ผลของการสอนการปฐมพยาบาลเบื้องต้นสำหรับงูกัดผ่านสื่อมัลติมีเดียต่อความรู้ของนักศึกษาระดับปริญญาตรีในประเทศจีน

The effect of a multimedia teaching method of a snakebite first aid program on knowledge among undergraduate students in China

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บทคัดย่อ

การวิจัยมีวัตถุประสงค์เพื่อศึกษาผลของการสอนการปฐมพยาบาลเบื้องต้นสำหรับงูกัดผ่านสื่อมัลติมีเดียต่อความรู้ของนักศึกษาระดับปริญญาตรีในประเทศจีน กลุ่มตัวอย่างคือนักศึกษาระดับปริญญาตรี มหาวิทยาลัยไป่เซ่อ ประเทศจีน จำนวน 60 คน แบ่งเป็นกลุ่มทดลองและกลุ่มควบคุม กลุ่มควบคุมได้รับการสอนตามปกติทั่วไป ในขณะที่กลุ่มทดลองได้รับการสอนการปฐมพยาบาลเบื้องต้นสำหรับงูกัดผ่านสื่อมัลติมีเดีย เก็บรวบรวมข้อมูลระหว่างเดือนมกราคม – มีนาคม พ.ศ.2562 โดยใช้แบบสอบถามความรู้ วิเคราะห์ข้อมูลโดยใช้ค่าความถี่ ร้อยละ ไคสแควร์ paired t-test และ independent t-test ผลการวิจัยพบว่าคะแนนความรู้ระหว่างกลุ่มทดลองและกลุ่มควบคุมแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 ($p < .05$) แสดงให้เห็นถึงประสิทธิภาพของโปรแกรมการสอนการปฐมพยาบาลเบื้องต้นสำหรับงูกัดผ่านสื่อมัลติมีเดียต่อความรู้ของนักศึกษาระดับปริญญาตรี ดังนั้นโปรแกรมการสอนการปฐมพยาบาลเบื้องต้นสำหรับงูกัดผ่านสื่อมัลติมีเดียจึงควรถูกนำมาสอนนักศึกษาระดับปริญญาตรีในประเทศจีนเพื่อเพิ่มความรู้ในการปฐมพยาบาลเบื้องต้นสำหรับงูกัด

คำสำคัญ: นักศึกษาระดับปริญญาตรี สื่อมัลติมีเดีย ความรู้ งูกัด

Abstract

The purpose of this study was to examine the effect of a multimedia teaching method of a snakebite first aid program on knowledge of snakebite among undergraduate students in China. The study group was undergraduate students in Baise University, China. 60 students were recruited and divided into experimental and control groups. Students in control group received general lecture while students in experimental group received a multimedia teaching method of snakebite first aid program. Data were collected among January to March, 2019 by using a questionnaire. Frequency, percentage, chi-square, paired t-test and independent t-test were performed for data analysis. The results revealed that knowledge score of snakebite between two groups was significantly different ($P < .05$). The study showed that the multimedia teaching method of a

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snakebite first aid program is effective enough to improve knowledge of snakebite in undergraduate students. Therefore, the multimedia teaching method of a snakebite first aid program was suggested to be a possible effective intervention to help undergraduate students get increases in knowledge of snakebite first aid.

keywords: undergraduate student, multimedia, knowledge, snakebite

Introduction

Medically important venomous snakes exist in 160 countries around the world, and snakebite is an important public health problem especially in rural areas of tropical and sub-tropical areas located in Africa, Asia, Middle-East, Latin America and Oceania[1]. The WHO estimated that about 5.4 million snakebites occur each year, resulting in 1.8 to 2.7 million cases of envenoming (poisoning from snakebites). In Asia nearly 2 million people were envenomed by snakes each year. In China, nearly 212,118 cases were reported[2]. Compared to other provinces, the situation in Guangxi and Guangdong province are the most serious. Most snakebites occurred in the South and Southeast of China[3]. The Affiliated Hospital of Youjiang Medical University for Nationality is located in Baise, Guangxi Province. In 2014, there were about 56 snakebite cases. In 2015, the amount of cases were about 51, was nearly equal to the previous year. While in 2016, about 89 cases were reported (The statistics were reviewed from 1st January, 2014 to 12st December, 2016). Besides from very serious symptoms, some snakebite victims survived with permanent physical damage, like amputation and disability. It was estimated that the death toll could range from 81,000 to 138,000 every year in the world. In China, about 4,081 people died of snakebite[2]. Moreover, it was estimated that 1.8–2.7 million of snakebite patients developed clinical illness (envenoming) after snakebite each year in the world, and caused as many as 400,000 amputations and other permanent disabilities[1]. From the medical and nursing records of 94 snakebite cases in the Affiliated Hospital of Youjiang Medical University for Nationality, we found that the mortality was 1.06%, and the amputation and disability was 4.25%.

Few attempts had been made to examine the factors responsible for death in cases of bites by identified species of snakes. However, many people died from inappropriate or incorrect first aid before reaching hospital[4]. First-aid treatment is supposed to be carried out very soon after the snakebite, before the patient reaches a dispensary or hospital. Snakebite victim himself/herself or anyone else who is present and able can perform first aid[4]. Though recommendations had been interpreted very well in the guidelines, people's knowledge of snakebite was disappointed. Many people still prefer to choose useless and dangerous first-aid methods[3-7].

Snakebite knowledge was rarely to be known by non-medical university students, for there were no course curriculums related to this topic for them in local area in China. Medical textbooks which contained information of snakebite knowledge was too difficult to understand for non-medical university students. Moreover, the traditional teaching method which was in-class teaching with only a handbook cannot provide a convenient way to review knowledge. Therefore, more convenient external resources should be added. Poor knowledge level

could be improved through many methods. The TV shows, videos were more convenient methods to review knowledge of snakebite than an in-class lecture with handbooks only. Many previous research had revealed that multimedia education intervention can improve students' level of knowledge. And it was an effective means of reaching a better learning of students. Video teaching made the students feel motivated to learn through this way[8-10].

In a pilot interview about undergraduate students' expectations to improve knowledge of snakebite, the researcher found that the undergraduate student who wished they could get more information through multimedia teaching methods, for example, TV show, the video took 80%. The undergraduate students who wished more training campaigns would be accessible in the local area took 60%. The undergraduate students who wanted to learn from university teachers took 20%.

The Cognitive theory of multimedia learning (CTML) was created by Richard E. Mayer and Roxana Moreno. As we explore the cognitive theory of multimedia learning, there are three main assumptions to improve people's knowledge level which are dual channel, limited capacity and active processing. In dual channel assumption, the human cognitive system compromises two distinct channels for representing and manipulating knowledge: a visual-pictorial channel and an auditory-verbal channel[11-13]. In limited capacity assumption, each channel in the human cognitive system has a limited capacity when it is going to hold and manipulate knowledge[11,12]. In active processing assumption, meaningful learning occurred when learners engage in active processing within the channels, including selecting relevant words and pictures, organizing them into coherent pictorial and verbal models, integrating them with each other, and correlating them with appropriate prior knowledge[14,15].

Nowadays, few studies have been conducted to improve undergraduate students' snakebite knowledge[3,4]. Colleges and universities are lack of good teaching information on snakebite topic. More education resources should be added into curriculum. Therefore, it is very necessary and significant to conduct this research to improve undergraduate students' snakebite knowledge level by using multimedia teaching method in local district.

Materials and methods

In this quasi-experimental study, 60 undergraduate students were enrolled during January to March, 2019. We selected our participants from faculty of education, Baise University, China using a purposive random sampling method. The sample size was calculated as 30 for each group based on many previous studies[16-20]. The researcher chose two bachelor classes randomly by using clustering sampling from5 classes. The names of classes were written on small ball and put into a box. First class being chosen was experimental group, the second class being chosen was control group. Later, 30 subjects from each class were picked out by using simple sampling.

The inclusion criteria were: undergraduate students who were aged over 18 years old, were willing to take part into this research, and were in major of education. The exclusion criteria were: undergraduate students who felt uncomfortable or even panic to topic of snakebite as to religion or

belief or other reasons

After explained the aims of this study, all the participants chosen signed consent forms and their anonymity and confidentiality were guaranteed. Data were collected by demographic and snakebite know ledge questionnaire. The first questionnaire for demographic data was developed by the researcher himself referred to the previous research[16]. Finally, it consists of 5 questions (sex, age, education level, and family with medical background)[3].

The second questionnaire for knowledge of snakebite was developed by the researcher himself mainly on the basis of snakebite guidelines from WHO and previous research[3,4]. Finally, it consisted of 18 questions including 4 sections. General know ledge had 4 questions (Q1-Q4), first aid knowledge had 6 questions (Q5-Q10), transportation know-ledge had 3 questions (Q11-Q13) and prevention knowledge had 5 questions (Q14-Q18). It had only multiple choice questions. Each questions worth 1 score. A total of 1 score were given on the condition that correct answer was selected, otherwise 0 score were given. Any missing, corrupted, or blank responses were marked as 0 score. The total score range was from 0 to 18. The participants were thought to have a good knowledge of snakebite if they achieved a score greater than 12 scores, an average knowledge if they had a score greater than 6 scores and less than or equal to 12 scores, a poor knowledge if they had only 6 scores or less. The questionnaire is reviewed for validity and reliability before using. This ques-tionnaire was translated in Chinese using back trans-lation technique. Bilingual experts translated English version to Chinese version, then back translated to English language.

The content validity was evaluated by 5 experts whose specialties are in the emergency nurs-ing area. They were asked to review the questionnaire and intervention tool for clarity and accuracy, the need of any extra questions to be included, and clarity of language. Their suggestions were accepted and incorporated into the questionnaires before using for data collection. Finally, for the 18-item question-naire, 5 experts agreed universally that 16 out of the 18 items were content valid by achieving a rating of 3 or 4 on the 4-point relevance scale. The content validity was proved 0.89. For the 4-dimension video, 5 experts agreed universally that 3 out of the 4 dimensions were content valid by achieving a rating of 3 or 4 on the 4-point relevance scale. The content validity was proved 0.75.

Afterwards, the participants of intervention group attended a multimedia teaching method of a snakebite first aid program. In this program, the multimedia teaching materials was presented on one handbook and one video. The contents presented were edited according to the WHO Guidelines for the Management of Snakebites and the American Heart Association [AHA] Guidelines Update for Cardio-pulmonary Resuscitation [CPR] and Emergency Cardiovascular Care [ECC]. And they were designed on the basis of CTML.

It has 3 sessions. In session1, the researcher used a handbook which contained balance-distributed words and pictures and guide marks, to narrate knowledge of snakebite. It took 30 minutes. In session2, the researcher used video which also contained balanced-distributed words and pictures and guide marks, to narrate knowledge of snakebite. It takes 10 minutes. In session3, the researcher let

the undergraduate students take the handbook and video back dorm to review by themselves.

All the participants filled out the questionnaires at baseline and after 6 weeks. Participants in control group received general lecture, but the program in experiment group was offered to this group after study was completed. The data collection was analyzed using SPSS software. Chi-square test, paired t-test and independent t-test were used. The significance level was set at $p<.05$.

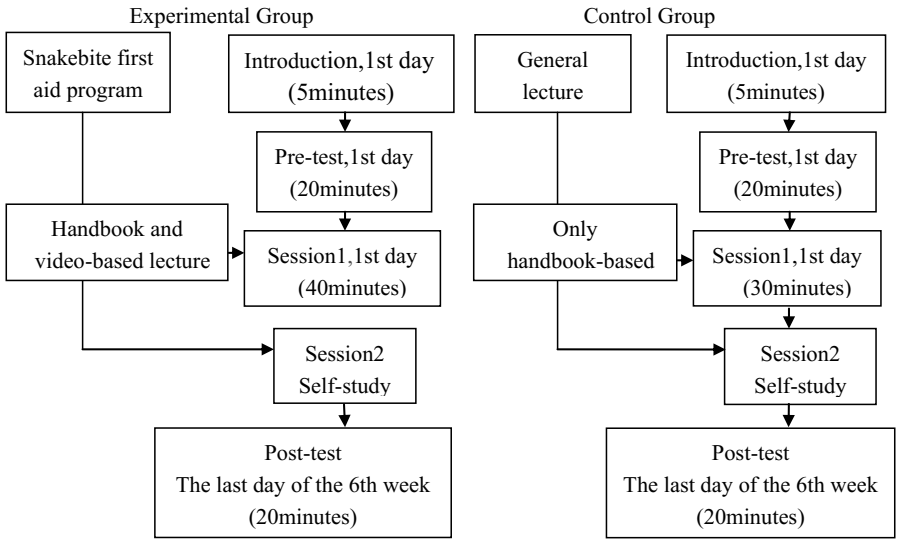

Figure 1 Diagram for experiment process

Findings

Most of the undergraduate students in the experimental group were females (n=22), were equal or less than 19 year-old (n=18), were in the situation of no family members had a medical background (n=27). Most of the undergraduate students in the control group were female (n=24), were equal or less than 19 year-old (n=25), were in the situation of no family members had a medical background (n=23). The Chi-square test revealed that all demographic characteristics of the experimental and control group were not significantly different at level .05.

Table 1 Comparison of the mean of snakebite knowledge score between experimental group and control group

Time	Sample group	Snakebite knowledge score		t	p-value
		$\bar{X}$	S.D.		
Pretest	Experimental group	9.03	2.798	680^{ns}	0.499
	Control group	9.53	2.897		
Posttest	Experimental group	12.03	1.81	2.491	0.016
	Control group	10.7	2.30		

ns=the mean was not significant (p>.05)

From Table 1, the researcher found that the mean of the snakebite knowledge score between the experimental group and the control group before the experiment were not significantly different at level .05. While after the experiment, the mean of the experimental group was significantly higher than that of the control group at the level of .05.

Table 2 Comparison of the mean of snakebite knowledge score within experimental group and control group

Sample group	Time	Snakebite knowledge score		t	p-value
		$\bar{X}$	S.D.		
Experimental group	Pretest	9.03	2.79	6.257	0.000
	Posttest	12.03	1.81		
Control group	Pretest	9.53	2.89	1.557^{ns}	0.130
	Posttest	10.7	2.30		

ns=the mean was not significant (p>.05)

Table 2 showed that the mean of snakebite knowledge score of the control group after the experiment was not significantly different from before the experiment at level .05. The mean of snakebite knowledge score of the experimental group after the experiment was significantly higher than before the experiment at level .01.

Table 3 Comparison of the mean of snakebite knowledge score between experimental group and control group on the aspects of different knowledge dimensions

Knowledge dimensions	Time	Sample group	Snakebite knowledge score		t	p-value
			$\overline{X}$	S.D.		
General	Pretest	Experimental group	2.83	1.020	1.35^{ns}	0.893
		Control group	2.80	0.887		
	Posttest	Experimental group	2.87	0.776	2.106	0.04
		Control group	2.43	0.817		
First aid	Pretest	Experimental group	1.67	1.124	.992^{ns}	0.326
		Control group	1.69	1.217		
	Posttest	Experimental group	3.73	1.112	2.193	0.032
		Control group	3.10	1.125		
Transport	Pretest	Experimental group	0.93	0.785	1.376^{ns}	0.174
		Control group	1.20	0.714		
	Posttest	Experimental group	1.90	1.185	.125^{ns}	0.901
		Control group	1.87	0.860		
Prevention	Pretest	Experimental group	2.53	1.306	.513^{ns}	0.610
		Control group	2.70	1.208		
	Posttest	Experimental group	3.53	1.042	.957^{ns}	0.343
		Control group	3.30	0.837		

ns=the mean was not significant (p>.05)

From Table 3, the researcher found that the mean of the snakebite knowledge score between the experimental group and the control group before the experiment were not significantly different at level .05 on the aspects of each snakebite knowledge dimensions. After the experiment, the mean of the experimental group was significantly higher than that of the control group at the level of .05 on the aspects of snakebite general knowledge and snakebite first aid knowledge. However, the mean of the experimental group was not significantly higher than that of the control group at the level of .05 on the aspects of snakebite transportation knowledge and snakebite prevention knowledge. Only slight improvement was found in these two dimensions.

Discussion

It was found that the means of snakebite knowledge scores of both experimental group ($\overline{X}$ =9.03) and control group ($\overline{X}$=9.53) before experiment were quite low according to the ranging from 0 to 18 points (Table 1). This result was in accordance with what were found in many previous studies. In a cross-sectional study to investigate gender and age-related differences in attitudes and knowledge of snakes comparing samples of students

and teachers, the result found that the average knowledge score was inadequate, university students was 60.7%, primary school pupils was 38.6%[7]. There was the other cross-sectional study aim to investigate knowledge and attitude about the highly venomous snakes among the students from the Rajarata University, Mihintale in Sri Lanka. The survey finding indicated that though most of the students had an idea of the first aid for snakes bite, they were still not quite sure about several questions, such as applying a tourniquet, giving some aspirin, giving large amount of water and food, and removing skin from bite position[6].

After the experiment, we found that snakebite knowledge scores of experimental group were significantly higher than those of control group at the level .05 (Table 1). This result revealed that multimedia teaching method of a snakebite first aid program can significantly affect students' snakebite knowledge scores. Little studies investigated the effect of multimedia teaching methods on knowledge of snakebite among undergraduate students. From many previous studies, similar results had been found. One study showed that students' academic achievements were improved significantly higher in experimental group after using the interactive multimedia CD educational intervention than using the traditional way of discussion and dialog, along with a teacher in control group[9]. The other one study revealed that students in experimental group increased knowledge scores significantly higher than students in control group because of using multimedia education intervention[8]. Similarly, in another study, the results showed that video teaching in experimental group was proved having significantly higher effect on improving students' skill training performance and making the students feel motivated to learn through this way than traditional lecturer demonstration[21]. As CTML stated, good instructional design is driven by our knowledge of human cognitive structures and the manner in which those structures are organized into a cognitive architecture. Without knowledge of relevant aspects of cognitive architecture such as the characteristics of intricate relations between working memory and long-term memory, the effectiveness of instructional design is likely to be random. Multimedia instructional messages that are designed in light of how the human mind works are more likely to lead to meaningful learning than those that are not. Nonetheless, in further results analysis, the researcher found that snakebite knowledge scores of experimental group were not significantly higher than those of control group at the level .05 on the aspects of snakebite transportation knowledge and snakebite prevention knowledge. This might be because of undergraduate students were not yet so familiar with emergency transportation process and the circumstance where snakes were frequently discovered. Comparing to first aid related teaching activities, ambulance was less often to be known by undergraduate students. Furthermore, undergraduate students would probably be high risk population after they graduated and worked in fixed community or rural area

In the experimental group, the mean of snakebite knowledge score before and after intervention showed that there was a significant difference at the level .01. (Table 2) This result suggested that the multimedia teaching method of a snakebite first aid program was possible an effective way to improve

undergraduate students' knowledge of snakebite. This result might be because that the multimedia teaching method of a snakebite first aid program covered all recommended dimensions of knowledge of snakebite based on the WHO guideline of snakebite management. And the multimedia teaching method of a snakebite first aid program was developed based on the CTML which could assist the learner to strengthen the learning process. Little studies investigated the effect of multimedia teaching methods on knowledge of snakebite among undergraduate students. Some studies investigated on knowledge of other topics among patients found the multimedia client education package led to statistically significant improvements in client knowledge of ulcer etiology[22]. A brief patient video could bring significant improvements in breast cancer knowledge[23]. The use of multimedia could increase patients' knowledge of registering to receive kidney donation[24]. While, in the control group the mean of snakebite knowledge score before the experiment and that after was not significantly different at level .05 (Table 2). This result showed that the general lecture using only a handbook could improve knowledge of snakebite a little bit. This result might be because that undergraduate student lost self-control of the learning process. Sometimes, undergraduate students might feel not easy to interrupt lectures when they had confusion about the lecture. And also, undergraduate students might feel not easy to review knowledge of snakebite by the voice which had just been taught immediately. Some undergraduate students might treat general lectures with a handbook to be outdated and be tired of this teaching method. Because the general lecture was the most frequent method being used in the high school.

Conclusion

Our findings showed that the multimedia teaching method of a snakebite first aid program designed based on the CTML could positively affect undergraduate students' snakebite knowledge. Since this topic was tropical and was rarely familiar with general population, more attention should be paid to the educational design based on theories and models. So, we could help to prevent biting and increase first aid capability.

Implications

1. The results demonstrated that the multimedia teaching method of a snakebite first aid program was effective for improving undergraduate students' snakebite knowledge. Thus, the program should be used in clinical practice in order to help undergraduate students prevent biting and increase first aid capability.

2. The snakebite knowledge questionnaire could assist nurses to evaluate the level of snakebite knowledge.

Recommendations

1. Further research should consider more psychological exclusion criteria in research methodology, for subjects who disliked the topic of snakebite paid no attention to this teaching program.

2. Further research should add consultation session into program, for some undergraduate students still had question about snakebite prevention or first aid.

3. Further research should consider more

ways of sharing video with subjects except for using cell phone alone.

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