KNOWLEDGE LEVELS ABOUT CRIMEAN-CONGO HEMORRHAGIC FEVER AMONG MIDWIFERY AND NURSING STUDENTS IN KAHRAMANMARAS, TURKEY

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Abstract. The aim of this study was to determine the knowledge levels of students in the Midwifery and Nursing Departments of the School of Health Sciences in Kahramanmaras Sutcuimam University (KSU) about Crimean-Congo hemorrhagic fever (CCHF) and to examine the factors influencing those knowledge levels. The study was conducted between April-June 2009 in the School of Health Sciences, KSU, Turkey. All the midwifery and nursing students in the School of Health Sciences at that time, 296 individuals, were included in the study. Questionnaire forms, developed from literature data and comprised of 66 questions, were given to the students, and they were asked to fill them out. Twenty-four point seven percent of the students were not available, thus 223 students(75.3%) were included in the study. Seventy-five point three percent of students stated a viruse was the cause for CCHF, 78.9% stated CCHF is seen between April and September in Turkey, and 80.7% stated there was no vaccine avaiable against it. Ninety-three point three percent of the study group stated that CCHF was transmitted by tick bite, 75.8% and 53.4% stated CCHF can be transmitted by exposure to blood of an infected animal or direct contact with an acutely infected animal, respectively. Thirty-three point two percent of students stated CCHF had no specific treatment. The mean knowledge score of students regarding CCHF was 54.6±14.8. The CCHF scores of the nursing students were significantly higher than those of the midwifery students. The CCHF knowledge scores did not vary by age or college year.

Key words: Crimean-Congo hemorrhagic fever, nursing and midwifery students, knowledge level, Turkey

INTRODUCTION

Crimean-Congo hemorrhagic fever (CCHF) is a zoonotic disease with a high mortality rate caused by viruses of the *Nairovirus* genus, Bunyaviridae family (Abram, 1995; Capua, 1998; Saijo *et al*, 2002). It poses a significant public health problem for Turkey and many other countries across the world. It is encountered sporadically and endemically in Eastern Europe, Asia, the Middle East, and Africa (LeDuc, 1989; Khan *et al*, 1997; Dunster *et al*, 2002). Recently, CCHF has occured endemically in our country with epidemics during April-September in central, northern, and eastern Anatolia (Ergonul *et al*, 2004; Gozalan *et al*,2004; Karti *et al*, 2004;

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Yilmaz *et al*, 2008).

The fatality rate of this disease has been estimated to vary between 15-70% (Swanepoel *et al*, 1989; Shuman, 2000). In our country, the fatality rate has been about 5% (Anonymous, 2009). CCHF virus is relatively vulnerable, cannot live outside a host, and is sensitive to light. It is inactivated at 56ºC for 30 minutes. It is sensitive to 1% hypochloride and 2% glutaraldehyde (Elaldi, 2004; Bakir and Elaldi, 2006). CCHF is transmitted through an infected tick bite; though exposure to blood, damp or other tissues, and via nosocomial route. It can also be transmitted by exposure to the body fluid of an infected patient or by coming into contact with an acutely infected patient (Aidaros, 2003; Athar *et al*, 2003). Nosocomial transmission has been well described in Pakistan, Iraq, South Africa, United Arab Emirates, and Iran (Fisher-Hoch *et al*, 1995; Mardani, 2001). CCHF has caused repeatedly nosocomial outbreaks with high mortality, but percutaneous exposure presents the highest risk of transmission (Van de Wal *et al*, 1985).

Since CCHF has nosocomial transmission, livestock farmers constitute the occupational group at highest risk, followed by healthcare personnel (Shepherd *et al*, 1985; Izadi *et al*, 2004). This is why it is important midwifery and nursing students have a knowledge regarding CCHF.

The incubation period following an infected tick bite is generally 1-3 days, at the most, 9 days. In cases where transmission occurs via direct contact with infected blood, body fluids or other tissues, the incubation period may be 5-6 days, or up to 13 days at most (Mardani and Bijani, 2003; Gozalan *et al*, 2004; WHO, 2009).

The initial presenting symptoms of CCHF are nonspecific, such as sudden fever, headache, fatigue, arthralgia, myalgia, abdominal pain, nausea, diarrhea, vomiting, conjunctivitis, sore throat, jaundice, photophobia, and mood disorders (Capua, 1998; WHO, 2009). Following these initial symptoms, hemorrhagic symptoms (petechia, ecchymosis, epistaxis, gingival bleeding, hemoptysis, hematemesis, melena, hematuria, metrorrhagia and internal bleeding) along with hepatomegaly, lymphadenopathy, confusion, and tachycardia may occur (Elaldi, 2004; Gozalan *et al*, 2004; WHO, 2009). In severe cases; shock, central nervous system dysfunction, coma, liver failure, kidney failure, respiratory failure, or DIC may be seen during advanced stages (Borio *et al*, 2002; WHO, 2009).

There is no specific therapy for CCHF. Ribavirin and supportive therapy (fluid and electrolyte replacement, blood replacement and use of vasopressors in shock) are employed (Borio *et al*, 2002; WHO, 2009).

While travelling to places where CCHF is known to be endemic, the following personal preventive measures should be taken: wear light colored long clothes, use boots and tuck your pant legs into your boots. The clothing and skin should be checked for ticks regularly. Animals should be treated with insecticides at regular intervals and insect repellent should be applied to the clothing and skin. Because the use of chemicals (*eg*, pouring eau de cologne onto the ticks or putting out a cigarette on ticks) might lead to vomiting of ticks, it should not be performed (Lacy and Smego, 1997).

Since CCHF has nosocomial spread, healthcare workers should take the following precautions while examining or treating a patient with CCHF. Both healthcare personnel and the patient should wear masks; healthcare personnel should also wear protective clothing and gloves while using safety glasses during invasive procedures. Penetrating procedures should be reduced, needles with a blunt tip should be used, and sharp and penetrating objects

should be put into special disposal containers (Anomymous, 2009).

The aim of this study was to determine the knowledge of students in the nursing and midwifery departments of the School of Health Sciences in Kahramanmaras Sutcuimam University, Turkey about CCHF, which has an increasing incidence in our country; healthcare workers are in a risk group, and to examine various factors that had an influence on CCHF knowledge levels.

MATERIALS AND METHODS

The investigation was conducted during April - June 2009 in the School of Health Sciences, Kahramanmaras Sutcuimam University. All 296 students, studying at the school were included in the study. No sampling was applied. A questionnaire, comprised of 66 questions based on data from the literature was delivered to the students and they were asked to fill it out. Twenty-four point seven percent of the students were not available. Two hundred twenty-three students (75.3%) were included in the final study. Age, college year and department were considered independent variables that could have an influence on CCHF knowledge level. Each correct answer out of 50 questions about CCHF, was given one point. The points were summed up, a maximum score was 50 points. The scores were then converted to a total score on a scale of 100 by multiplying them by 2. These final scores were considered the "CCHF knowledge score". Student's *t*-test was used for statistical comparison among groups. In order to reveal the influence of various characteristics on student knowledge, multiple linear regression analysis was employed. A $p<0.05$ was considered as significant for all analyses. Statistical analysis was performed using SPSS 9.0 for Windows (SPSS Inc, Chicago, IL).

Table 1
Various descriptive characteristics of students enrolled in the study.

Characteristics	*n*	%
Gender		
Male	14	6.3
Fermale	209	93.7
Marital status		
Married	11	4.9
Single	212	95.1
College year		
First year	45	20.2
Second year	88	39.5
Third year	57	25.6
Fourth year	33	14.8
Department		
Nursing	107	48.0
Midwifery	116	52.0
Total	223	100.0

The study was approved by the Ethics Committee at the University of Kahramanmaras Sutcuimam Medical School, and all subjects gave verbal informed consent before participating in the study.

RESULTS

The mean age of the study group was 21.2±1.7. Seventy-eight point nine percent of students knew CCHF occurred during April-September in Turkey, 38.5% stated the fatality rate in Turkey was 5%, and 80.7% knew there was no vaccine. Fifty-five point two percent of students knew the incubation period in cases bitten by a tick was 1-3 days, 56.0% knew the incubation period after exposure to infected blood, tissue or body fluid was 5-6 days.

Several descriptive characteristics of students included in the study are shown in Table 1. Ninty-three point seven percent of our study group were female, 95.1%

Table 2
Knowledge level of the study group on characteristics of CCHF (*n*=223).

Characteristics of CCHF	Students who knew	
	n	%
Pathogen characteristics and transmission routes of CCHF		
Pathogen characteristics		
Viruses cause CCHF	168	75.3
Relatively weak and cannot live outside a host	106	47.5
Sensitive to sunlight	34	15.2
Inactivated at 56ºC in 30 minutes	108	48.4
Sensitive to 1% hypochloride and 2% glutaraldehyde	168	75.3
Transmission routes		
Tick bite	208	93.3
Exposure to blood of infected animals	169	75.8
Contact with an acutely infected patient	119	53.4
Exposure to body fluids of an infected patient	168	75.3
It does not result in airborne transmission from an infected patient	132	59.2
Symptoms		
Initial symptoms		
Fever	209	93.7
Headache	147	65.9
Extreme fatigue, exhaustion	198	88.8
Arthralgia and myalgia	153	68.6
Abdominal pain	100	44.8
Nausea, vomiting, diarrhea	136	61.0
Sore throat	59	26.5
Conjunctivitis	39	17.5
Jaundice	11	4.9
Photophobia	25	11.2
Symptoms occurring after the initial symptoms		
Subcutaneous bleeding	144	64.6
Epistaxis	92	41.3
Gingival bleeding	60	26.9
Hemoptysis	66	29.6
Hematemesis	57	25.6
Melena	51	22.9
Hematuria	49	22.0
Hepatomegaly	42	18.8
Confusion	65	29.1
Tachycardia	85	38.1
Prevention and treatment of CCHF		
Prevention		
One should check his/her body regularly when travelling to regions recognized as habitats of ticks	194	87.0
Long clothes and boots should be worn in the field	185	83.0
Pant legs should be tucked into the socks	192	86.1
Animals should be treated with insecticides/acaricides at regular intervals	171	76.7
One should not put out a cigarette on a tick in order to remove it	179	80.3
One should not pour eau de cologne onto ticks in order to remove them	171	76.7

Table 2 (Continued).

Characteristics of CCHF	Students who knew	
	n	%
Light-colored clothing should be worn	134	60.1
Insect repellent should be used in the field	161	72.2
Precautions that should be taken by healthcare personnel		
Gloves should be worn	201	90.1
Needles with a blunt tip should be used	68	30.5
Patients should wear a mask	118	52.9
Healthcare personnel should wear a mask	164	73.5
Safety glasses should be worn during invasive procedures	123	55.2
Used sharp and penetrating instruments should be collected in special disposal containers	169	75.8
Penetrative procedures should be reduced	132	59.2
Protective suits should be worn	175	34.1
Treatment		
There is no specific treatment	74	33.2
Supportive therapy is required	170	76.2
Blood replacement therapy is required	99	44.4
Antiviral drug therapy (ribavirin) should be delivered	133	59.6

were single. Twenty point two percent were first-year students, 39.5, 25.6, and 14.8% were second-year, third-year, and fourth-year students, respectively.

Knowledge levels of the students in the study group regarding the pathogen, transmission methods, symptoms, prevention and treatment of CCHF are shown in Table 2. Seventy-five point three percent of participants stated a virus was the cause of CCHF, 47% described the virus as vulnerable which could not live outside the host. Ninety-three point three percent knew CCHF could be transmitted by tick bite, and 75.8% and 73.3% knew that it could be spread by exposure to the blood of infected animals or contact with the body fluids of an infected patient, respectively. Fever was the most commonly known initial symptom of CCHF in the study group, the least known was jaundice. The second most commonly known symptom was subcutaneous bleeding, and the second least known sign was hepatomegaly. Eighty-seven percent of the students stated one should frequently check his/her body for the presence of ticks when living ot traveling in areas known as a habitat for ticks. Wearing gloves was the most commonly known protective measure that should be taken by healthcare personnel, whereas the least known protective measure was the use of needles with a blunt tip. Thirty-three point two percent of the study group knew that CCHF did not have a specific therapy, 76.2% knew CCHF required supportive therapy, 44.4% knew CCHF sometimes requires blood replacement therapy and 59.6% knew the necessity of using antiviral therapy.

The mean CCHF knowledge level among students enrolled in the study was 54.6±14.8. The mean knowledge levels by department are shown in Table 3. The mean knowledge score of the nursing students about CCHF was 58.2±14.2 and among midwifery students was 51.4±14.7. The mean CCHF knowledge score for the

nursing students was significantly higher than that of the midwifery students ($p < 0.05$). Multiple linear regression analysis was applied to evaluate the influence of age, year in college, and department regarding CCHF knowledge level, the results of the analysis are shown in Table 4. Age and year in college were not associated with knowledge level.

DISCUSSION

CCHF infection, an important public health problem in Turkey and other countries across the world, is sporadically and endemically seen in Eastern Europe, Asia, the Middle East, and Africa (LeDuc, 1989; Khan *et al*, 1997; Dunster *et al*, 2002). Since CCHF has nosocomial transmission (Fisher-Hoch, 1995) it is important all healthcare personnel know about the clinical presentition and protective methods against the virus. Since both midwifery and nursing students are firstline healthcare personnel encountering patients during college, internship and work, they should have a good knowledge of CCHF.

CCHF occurs during April-September in Turkey (Anomymous, 2009). Seventy-eight point nine percent of students knew when CCHF occurs. It is important to know the period with greatest infection because this plays a significant role in diagnosis and prevention.

The most frequently known initial CCHF symptom (93.7%) was fever among our study group and the least known was jaundice. Headache was mentioned by 65.9%, abdominal pain by 44.8% and nausea, vomiting and diarrhea by 61.0%. In a study conducted on healthcare personnel in Balochistan regarding awareness of CCHF symptoms, fever was mentioned by 65.9%, headache by 19.5%, abdominal pain by 9.8%, and vomiting by 19.5% (Sheikh *et al*, 2004). The knowledge levels in our study were higher than that study. The reason behind our higher results might be the increasing incidence of CCHF cases in our country since 2002, which also promotes growing awareness. However, both

Table 3
Comparison of CCHF knowledge scores by departments.

Department	*N*	CCHF knowledge scores ±SD
Nursing	107	58.2±14.2
Midwifery	116	51.4±14.7
Total	223	54.6±14.8

t=3.49, p=0.001

Table 4
Influence of various factors over CCHF knowledge scores in the study group.

Dependent variable: CCHF knowledge score					
Independent variables	B	SE	Beta	*t*	*p*
Constant	71.9	13.7		5.24	0.00
Age (Numerical)	0.2	0.67	0.02	0.26	0.79
College year (1, 2, 3, 4)	0.8	1.21	0.52	0.65	0.52
Department (1.Nursing, 2. Midwifery)	7.6	2.11	0.26	3.58	0.00
n=223 / R=0.24 / R^2=0.06 / Adjusted R^2=0.04					

CCHF pathogen knowledge level=71.9+0.2(Age)+0.8 (College year)+7.6(Department)

studies exhibited markedly low knowledge levels about the initial symptoms of CCHF. The most commonly known symptom, after the initial symptoms, was subcutaneous hemorrhage, and the least known sign was hepatomegaly.

Eighty-seven percent of the study group knew one should check his/her body for ticks regularly when travelling to places recognized as a tick habitat. The most commonly known precaution a healthcare person should take was wearing gloves, the least known was the use of needles with a blunt tip. Regarding preventive measures, 90.1% of students enrolled in the study mentioned wearing gloves, whereas 73.5, 55.2, and 34.1% mentioned wearing a mask, wearing safety glasses during invasive procedures and wearing protective suits, respectively. In a study carried out among healthcare personnel in Balochistan (Sheikh *et al*, 2004), 59.1% of the study group stated wearing gloves as a preventive measure that should be taken, whereas 28.9, 3.8, and 16.6% mentioned wearing a mask, safety glasses during invasive procedures, and protective suit. In our study, awareness among healthcare personnel about preventive measures was higher than in the Balochistan study.

There is no specific treatment for CCHF. Supportive therapy (fluid/electrolyte replacement, blood replacement and administration of vasopressors in cases of shock) and ribavirin against the pathogen are used (Borio *et al*, 2002; WHO, 2009). Thirty-three point two percent of the study group knew there was no specific therapy for CCHF, 76.2, 44.4, and 59.6% mentioned the necessity of administration of supportive therapy, blood replacement therapy, and antiviral drug therapy, respectively. The knowledge level of students regarding CCHF treatment was remarkably low in the study.

The mean CCHF knowledge score of the study group was 54.6±14.8, which was quite low. The absence of education about CCHF in the curriculum is most likely the reason behind these low scores. As seen in Table 3, the mean CCHF knowledge score among the nursing students was 58.2±14.2, and among midwifery students was 51.4±14.7. CCHF knowledge scores of nursing students were found to be significantly higher than those of midwifery students ($p<0.05$).

In conclusion, the knowledge levels of nursing and midwifery students regarding CCHF, were inadequate. The knowledge scores of the nursing students were higher than the midwifery students. Education regarding CCHF should be taught in nursing and midwifery schools in regions with CCHF.

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