male	18.04 ± 4.57
Female	21.54 ± 4.14
<b>P-value</b>	<b>0.001**</b>
<b>Father education:</b>	
Less than secondary	17.25 ± 4.68
Secondary/ Technical institute	17.19 ± 4.49
University/ Postgraduate	20.21 ± 4.54
<b>P-value</b>	<b>0.019**</b>
<b>Mother education:</b>	
Less than secondary	17.75 ± 4.23
Secondary/ Technical institute	18.69 ± 4.70
University/ Postgraduate	20.13 ± 4.81
<b>P-value</b>	<b>0.184</b>
<b>Residence:</b>	
Rural	17.63 ± 4.68
Urban	20.13 ± 4.52
<b>P-value</b>	<b>0.017**</b>
<b>Social class:</b>	
Very low	18.19 ± 4.17
Low	17.90 ± 4.81
Middle	20.05 ± 4.49
High	22.36 ± 4.24
<b>P-value</b>	<b>0.014**</b>

\* ANOVA test    \* Independent sample t-test    \* Statistically significant correlation (p<0.05)



Figures (2): Correlation between total knowledge scores and total practice scores among engineering students (n=85).

**Table (1):** Shows that, (76.5%, 67.1%, 62.4%, and 36.5%) of engineering students were in the age group <20 years, male, reside in urban area, and constituted in the low social class respectively.

**Figure (1):** Illustrates that (87.1%) of engineering students depend on internet as the main source of their information about first aid.

**Table (2):** Reveals that (84.7%, 78.8%, 78.8%, 68.2%, 67.1%, 64.7%, 63.5%, and 60.0%) of engineering students had poor knowledge score about bleeding, fainting, fractures, wounds, basic concepts of first aid, burns, electrocution, and sunstroke respectively. Furthermore, (61.2% and 23.5%) of them had poor and fair total knowledge score respectively.

**Table (3):** Reports that(100.0%, 100.0%, 97.6%, 97.6%, 96.5%, 95.3%, and 90.6%) of engineering students had poor practice score about sunstroke, burns, bleeding, fractures, fainting, wounds, and electrocution respectively. In addition, (85.9% and 14.1%) of them had poor and fair total practice score respectively.

**Table (4):** Shows that there were no statistically significant differences between socio-demographic data and mean knowledge scores among engineering students except at sex variable there was highly statistically significant difference found ( $p=0.000^*$ )

**Table (5):** Demonstrates that there are no statistically significant differences between socio-demographic data and mean practice scores among engineering students except at sex variable there was statistically significant difference found ( $p=0.001$ ).

**Figures (2):** Illustrates that there was positive correlation between total score of knowledge and total score of practice  $r=0.351$  with statistical significant was found  $p\text{-value}=0.001$ .

## Discussion

Adequate knowledge and skills are playing a vital role for undergraduate students, as they are the lifesavers of tomorrow. In the lives of students, there is a growing likelihood that they could experience a life-saving situation equally within and outside the university that needs first aid intervention, which may help improve the patients' medical state before going to the hospital (Arasu et al., 2020). Therefore, the current study aimed to assess the engineering students' knowledge and practice about first aid at Assiut University.

Regarding socio-demographic data of the engineering students, the findings of the current study revealed that more than three-quarters of students were under 20 years old, more than two-thirds of students were male and more than half of them were from urban areas. Also, the majority of students did

not participate in the previous first aid training course.

Similarity, other study carried out in Egypt by **Abouzed et al., 2021** to assess the effects of peer education on the knowledge and practice regarding selected first aid among engineering student's at south valley university. Who indicated that the age of the students' ranged from 18- 22 years, less than three quarters of them were male, more than half of them were from urban areas, and the vast majority of students did not participate in the previous first aid training program.

Concerning social class the present study cleared that more than one third of engineering students constituted in the low level and less than one-fifth of them are in the high social level. This due to the Egyptian community is facing intense challenges due to rapid population growth and widespread youth unemployment. These results disagree with other study conducted in Syria with titled assessing knowledge of first aid management of burns amongst syrian private university students by **Alistwani et al., 2022** who reported that more than half of students had a good economic level, followed by one-fifth of them had excellent economic level.

Also, in the present study internet was the main source of information about first aid for majority of students. Other study conducted in Saudi Arabia about assessment of knowledge, attitude, and practice about first aid among male school teachers in Hail city by **Alshammari, 2021** who had encouraged this result and stated that most of samples depend on social media to gain information regarding first aid. This is due to the excessive use of internet by youth group nowadays and considered from the most available and accessible information source.

Related to basic concepts of first aid, the present study demonstrated that more than two-thirds of engineering students had poor knowledge. The vast majority of students reported who did not attend training in first aid expressed poor knowledge about basics concept of first aid. These outcomes in contrary with **AlQahtani et al., 2020** who conducted the study in Saudi Arabia titled knowledge of first aid skills among medical and nonmedical students and reported that more than half of nonmedical students had good knowledge regarding first aid skills.

The current study found that more than three-quarters of students had poor knowledge about fainting while the majority of students had poor practice about fainting first aid. These results disagree with other study carried out in Indonesian about the effect of health education towards the level knowledge of youth Red Cross members about first aid of syncope in senior high school Bengkulu by **Rahmawati et al., 2021** who documented that the majority of the

respondents on moderately knowledgeable category about first aid of syncope.

Related to level of knowledge and practice about sunstroke the findings revealed that two-thirds of students had poor knowledge while all students had poor practice. The reason for this low score may be they had never encountered any such situation. These results in contrary with study done in Saudi Arabia by **Almahmoud et al., 2021** about knowledge of non-healthcare providers towards first aid skills in Riyadh city stated that three quarters of participants had correct answer about heat stroke knowledge.

Concerning students' knowledge about bleeding and wounds, the results revealed that the majority of students and about three quarters of them had poor knowledge about bleeding and wounds respectively. While the majority of the students had practice about bleeding and wounds first aid. These findings in contrary with study conducted in Jordan about first aid knowledge among university students by **Khatatbeh, 2016** who reported that more than two thirds of students had correct answers about first aid care of bleeding.

Another study executed in India to assess the awareness and attitude regarding first aid among college students-a cross-sectional study in urban Bangalore by **Arasu et al., 2020** who stated that more than two fifths of participants had right answers about first aid of bleeding wound.

Furthermore, the results reported that more than three-quarters of students and the majority of them had poor knowledge and practice about fractures first aid. These outcomes was in contrast with study conducted in Suadia Arabis titled knowledge and attitude of Saudi female university students about first aid skills by **Halawani et al., 2019** who demonstrated that one third of participants had wrong responses about fractures emergency situations. While, the results agree with **Khatatbeh, 2016** who presented that more than one quarter of students had the correct answers about the bone fractured care.

The present study findings reported that all students had poor practice about burns first aid while more than two thirds of them had poor knowledge. These results agree with **Batais et al., 2020** who conducted the study in Saudi Arabia to assess the knowledge and practice of burn first aid among Saudi Arabian medical and non-medical university students and documented that the majority students did not use the correct first aid technique for burns and had seriously limited knowledge level about burn injuries first aid.

Furthermore, more than two-thirds of students had poor knowledge about electrocution and about one-quarter of them had good knowledge but the majority of students had poor practice about electrocution first aid. These results disagree with other study carried

out in Sri Lanka about knowledge and attitudes on first aid among advanced level students in Gampaha educational zone by **Alahakoon et al., 2022** who state that the majority of participants had correct answers about electrical first aid.

Concerning the total score of engineering students' knowledge and practice about first aid, these results stated that more than two-thirds of students had poor knowledge while more than one-fifth had fair knowledge. But, the majority of students had poor practice while less than one-fifth of them had fair practice. This is due to they did not attend a previous training in first aid and lack of public health awareness about first aid through mass media. Also, lack of students' interest to learn about first aid is main reasons for insufficiency of their knowledge and practice.

These findings were in accordance with study executed in Egypt about effect of training program regarding first aid and basic life support on the management of educational risk injuries among students in industrial secondary schools by **Abd El-Hay et al., 2015** who documented that all studied students had poor knowledge and practice regarding first aid and basic life support.

Concerning the relation between the socio-demographic data and mean scores of knowledge and practice about first aid among engineering students, the present study demonstrated that there were no statistically significant differences except with sex there was statistically significant difference found ( $p=0.000$ ,  $p=0.001$ ).

This due to there is no variations between the students according to their educational level and background as well as their age but the statistically significant differences related to sex is might also be attributed to the female gender role which characterized by nurturing, responsibility, and sympathy with others who suffer from injuries and require first aid.

These outcomes in similar with **Al-Johani et al., 2018** who carried out the study in Saudi Arabia about knowledge and practice of first aid among parents attending primary health care centers in Madinah City and found that there were no statistically significant differences between participants' socio-demographic characteristics and first-aid knowledge and practice except between educational level and knowledge there was statistically significant difference found ( $p=0.001$ ).

In addition, the current study revealed a positive correlation between the engineering students total knowledge and their practice scores  $r=0.351$  with statistically significant was found  $p\text{-value}=0.001$ . This attributed to the direct influencing of the students' knowledge on their practice of first aid measures. Since a lack of information appears to be a

significant barrier to implementation of correct first aid procedures

These results were in the same line with another study carried out in Egypt by **Abd El-Hay et al., 2015** who reported that a positive correlation between total knowledge and total practice scores among studied students  $r= 0.505$  with statistically significant was found  $p =0.000$ .

### Conclusion:

The study concluded that majority of engineering students show poor practice about first aid while more than two thirds of them had poor knowledge with positive correlation between total score of knowledge and total score of practice and statistically significant was found.

### Recommendations:

1. Education programs should be developed for engineering students regarding first aid and prevention of engineering occupational hazards.
2. Perform seminars for students to raise their awareness of first aid.
3. Provision the students with brochures and booklets about first aid to improve their knowledge.
4. Further research about the prevention of engineering work accidents and injuries.

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