ORIGINAL ARTICLE

The effect of training course on knowledge, attitudes, and skills regarding health and safety among university students: A quasi-experimental study

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ABSTRACT

Background: In most universities around the world and particularly in universities in Iraq, students are not provided with any health and safety training courses; therefore, once they graduate and enter workplaces, they might face with health and safety hazards. The present study aimed to assess the impacts of a health and safety training program on health and safety knowledge, attitudes, and skills among students in the University of Sulaimani, the Kurdistan region of Iraq.

Methods: In a quasi-experimental study, 960 students of the University of Sulaimani were randomly selected in the academic year 2019-20. Required data on the students' knowledge, attitudes, and skills regarding health and safety were collected through a standardized self-report questionnaire. Afterwards, they were provided with a health and safety training course which lasted 6 hours. After the training, the same questionnaire was used to check the changes in their health and safety knowledge, attitudes, and skills, and the collected data were analyzed through Statistical Package for the Social Sciences (version 22.0).

Results: Most of the students were females (60.9%), freshmen (47%), and from urban areas (63.3%). Following the health and safety training course, significant changes were seen in all aspects of their health and safety knowledge, attitude, and skills. There was also significant improvement in their risk control in workplace ($p<0.001$), knowledge about workplace threats and risks ($p<0.001$), and knowledge about emergency phone numbers and how to use safety equipment ($p<0.001$).

Conclusion: Training students about health and safety in the form of a training course can lead to improvement in their knowledge, attitude, and skills regarding health and safety, which ultimately ensures their health and safety in their future workplaces.

Keywords: health and safety; health and safety training courses; university students; health and safety knowledge, attitude, and skills; the University of Sulaimani

INTRODUCTION

As a large and growing sector, universities in most countries consist of employers with broadly different organizational cultures. The environment of universities can involve high-risk exposures. Although occupational health in this sector is complex, very few studies have focused on this issue. In this regard, sufficient information needs to be collected about risks and hazards and planning occupational health provision in universities[1]. Such information can include employment pattern in universities, the age distribution of university staff and students, the size of universities, relevant legislation, and relevant guidance on the health of special groups[2].

Productivity, motivation, and satisfaction can rise among staff and students through investment in safety management training. Such training should include issues like measures, policies, hazards, and safe use of equipment[3]. University students should be equipped with sufficient knowledge so that they can protect themselves from hazards in their learning and working environments. In this regard, supervisors need to ensure that students are provided with relevant information and appropriate training[4]. University workplaces and/or laboratories should take into account general health and safety practices, including emergency procedures; job-specific health and safety practices and hazards; recognition and assessment of health and safety risks; the method of reducing risks through sound safety practices and use of protective equipment; and awareness of proper practices to protect the environment[5].

Several concepts or values should be included in preparing work safety culture (WSC) principles in universities and shared among all the university students and staff. WSC indicates an organization's willingness to devise safety measures and learn from accidents, incidents, and errors. Developing a good WSC in an academic setting influences the quality of teaching and learning, the education system's competitiveness and reliability, and improvement in the final product of the industry in terms of producing high-quality graduates[6,7].

Research has indicated that a positive attitude towards and good knowledge about WSC are significant factors in deciding good safety practices among university students. Moreover, all students regardless of their socio-demographic characteristics, orientation, level, and field should be provided with continuous education and safety promotion in order to develop a positive attitude toward and good knowledge about WSC among them, eventually

resulting in optimum safety practices in university workplaces and laboratories[8]. With regard to the training of human resources, universities mostly focus on the workplace not on academic research, as a result, university students should be provided with suitable training on maintaining good health and paying attention to safety at work because they enter workplaces after graduation. However, most universities fail to do so[9]. According to research, poor management systems of occupational safety and health at the university can cause different hazards exposes to students[1].

Even if universities do not implement robust occupational safety and health management systems, they need to provide the students, who will be future employers in different sectors, with health and safety training. In this regard, the present study was carried out in the University of Sulaimani in order to evaluate the effect of a health and safety training course on the students' knowledge, attitudes, and skills regarding health and safety.

MATERIALS AND METHODS

Study design and setting: The present study was carried out using a quasi-experimental design in the University of Sulaimani over a period of 12 months from February 2019 to February 2020.

Study sample and sampling method: The study sample consisted of 960 university students who were randomly selected from among all the students who were studying in colleges of the University of Sulaimani in 2019. The only inclusion criteria was their willingness to participate in the study, and the only exclusion criteria was their unwillingness to do so.

Data collection instrument: Required data on the students' knowledge, attitudes, and skills of regarding health and safety were collected through a questionnaire which was designed based on a thorough review of the literature. The questionnaire completion method was based on self-report. The validity and reliability of the questionnaire were confirmed.

Procedures: Each of the selected students was provided with a copy of the questionnaire. After the completed questionnaires were returned by the students, they were provided with the proposed health and safety training program in which the basic principles of health and safety were trained. The program was delivered in small groups with a maximum of 20 to 30 students. The training period for each group took about 6 hours. The training sessions were run by well-trained trainers. After the training sessions, the students were provided with the same questionnaires. The data collected in the pre- and post-training phases were compared, and relevant results and conclusions were drawn.

Data analysis: After the collected data were encoded and fed into Excel sheets, they were transferred to SPSS version 22. To analyze the data, descriptive statistics was used, and the results were expressed in the form of frequencies and percentages. To compare the pre- and post-training data, inferential statistics was used. The level of statistical significance was considered to equal or below 0.05 (p-value<0.05).

Ethical considerations: Necessary approval was obtained from both the Scientific Committee of Department of Family and Community Medicine and the Ethical Committee of College of Medicine. In addition, informed written consent was obtained from all of the participants before the study started.

RESULTS

According to the collected data from the 960 students, most of them were females (60.9%), freshmen (47%), and from urban areas (63.3%) (Table 1).

The students were selected from all colleges of the University of Sulaimani. Most of the students were from College of Basic Education with 205 students (10.9%), followed by College of Science with 100 students (10.4%), College of Agriculture with 80 students (8.3%), and College of Administration and Economics with 65 students (6.8%) (Table 2).

Table 1. The students' sociodemographic data

	Frequency (N)	%age
Gender		
Male	375	39.1
Female	585	60.9
Total	960	100.0
Stage		
1	451	47.0
2	170	17.7
3	203	21.1
4	136	14.2
Total	960	100.0
Address		
Inside city	608	63.3
Outside city	352	36.7
Total	960	100.0

Table 2: Frequency of the students based on their colleges

	Frequency	%age
Collage		
College of Agricultural	80	8.3
College of Nursing	25	2.6
College of Veterinary Medicine	25	2.6
College of Humanities Education-Saidsadiq	25	2.6
College of Islamic sciences	60	6.3
College of Fine Arts	30	3.1
College of Political Sciences	15	1.6
College of Physical Education	40	4.2
College of Pharmacy	25	2.6
College of Humanities	60	6.3
College of Education	60	6.3
College of Science	100	10.4
College of Commerce	35	3.6
College of Law and Political Sciences	30	3.1
College of Language	60	6.3
College of Medicine	35	3.6
College of Dentistry	25	2.6
College of Engineering	60	6.3
College of Administration and Economics	65	6.8
College of Basic Education	105	10.9
Total	960	100.0

Analyzing and comparing the data collected at pre- and post-test stages revealed significant changes and improvement in all factors related to the students' attitude toward health and safety, including essentiality of health and safety for managing every institution, inclusion of methods to control and reduce threats in health and safety procedures, the need for health and safety programs all the time in workplaces, and so forth (p<0.001) (Table 3). It was also seen that training the students led to significant changes in the ranks they gave the steps to control threats in workplaces. Before training, the first three steps were ranked as "taking away the threat from the workplace" (45.8%), "using personal protective equipment (PPE)" (34.8%), and "using administrative procedures" (27.2%), while after training, they changed as "taking away the threat from the workplace" (31.7%), "using administrative procedures" (19.1%) and using personal protective equipment (PPE)" (16.6%). All these changes were significant (p<0.001) (Table 4).

Table 3. Students' attitude toward health and safety at pre- and post-test stages

Items	True N (%)		False N (%)		I do not know N (%)		P-value
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	
Health and safety are the essential basis for managing every institution.	893(93.0)	931(97.0)	35(3.6)	9(.9)	32(3.3)	20(2.1)	<0.001
Health and safety include adopting some methods to control and reduce threats in workplace.	878(91.5)	912(95.0)	37(3.9)	25(2.6)	45(4.7)	23(2.4)	<0.001
Health and safety programs are needed anytime and in all workplaces	879(91.6)	952(99.2)	44(4.6)	5(.5)	37(3.9)	3(.3)	<0.001
Health and safety programs are mainly aimed at preserving the health and safety of human, equipment, and reputation of institutions.	763(79.5)	867(90.3)	106(11.0)	62(6.5)	91(9.5)	31(3.2)	<0.001
To promote health and safety programs, I think all institutions need to assign a room and allocate special budget.	881(91.8)	933(97.2)	34(3.5)	17(1.8)	45(4.7)	10(1.0)	<0.001
All institutions require a special health and safety record.	874(91.0)	941(98.0)	43(4.5)	10(1.0)	43(4.5)	9(.9)	<0.001
Legal departments play a significant role in implementing health and safety programs.	778(81.0)	923(96.1)	49(5.1)	8(.8)	133(13.9)	29(3.0)	<0.001
The director or manager in each institution is the main person in charge of health and safety program.	729(75.9)	863(89.9)	139(14.5)	63(6.6)	92(9.6)	34(3.5)	<0.001
First aid is one of the components of health and safety programs.	926(96.5)	954(99.4)	12(1.3)	1(.1)	22(2.3)	5(.5)	<0.001
Inefficiency of administrative departments plays an important role in ignoring health and safety programs.	760(79.2)	885(92.2)	52(5.4)	21(2.2)	148(15.4)	54(5.6)	<0.001
All homes and workplaces need health and safety records and principles.	834(86.9)	898(93.5)	41(4.3)	20(2.1)	85(8.9)	42(4.4)	<0.001
All people who work in a place should be trained about health and safety principles to different extents.	815(84.9)	917(95.5)	78(8.1)	32(3.3)	67(7.0)	11(1.1)	<0.001
At least one third of all employees in a workplace should know fire extinguishing principles and escape gate use	837(87.2)	932(97.1)	77(8.0)	18(1.9)	46(4.8)	10(1.0)	<0.001
Allocation budget is required to promote health and safety programs in administrative structures of institutions	844(87.9)	931(97.0)	53(5.5)	14(1.5)	63(6.6)	15(1.6)	<0.001

Table 4. Ranking steps to control workplace threats in the students' opinion before and after training

Items	Yes	No	Yes	No	P-value
	Pre-test		Post-test		
Rank the steps to control workplace threats from 1 (the first step) to 5 (the last step):					
1-Engineered control (taking threats away from people based on a plan)	250(26.0)	710(74.0)	125(13.0)	835(87.0)	<0.001
2- Taking away the threat from the workplace	440(45.8)	520(54.2)	304(31.7)	656(68.3)	<0.001
3-Using administrative procedures (similar to assigning work record for the employees)	261(27.2)	699(72.8)	183(19.1)	777(80.9)	<0.001
4-Using personal protective equipment (PPE)	334(34.8)	626(65.2)	159(16.6)	801(83.4)	<0.001
5-Using less dangerous materials instead of more dangerous ones	223(23.2)	737(76.8)	149(15.5)	811(84.5)	<0.001

The collected data showed that before receiving health and safety program, the students believed that the most common workplace threats include chemical (28.6), mechanical (19.7%), psychological (19.0%), physical (16.5%), and biological (16.2%), respectively. After the training; however, the three most common threats were reported to be chemical (26.1%), psychological (20%), mechanical (19.9%), physical (17.5%), and biological (16.5%) (Table 5).

Providing the students with the health and safety program also made significant changes in their knowledge about emergency phone numbers in Kurdistan region ($p<0.001$). After the training, they also learned how to use a fire extinguisher ($p<0.001$). Also, more students stated that they participated in health and safety training courses ($p<0.001$), and more students started fastening their seatbelts while driving ($p<0.001$) (Table 6).

Furthermore, the students' participation in the health and safety program led to significant changes and improvement in their attitude toward preventing events completely, recording injuries and events at workplaces, using personal protective equipment as crucial elements in health and safety, maintaining the health and safety of food, allocating budget to promote health and safety, and so forth ($p<0.001$) (Table 7).

Table 5: The most common threats at workplace in the students' opinion

Workplace threats include	**Pre-test No. (%)**	**Post-test No. (%)**
Chemical	802 (28.6)	793 (26.1)
Physical	466 (16.5)	529 (17.5)
Biological	454 (16.2)	497 (16.5)
Mechanical	553 (19.7)	605 (19.9)
Psychological	535 (19.0)	606 (20.0)

Table 6: The effect of the health and safety program on the students' knowledge about emergency numbers, using fire extinguishers, and fastening seatbelt

Items	**Yes**	**No**	**Yes**	**No**	**P-value**
	Pre-test		**Post-test**		
Emergency phone numbers in the Kurdistan Region of Iraq are:					
1-Health Emergency:	709(73.9)	251(26.1)	892(92.9)	68(7.1)	<0.001
2-Fire Department:	610(63.5)	350(36.5)	820(85.4)	140(14.6)	<0.001
3-Police:	784(81.7)	176(18.3)	913(95.1)	47(4.9)	<0.001
Do you have a fire extinguisher at home?	277(28.9)	683(71.1)	317(33.0)	643(67.0)	0.05
Do you know how to use a fire extinguisher correctly?	300(31.3)	660(68.8)	527(54.9)	433(45.1)	<0.001
Have you ever participated in any health and safety training courses?	297(30.9)	663(69.1)	568(59.2)	392(40.8)	<0.001
I fasten my seatbelt while I'm driving or in car.	768(80.0)	192(20.0)	874(91.0)	86(9.0)	<0.001

Table 7: The effect of the health and safety program on the students' attitude toward event prevention

Items	**True N (%)**		**Falls N (%)**		**I do not know N (%)**		**P-value**
	Pre-test	**Post-test**	**Pre-test**	**Post-test**	**Pre-test**	**Post-test**	
It is possible to prevent events completely	369(38.4)	609(63.4)	410(42.7)	267(27.8)	181(18.9)	84(8.8)	<0.001
All events and injuries in workplaces must be recorded	834(86.9)	911(94.9)	65(6.8)	21(2.2)	61(6.4)	28(2.9)	<0.001
Personal protective equipment (gloves, glasses, gowns, boots, etc.) is the essential element in health and safety programs.	769(80.1)	583(60.7)	108(11.3)	347(36.1)	83(8.6)	30(3.1)	<0.001
Personal protective equipment (gloves, glasses, gowns, boots, etc.) is the essential element in health and safety programs	853(88.9)	928(96.7)	56(5.8)	11(1.1)	51(5.3)	21(2.2)	<0.001
Fire is the most dangerous events at home.	480(50.0)	886(92.3)	403(42.0)	47(4.9)	77(8.0)	27(2.8)	<0.001
Illnesses and injuries are among the threats of workplaces.	754(78.5)	876(91.3)	108(11.3)	28(2.9)	98(10.2)	56(5.8)	<0.001
Maintaining the health and safety of food is a part of health and safety programs.	875(91.1)	943(98.2)	58(6.0)	10(1.0)	27(2.8)	7(.7)	<0.001
All people who work in a place should be trained about health and safety principles to different extents.	849(88.4)	937(97.6)	59(6.1)	12(1.3)	52(5.4)	11(1.1)	<0.001
Continuous health and safety inspection is needed to prevent dangerous events and injuries.	826(86.0)	915(95.3)	82(8.5)	22(2.3)	52(5.4)	23(2.4)	<0.001
Allocation budget is required to promote health and safety programs in administrative structures of institutions.	817(85.1)	883(92.0)	101(10.5)	36(3.8)	42(4.4)	41(4.3)	<0.001
Which picture shows the correct or incorrect method of lifting heavy things?	824(85.8)	902(94.0)	136(14.2)	58(6.0)	0(0.0)	0(0.0)	<0.001

DISCUSSION

As shown by recent studies, large organizations can include numerous hazards; however, the scope of such hazards is more limited in the context of universities. In addition, compared to other workplaces, since universities might not have responsibility clarification, and their organizational structure is decentralized[10], a limited number of hazards can be serious. Academic staff and students are the major users and receivers of the facilities and services in universities. Compared toother industries, working in universities is associated with less supervision and training regarding health and safety[11].

Approximately half of the students in the present study were freshmen who should be trained about doing hard physical activities or dealing with hazardous chemicals. Such training should be based on the students' fields of study and the rate of their exposure to occupational hazards[12]. According to the results of a survey on cardiovascular risk factors, university students who had trained about occupational risks, experienced lower levels of cardiovascular disease risk compared to the general population. This lower rate has been attributed to adequate training of university students and the higher educational levels[13,14].

Health can be negatively affected as due to the lack of basic professional training in occupational health and safety, lack of information and accurate records of occupational diseases and accidents, and lack of an effective enforcement system. Since maintaining a safe working environment is depicted on a healthy student, in is necessary to train them further sessions to provide them with the knowledge required to protect themselves and their working environment. For this purpose, some special equipment such as first aid kit, firefighting equipment, and their usage instructions should exist[15]. In the present study, it was observed that nearly all of the students cited that they believe that health and safety principles should be trained to all people to different extents, especially about fire extinguishing principles and escape gate use.

Additionally, providing the students with health and safety education led to improve in their attitudes toward health and safety in workplaces and institutions. The results also showed that such training could change the students' beliefs about controlling workplace threats. Similarly, Earl et al (2004) indicated that the students' safe behavior can decrease remarkably due to the lack of adequate and effective safety education[16]. Also, it has been indicated that safety training can improve the students' knowledge about techniques of injury prevention[17,18].

University staff and students can be hurt by various chemical, mechanical psychological, physical, and biological threats. Therefore, all students and staff need to be trained adequately to be protected and kept safe[19]. All students in labs need to be aware of the fact that they may be threatened as a result of handling chemical substances[20]. In this regard, the results of the present study indicated that the proposed health and safety program changed the students' attitude toward and raised their awareness of chemical, mechanical, psychological, physical, and biological threats that are quite common in workplaces. The results also revealed that the health and safety program caused more students to know emergency phone numbers, learn how to use fire extinguishers, and wear their seatbelts while driving. Moreover, training the students about using personal protective equipment, maintaining the health and safety of food, and allocating budget to promote health and safety led to significant improvement in the their attitudes toward event prevention.

Research has shown that continuous health and safety inspection is required to prevent injuries caused by dangerous events. For this purpose, there should be recording system for all events and injuries in workplaces. In this regard, using personal protective equipment like gloves, glasses, gowns, and boots is the essential element in health and safety programs[21,22]. Integration of safety and health in the curricula of universities can be achieved by developing best practices and improving strategies to guide the process of teaching and learning in healthy and safe behaviors in different countries particularly developing countries like Iraq which has a traditional economy and society. For this purpose, strategies for improvement are needed by analyzing the key elements in the process of teaching and learning at different educational levels[23]. The philosophy behind this lies in the fact that a safe and healthy learning environment raises the students' risk awareness and allows for competences as early as possible[24-26].

Following the conduction of the health and safety training courses, all of the students agreed with the possibility of preventing events completely, recording all events and injuries, and the necessity of using personal protective equipment. Moreover, all students referred to fire as the most dangerous event at home. They also stated that illnesses and injuries are among workplace threats, and health and safety programs should train how to maintain health and safety of food. Also, they emphasized the necessity of training all people in a workplace about health and safety, the necessity of continuous health and safety inspection at workplaces, and allocation of budget to health and safety programs.

CONCLUSION

The results indicated that training the students about health and safety through the proposed health and safety lead to significant improvement in their health and safety knowledge, attitude, and skills. Therefore, the Ministry of Higher Education is recommended to put more emphasis on devising health and safety training courses in the curricula of universities. Also, universities need to be equipped with first aid kits, fire extinguishers, and other equipment to control disasters and their usage instructions. Moreover, university staff and students should be trained how to use the equipment.

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