Journal of The Korea Society of Computer and Information
Vol. 24 No. 4, pp. 161-167, April 2019

www.ksci.re.kr
https://doi.org/10.9708/jksci.2019.24.04.161

The analysis on general characteristics and awareness of first aid of scuba diver

Jang-Sik KO*, Byung-Jun Cho*, Gyoung-Yong Kim**

Abstract

In this paper, we propose a study on awareness of first aid of scuba diver. In order to achieve this purpose, a total of 310 customers over the age of 20 were selected as study participants form diving pools and dive resort in Seoul, Gyeonggi, Gangwon, Gyeongsang province area using the convenience sampling method However, only data from 295 customers were used after screening the data for reliability. The instrument for data collection was a questionnaire, and descriptive statistics, inter-item consistency reliability, pearson chi-square test were conducted on the data using the SPSS 21.0 version statistical package program. The followings are the results: The level differ significantly according hemorrhage, abrasion, sprain, fracture, fever, arrest, airway obstruction. As a result of analyzing the difference of first aid recognition according to the level of scuba diver, we found bleeding patients, abrasions, sprains, fractures, high heat exposure patients, cardiac arrest patients. There was a statistically significant difference in the level of airway obstruction due to food.

▸Keyword: Scuba diving. awareness, first aid, cardiac arrest, general characteristics

I. Introduction

In the national leisure activities, sports activities are followed by rest activities and hobby entertainment activities by type Ministry of Culture, Sports and Tourism [1]. The number of clubs in Scuba is 145 more than windsurfing, water skiing, 115 canoes, more than total 100,000 people announced Ministry of Culture, Sports and Tourism[2].

Although a large number of people are emigrating, there have been a lot of popular accidents along with various water accidents, and concrete measures have not yet been established[3]. The physical characteristics of water pressure, cold stimulation, and other aquatic environments that are applied to the human body during scuba diving have direct and indirect effects on almost all human possibilities[4].

Water pressure affects cardiac output, arterial pressure, blood flow, and local blood flow. In addition, toxicity due to oxygen or nitrogen gas occurs[5, 6].

Therefore, when exposed to underwater environments such as water temperature, water pressure, algae, salinity, and darkness encountered by diver, pressure equilibrium imbalance and body temperature decrease occur, resulting in psychological panic or panic feeling. Such unstable psychological state is caused by increased heart rate and excessive breathing[7].

In scuba diving activities, first aid awareness protects oneself from accidents and illnesses, and provides prompt, efficient response and appropriate first aid treatment when an emergency patient or wounded person occurs before the patient receives professional medical care. It is important to protect valuable life by helping to relieve and prevent disability and further to provide professional treatment[8].

• First Author: Jang-Sik KO, Corresponding Author: Gyoung-Yong Kim
*Jang-Sik KO (diver114kr@naver.com) Dept. Emergency Medical Technology, Kangwon National University
*Byung-Jun Cho (cho6451@gmail.com) Dept. Emergency Medical Technology, Kangwon National University
**Gyoung-Yong Kim (1021hk@hanmail.net) Fire Fighter, YangPyeong Fire Station
• Received: 2019. 04. 08, Revised: 2019. 04. 24, Accepted: 2019. 04. 24.

Previous studies related to domestic scuba have been continuing to study safety knowledge, safety standard and diving accident[9-12]. However, there is a lack of research on the recognition of first aid treatment of scuba divers.

The purpose of this study is to identify the trends of scuba divers and to identify the differences in the recognition of first aid to scuba divers and to provide important evidence for expanding the scope of safe scuba diving activities

II. Methods

1. Research Methods

The subjects of this study is to examine the diving resorts and swimming pools in Seoul, Gyeonggi province, Gangwon province and Gyeongsang province. The researchers visit the diving resort and the pool and ask for the convenience sampling of the research purpose and the purpose of the study using the survey tool, ask for the understanding of the facility manager and the person in charge, share the questionnaire, And the researcher immediately retrieved the data after the response. It is divided into the level (level) of the beginner (Open Water Diver, Open Water Diver), Advanced Diver, Dive Master, Assistant Instructor, Instructor, Trainer. 310 questionnaires were distributed through convenience sampling of non-probability sampling.

Out of the collected data, 295 copies (95.8%) were used for the actual analysis except 15 copies of unfair questionnaires such as no entry and double entry. The frequency and percentage of descriptive statistics on demographic characteristics of the final 295 copies included in the analysis are shown in Table 1. The demographic characteristics were male 211(71.5%) and female 84(28.5%). The average age of the participants was 147 (49.8%) aged between 20 and 29, 95 (32.2%) aged between 30 and 39 and 53 (18.0%) aged between 40 and over. The final education rate was 50 high school graduates (16.9% 110 students graduated (37.3%), 109 students graduated (36.9%), and 26 graduates graduated (8.8%). Jobs were followed by 120 students (40.7%), professionals 85 (28.8%), self-employed 41 (13.9%), others 36 (12.2%) and 13 production workers (4.4%). In scuba diving, 153 (51.9%), 86 (29.2%) and 56 intermediate (19.0% (21.0%), 32 (10.8%) for 10 years or more, 31 (10.5%) for 3 ~ 5 years, and 15 (5.1%) for 5 ~ 10 years.

Table 1. Descriptive statistics on demographic characteristics

division		frequence (N)	(%)
gender	man	211	71.5
	Woman	84	28.5
age(year)	20 to 29	147	49.8
	30-39	95	32.2
	over 40	53	18.0
Education	high school	50	16.9
	College	110	37.3
	University	109	36.9
	Graduate school	26	8.8
job	student	120	40.7
	Production	13	4.4
	Profession	85	28.8
	self-employment	41	13.9
	Other	36	12.2
scuba diving Level	beginner	153	51.9
	Middle class	56	19.0
	Higher	86	29.2
Participation term	Less than a year	155	52.5
	1 year ~ 3 years	62	21.0
	3 ~ 5 years	31	10.5
	5 years ~ 10 years	15	5.1
	More than 10 years	32	10.8
total		295	100.0

2. Study Design

The purpose of this study is to investigate the research on the recognition of first aid scuba divers. Questionnaires were used for the study. Table 2 shows the results of the questionnaire using the data collection tool.

Table 2. Composition of Questionnaires

Item	contents	question
Demographic characteristics	gender age Final education job Diving level Participation period	1 1 1 1 1 1
awareness of first aid	Bleeding and abrasions Sprains and fractures High temperature exposure and emergency accidents	2 2 3
total		13

The demographic characteristics consisted of six items including sex, age, final education, occupation, diving

level, and duration of participation. Gender is divided into male and female, ages 20 to 29, 30 to 39, and older than 40, and the final grade is 4 grades from high school graduation to graduate school, graduation, Self-employed, other 5 grade, diving level is classified into 3 levels as beginner, intermediate, and advanced.

First-aid knowledge was used in the previous research data[13,14].

In the knowledge level of the first aid method, 2 items of the bleeding accident occurred during the scuba diving activity, 2 items of the accident (sprain, fracture) accident and sprain occurred. 3 cases of high temperature exposure (sunstroke) situation, emergency accidents (cardiac arrest). A total of 7 items were composed of first aid knowledge about 3 situations.

In order to verify the validity of the research tools used in this study, draft questionnaires based on the previous research were composed of 1 professor of Emergency Department, 1 professor of Fire Department, 1 Professor of Leisure Sports Department, 3 Scuba Lecturer Trainer , And four scuba instructors. In order to verify the reliability of the survey tool used in this study, we used a method of verifying the inter-item consistency reliability with Cronbach's α value, The results are shown in Table 3.

Table 3. Reliability analysis results by variables

Item	question	α
awareness of first aid	7	.828

As shown in Table 3, Cronbach's α, which is a reliability index, was 0.828, indicating that the reliability of each measure was high and it was appropriate to verify the present study.

3. Data Analysis

Among the 310 questionnaires collected, 295 questionnaires were entered into the computer, except for the responses of no entry and double entry, and 15 items of unreliable data. The data were analyzed using the SPSS 21.0 program and all statistical analyzes The significance level of p<.05 was analyzed, and the specific data processing method is as follows. Chi square was used to verify the differences in first aid recognition per scuba diving level.

III. Results

1. Difference in the discovery of bleeding patients according to the level of scuba divers

<Table 4> shows the results of the survey to find out the difference of the question "The scuba diver found a bleeding patient during the diving participation activity".

Table 4. Differences in finding bleeding patients

Item	beginner		intermediate		advanced		total		X2
nothing	2	(1.3)	1	(1.8)	0	(.0)	3	(1.0)	80.361 ***
control bleeding	46	(30.1)	24	(42.9)	60	(69.8)	130	(44.1)	
rest	10	(6.5)	19	(33.9)	9	(10.5)	38	(12.9)	
call 119	86	(56.2)	9	(16.1)	13	(15.1)	108	(36.6)	
let it be	6	(3.9)	1	(1.8)	3	(3.5)	10	(3.4)	
etc	3	(2.0)	2	(3.6)	1	(1.2)	6	(2.0)	
total	153	(100.0)	56	(100.0)	86	(100.0)	295	(100.0)	

***p<.001

Specifically, 69.8% of the respondents said that they were "bleeding", 42.9% were intermediate, and 30.1% were beginners. In the case of beginners, 'report to 119' was 56.2%. There was a statistically significant difference between the two levels of response (2 = 80.316, p <.001).

2. Differences in abrasions depending on the level of scuba divers

<Table 5> shows the difference of the question 'When I got scratched during the diving activities of scuba divers'.

Table 5. Differences in abrasion

Item	beginner		intermediate		advanced		total		X2
nothing	2	(1.3)	1	(1.8)	0	(.0)	3	(1.0)	41.381 ***
clean up	71	(46.4)	30	(53.6)	69	(80.2)	170	(57.6)	
rest	19	(12.4)	13	(23.2)	6	(7.0)	38	(12.9)	
call 119	44	(28.8)	7	(12.5)	8	(9.3)	59	(20.0)	
don't know	16	(10.5)	3	(5.4)	1	(1.2)	20	(6.8)	
etc	1	(.7)	2	(3.6)	2	(2.3)	5	(1.7)	
total	153	(100.0)	56	(100.0)	86	(100.0)	295	(100.0)	

***p<.001

Table 5. Differences in abrasions involved in diving Specifically, 80.2% of advanced workers, 53.6% of intermediate workers, and 46.4% of beginners answered 'wash clean with water'. In the case of beginners, 'report

to 119' was 56.2%. There was a statistically significant difference between the two levels of response (2 = 41.381, p<.001).

3. Difference in sprains according to level of scuba divers

As shown in Table 6, 61.6% of the respondents said that they do not move, 53.6% said that they are intermediate and 53.6% said that they are not. And 39.2% respectively. There was a statistically significant difference in these responses between levels (2 = 22.641, p <.01).

Table 6. Differences in sprains

Item	beginner		intermediate		advanced		total		X2
nothing	4	(2.6)	0	(.0)	1	(1.2)	5	(1.7)	
don't move	60	(39.2)	30	(53.6)	53	(61.6)	143	(48.5)	22.641 **
rest	22	(14.4)	11	(19.6)	12	(14.0)	45	(15.3)	
call 119	57	(37.3)	11	(19.6)	17	(19.8)	85	(28.8)	
let it be	8	(5.2)	2	(3.6)	0	(.0)	10	(3.4)	
etc	2	(1.3)	2	(3.6)	3	(3.5)	7	(2.4)	
total	153	(100.0)	56	(100.0)	86	(100.0)	295	(100.0)	

**p<.01

4. Differences in scuba divers's level of fracture patients

<Table 7> shows the difference between the question "Scuba diver found a fractured patient during participation in diving activities".

Table 7. Differences in fracture patients

Item	beginner		intermediate		advanced		total		X2
nothing	3	(2.0)	0	(.0)	1	(1.2)	4	(1.4)	
care fracture	17	(11.1)	12	(21.4)	44	(51.2)	73	(24.7)	
rest	26	(17.0)	11	(19.6)	6	(7.0)	43	(14.6)	56.57 ***
call 119	87	(56.9)	29	(51.8)	34	(39.5)	150	(50.8)	
don't know	18	(11.8)	3	(5.4)	0	(.0)	21	(7.1)	
etc	2	(1.3)	1	(1.8)	1	(1.2)	4	(1.4)	
total	153	(100.0)	56	(100.0)	86	(100.0)	295	(100.0)	

***p<.001

More specifically, 51.2% of advanced, 21.4% of intermediate, and 11.1% of beginners answered 'fracture treatment'. In the case of beginners, 'report to 119' was 56.9%. There was a statistically significant difference between the two levels of response (2 = 56.57, p <.001).

5. Difference in patients exposed to high heat according to the level of scuba divers

<Table 8> shows the difference in the question 'I found a patient who was exposed to high fever among diving activities of scuba divers'.

Table 8. Differences in patients exposed to high heat

Item	beginner		intermediate		advanced		total		X2
nothing	4	(2.6)	1	(1.8)	1	(1.2)	6	(2.0)	
cooling	68	(44.4)	20	(35.7)	63	(73.3)	151	(51.2)	28.754 **
drinking	6	(3.9)	4	(7.1)	1	(1.2)	11	(3.7)	
call 119	69	(45.1)	27	(48.2)	21	(24.4)	117	(39.7)	
don't know	4	(2.6)	3	(5.4)	0	(.0)	7	(2.4)	
etc	2	(1.3)	1	(1.8)	0	(.0)	3	(1.0)	
total	153	(100.0)	56	(100.0)	86	(100.0)	295	(100.0)	

**p<.01

Specifically, 73.3% of advanced, 35.7% of intermediate, and 44.4% of beginners were "moving to a cool place". 'Report to 119' was 48.2% for intermediate and 45.1% for beginner, and this response was statistically significant according to the level (2 = 28.754, p <.01).

6. Difference of scuba diver's level according to level of cardiac arrest

As shown in Table 9, in order to find out the difference of the question 'The scuba diver found dysfunctional cardiac arrest', 'Cardiopulmonary resuscitation' was performed. 67.4% 37.5% of intermediate-level, and 28.1% of beginners. And 'report to 119' was high at 42.5% for beginners. There was a statistically significant difference between these responses (2 = 46.573, p<.001).

Table 9. Differences in patients with cardiac arrest

Item	beginner		intermediate		advanced		total		X2
do cpr	43	(28.1)	21	(37.5)	58	(67.4)	122	(41.4)	
ask help	27	(17.6)	16	(28.6)	7	(8.1)	50	(16.9)	
breathing	10	(6.5)	4	(7.1)	0	(.0)	14	(4.7)	46.573 ***
call 119	65	(42.5)	14	(25.0)	20	(23.3)	99	(33.6)	
don't know	5	(3.3)	1	(1.8)	1	(1.2)	7	(2.4)	
let it go	3	(2.0)	0	(.0)	0	(.0)	3	(1.0)	
total	153	(100.0)	56	(100.0)	86	(100.0)	295	(100.0)	

*** ***p<.001

7. Difference in airway obstruction due to food by scuba divers

As shown in Table 10, 69.8% of the respondents were in the advanced abdomen technique, and 69.8% were in the abdomen surgeon. 25.0% of intermediate-level students, and 37.3% of beginners. 'Report to 119' was 42.9% for intermediate and 35.3% for beginners. There was a statistically significant difference in these responses between levels (2 = 37.673, p <.001).

Table 10. Difference in airway obstruction due to food

Item	beginner		intermediate		advanced		total		X^2
thrust of abdominal	57	(37.3)	14	(25.0)	60	(69.8)	131	(44.4)	37.673 ***
ask help	20	(13.1)	10	(17.9)	4	(4.7)	34	(11.5)	
breathing	12	(7.8)	5	(8.9)	3	(3.5)	20	(6.8)	
call 119	54	(35.3)	24	(42.9)	19	(22.1)	97	(32.9)	
don't know	9	(5.9)	3	(5.4)	0	(.0)	12	(4.1)	
let it go	1	(.7)	0	(.0)	0	(.0)	1	(.3)	
total	153	(100.0)	56	(100.0)	86	(100.0)	295	(100.0)	

***p<.001

IV. Discussions

The purpose of this study is to investigate the difference in the recognition of first aid to scuba divers. Based on the results of the hypothesis test, the following results were discussed based on previous studies and professional data.

The differences in risk perception were examined according to demographic characteristics. There was no significant difference in sex, age, education, occupation, level, and duration of participation.

The difference in first aid recognition per level was analyzed. Specifically, when the bleeding patients were found, the items of 'Bleeding' appeared in the order of the senior, intermediate, and beginner, and the senior diver of the higher level required the completion of the first aid education and the effect of understanding was found in the field learning. In the case of beginners, 'Report to 119' showed a high level. This response partially agrees with the previous paper, except for the difference by level. In this study[15].

As a result of the difference in first aid recognition by level, it was found that the items 'clean clean with water' were higher in the order of advanced, intermediate, and beginner than those of the beginner, and 'report to 119' It is thought that it is the priority report to professional institution because it does not receive specialized first aid training. This reaction was in part consistent with reporting to the specialized agencies proposed by the previous articles[14,16]. In this study, it was found that there was statistically significant difference according to the level.

As a result of examining the differences in recognition of first aid treatment by level, the 'not moving' items appeared in order of superior, intermediate, and beginner.

Supported by Kim[14], which showed the greatest number of responses, "do not move" in the first aid method. In the case of a senior person, it is often the case that they have the authority to control the scuba diving scene and that the stability of the patient as the leader is considered as the top priority. In this study, it was found that there was a statistically significant difference in the response according to the level.

As a result of examining the difference of first aid recognition by level, the item 'fracture treatment' was concordant with the previous article [14], and in the order of advanced, intermediate, and beginner, Second-order treatment was included, and the effect on learning was partly consistent with the previous article, [16], by learning how to use splints or applying objects. In the case of the beginner, 'Report to 119' was high, and this response showed statistically significant difference according to the level in this study. As a result of examining the difference of first aid recognition by level, it was found that the item 'Move to a cool place' was higher in the order of advanced, beginner and intermediate, and 'report to 119' The result is that the intermediate and beginners are not able to solve the problems in the field as a result of not getting specialized education compared to the advanced ones. These responses were similar to those presented by Park and Kang, and there was a statistically significant difference in the level of the study[15, 16].

The difference in first aid recognition per level was analyzed. 'CPR' items appeared in the order of senior, intermediate, and beginner, and advanced students learned that immediate measures should be performed within a short period of time when they found cardiac arrest, consistent with the previous article[14]. In this study, it was shown that 'Be sure to report to 119' for beginners, which seems to be reported to the specialized agency because it is not a situation or condition that can be solved by the beginner

himself. There was a statistically significant difference in these responses from level to level.

The difference in first aid recognition per level was analyzed. Specifically, the 'abdominal push-out technique' item appears in the order of senior, beginner, and intermediate, and if immediate action is not taken, such as cardiac arrest, it may be exposed to emergency and serious situation may occur. 'Report to 119' appeared in the order of midterm and beginner, and was consistent with Kim of this reaction, and there was a statistically significant difference according to the level in this study[14].

In this study, the recognition of first aid treatment of scuba divers was higher as the duration of participation increased, and it was the same as the results of previous studies such as Kim and Kang [14, 16-18]. On the other hand, in this study, it is necessary to repeatedly study conservative education which is not achieved despite the high qualification level.

V. Conclusion

The purpose of this study is to identify differences in the recognition of first aid treatment of scuba divers. Intermediate and advanced dive levels for visitors over 20 years of age visiting dive resorts and swimming pools Convenience sampling of non-probability sampling for five months from January 25, 2016 to May 24, 2016 The data were analyzed by SPSS 21.0 program after coding 295 parts by convenience sampling. The results were as follows. Based on the demographic characteristics, the following conclusions were obtained.

As a result of analyzing the difference of first aid recognition according to the level of scuba diver, we found bleeding patients, abrasions, sprains, fractures, high heat exposure patients, cardiac arrest patients. There was a statistically significant difference in the level of airway obstruction due to food.

REFERENCES

[1] Ministry of Culture, Sports and Tourism. National leisure activity survey report. Seoul: Ministry of Culture, Sports and Tourism, pp. 51-100, 2015.

[2] Ministry of Culture, Sports and Tourism. National leisure activity survey report. Seoul: Ministry of Culture, Sports and Tourism, Korea Culture & Tourism Research Institute, pp. 55-95, 2018.

[3] H. C. Kim, “A Study on the Actual Condition of First Aid Education in Middle School,” Unpublished master's thesis, Kangwon National University, pp.1-64, Feb 1998.

[4] Y. S. Park, “Korean Marine-Diving Physiological Characteristics”, Kosin University Press pp.10-20, 2014.

[5] W. S. Lee, “A Study on the Variation of the Monoamines in the Brain of Oxygen Intoxicated Rats”, Marine Medicine, Vol. 7, No. 3, pp. 63-78, 1995.

[6] N. R. Anthonisen, “Respiratory System in Diving”, In Diving Medicine, Gun & Stratton, New York, pp. 35-48, 1976.

[7] B. G. Kim, and J. I. Choi, “Changes of Heart Rate, Body Temperature and Oxygen Saturation according to water area in Scuba Diving”, Journal of the Korean Society of Sports Science, Vol. 8, No. 2, pp. 371-379, April 2010.

[8] K. Y. Hong, “Survey on the level of knowledge of first aid in middle and high school students”, Journal of Health Education and Promotion, Vol. 18, No. 3, pp. 77-88, June 2000.

[9] Underwater world. Korea Diving Education Representative Council Divers Emission Status. pp. 3-41, 139, 2012.

[10] Kil-hyung Han, Kwangseok Hyun, Jeong-Min Park. The Effect of Pre-Scuba Diving Exercise Intensity on Vein Bubble Formation after Scuba Diving. Exercise Science. 28, 1, 74-81. 2019.

[11] Madden D, Thom SR, Dujic Z. Exercise before and after SCUBA diving and the role of cellular microparticles in decompression stress. Med Hypotheses. 86:80-4, 2016.

[12] C. W. Lee, C. H. Chung, and S. Y. Kang, “A Study on the Safety Measures through Consideration of Diving Accident”, Korea Maritime Port Association, Vol. 29, No. 1, pp. 125-129, January 2005.

[13] S. H. Jung, “The A Study on the Awareness of First Aid Education of Rural Residents”, Unpublished master's thesis, Graduate School of Education, Kyonggi University, pp. 1-39, August 2006.

[14] C. S. Kim, “Analysis of expected first aid behaviors in case of injury due to leisure and sports activities”. Distinguished Master's Degree, Seoul National University of Technology, pp.1-47, Feb 2011.

[15] H. C. Park, “The relationship between scuba divers safety knowledge, safety rules and ability to cope with emergencies”, Unpublished master's thesis, Graduate School of Kongju National University, pp.1-58, Feb 2014.

[16] K. S. Kang, “The Effect of Participation Activities of

Skin Scuba Club on Safety Knowledge", Unpublished Master's Thesis, Daejeon University Graduate School, pp.1-54, August 2012.
[17] Yun-Jeong Kim1. Cognition for First Aid in Persons Taking First Aid Education Theory and Practice related to Convergence Training. Journal of the Korea Convergence Society. 6. 3. pp. 1-12. 2015. http://dx.doi.org/10.15207/ JKCS.2015.6.3.001
[18] C. T. Kim, "An analysis of emergency transport proportional population", Journal of Digital Convergence, Vol. 12, No. 23, pp. 449-456, 2014. https://doi.org/10.14400 /JDC.2014.12. 12.449
[19] Hoon SO · Hyun-Jo YOO* · Young-Seong HWANG/ Study on Relational Model of Scuba Diving Instructors' Expertise,Instructor Reliability and Instruction Efficiency. The Korea Society for Fisheries and Marine Sciences Education, 27. 5, 77, 2015. http://dx.doi.org/10.13000/JFMSE.2015.27.5.1436

Authors

Jang-Sik KO received the B.S., M.S. degrees in Health Science and Phycical promotion from KangWon National University, Korea, in 2012, 2016 , respectively Dr. Ko is a doctoral degree in emergency rescue at Samcheok National University, Gangwon Province, and currently serving as a lecturer. He is interested in Health care and emergence care.

Byung-Jun Cho received the B.S., M.S. and Ph.D. degrees in Health Science and Phycical promotion from Chungnam National University, Korea, in 1995, 1997 and 2003, respectively Dr. Cho joined the faculty of the Department of EMT at Kangwon National University, Samcheok, Korea in 2010. He is currently a Professor in the Department of EMT, Kangwon National University. He is interested in Health care and emergence care.

Gyoung-Yong Kim received the B.S., M.S. degrees in Health Science and Phycical promotion from KangWon National University, Korea, in 2014 Dr. Kim is a doctoral degree in emergency rescue at Samcheok National University, Gangwon Province, and currently serving as a YangPyeong Fire Station. He is interested in Health care and emergence care.