Knowledge of Medical Sciences Collegians about Protection against Crimean-Congo Hemorrhagic Fever (CCHF)

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Abstract

Background: Crimean-Congo hemorrhagic fever (CCHF) virus, due to its person-to-person transmission through contaminated secretions, is one of the most common nosocomial infections. Medical sciences students as important members of the health profession are at risk of being infected.

Objectives: The aim of this study was investigating the evaluation of knowledge medical sciences collegians about protection against Crimean-Congo hemorrhagic fever.

Materials and Methods: This study was cross-sectional and conducted during August 2015 to March 2016. The study group was all the students in Zahedan University of Medical Sciences, Iran. A total of 324 students were included in the study by stratified random sampling method. Data were collected by a validity and reliability proven questionnaire; it included 24 questions in 4 sections and was designed according to Likert five-point scale. Analysis of data was done by descriptive statistics (Mean ± SD and Frequency) and analytic statistics (T-test, Pearson correlation, ANOVA) using SPSS software version 16.0.

Results: The study results showed that the participants’ mean age was 23.37±11.64 and 207 (63.88%) students were females and 117 (36.12%) were males with the. The students’ mean knowledge score was 67.42±10.92. The highest knowledge score was about the prognosis and treatment (28.41±5.56) and the lowest was about the prevention (8.33±1.87). There was significant correlation between knowledge score with department (p= 0.001), education level (p= 0.001), college year (p= 0.013) and education level of parent’s (p= 0.001).

Conclusions: Considering the results, performing educatory courses can help increase students’ knowledge level.

Keywords: Knowledge, CCHF, Medical Sciences Students, Prevention.
1. Background

Crimean-Congo hemorrhagic fever (CCHF) is an acute, fatal and viral disease. The causing virus is of bunyaviridae family (1). This virus was first reported in Congo Peninsula in Russia in 1944 and thereafter was known as a fatal viral disease and named CCHF (2). CCHF is a common zoonotic disease that has been reported in different African, Asian, European and Middle East countries (3). This virus can be transmitted through Ixodes (Hyalomma) tick bite (the most common and most important way), contact with contaminated blood or tissue or contact with an infected person(4). However, the most important way of transmission in Iran is direct contact with contaminated secretions such as blood and tissues of infected animals (5, 6). In Iran, this virus was first reported in 1970 and has been reported to occur most commonly during August and September months. This virus is most commonly seen in Systan and Baluchistian province, Isfahan, Tehran and Golestan. Mortality rate was 11% in 2001 and reached 27% in 2004 (7). This disease is known with other names such as Hungribta, Khunymuny and Karakhalak in some other countries (8). Since one of the ways of transmission of this disease is the direct contact with infected persons’ blood and contaminated secretions, this disease is considered one of the most important nosocomial infections threatening the health of healthcare team and medical sciences students as members of this team (9). Mortality rate of this disease in hospital is between 5 and 30% (1). The highest risk of transmission of CCHF virus is at the time of contact with contaminated blood and meat during slaughtering the animal in the viremic period, but in hospitals this risk is highest with needle stick injury with sharp instruments and surgical instruments (10). CCHF has four phases, including incubation, introductory or pre-hemorrhagic, hemorrhagic and convalescence, with different manifestations. Incubation period depends on the way of transmission of the virus (11). The initial manifestations include sudden onset of fever, chills, fatigue, anorexia, nausea and vomiting. After 3-6 days bleeding usually begins in skin and mucus membranes which is accompanied by high mortality rate of 30-50 % (12). In order to prevent the disease from spreading and to save the infected patient, early diagnosis is of great importance. Thus, teaching high risk groups to increase their knowledge and identifying individuals with history of fever, tick bite or travel to endemic regions and also individuals who have had contact with contaminated secretions is necessary (13). Prevention is the best and the most effective and also the most important way of controlling the disease and of preventing its transmission, thus using personal items, avoiding gathering places of insects and bites and restricting contact with animals and, in case of healthcare workers, using suitable protective clothing and gloves and observance of safety measures when working with sharp or surgical equipment are effective in prevention of this disease (11). Health care centers of each country, due to their wide range of activities in the health fields, are of great importance to human societies. The main resources of these centers are healthy forces (14). Thus, of important issues in health centers are attention to the health of health personnel against nosocomial infections that can be transmitted through blood and contaminated secretions. Infection with viruses like hepatitis, HIV and CCHF, due to their transmission through blood and contaminated secretions, is always threatening the health of health care workers. Because of the importance of this subject, WHO recommends the precaution and stresses the necessity of high level knowledge, correct activity, and observance of safety measures in order to control the disease and prevent its transmission to the health care workers of which medical sciences students are inseparable members (15). Thus, preparation of educational programs, as the first step, requires a precise investigation of the knowledge
level and kind of attitude and analysis of the students’ practice (16-18). In a study done with the purpose of determination the knowledge level, attitude and the practice of nurses towards infection, only 9.6% of the participants had a good level of knowledge (19). In another study by Naji, the nurses’ level of knowledge about the current standards was low (20). Considering the importance of CCHF in nosocomial infections and being the medical sciences students at risk and lack of accurate studies about the evaluation of medical sciences students’ level of knowledge about this disease, this study was done. Evaluation of level of knowledge in any society and education according to it can be effective in better controlling and on time prevention of the disease(16). Thus, this study was done with purpose of investigation the evaluation of knowledge medical sciences collegians about protection against Crimean-Congo hemorrhagic fever.

2. Objectives
The aim of this study was investigating the evaluation of knowledge medical sciences collegians about protection against Crimean-Congo hemorrhagic fever.

3. Materials & Methods
This was a cross sectional study that was conducted during August 2015 to March 2016, with the aim of investigation the evaluation of knowledge medical sciences collegians about protection against Crimean-Congo hemorrhagic fever. It was done in Zahedan University of medical sciences (ZAUMS), Systan and Baluchistan, Iran.

3.1. Sampling
The study population was all the students at ZAUMS studying during 2015-2016 year. A total of 324 students were included in the study by way of stratified random sampling. Inclusion criteria consisted of studying at one of the schools of ZAUMS (Medicine, Dentistry, Nursing and Midwifery, Health, Paramedicine and Rehabilitation) and passing the microbiology and pharmacology courses. Exclusion criteria was the students’ unwillingness to fill out the questionnaire and first year students were also excluded from the study because not having passed the microbiology and pharmacology courses.

3.2. Data Collection
For collecting data a self-administered questionnaire was used after proving its validity and reliability. The questionnaire had two main parts. The first part was about students’ demographic characteristics such as their age, gender, department, educational level, college year, marital status, family income and parents’ educational level. The second part had 24 items in 4 sections including ways of transmission of the disease (7 items), signs and symptoms (3 items), preventive measures (10 items) and prognosis and treatment (4 items). Answer to all questions was according to Likert five-point scale, from 1 to 5. 1 was assigned to completely disagree, 2 to disagree, 3 to slightly agree, 4 to agree and 5 to completely agree. Total scores of the questionnaire were classified in three levels; scores 24-56 were considered as low, 57-89 as moderate and 90-124 as good level of knowledge. Overall knowledge score was calculated as sums of the scores of different sections of knowledge.
3.3. Validity and Reliability of Questionnaire

Validity of the questionnaire was proven based on the review of previous studies (13, 21), four infectious diseases specialists’ and six infectious disease assistants’ views and a few faculty members of the School of Medicine (pharmacology and microbiology department). After receiving their comments corrections and modifications were made and CVI= 0.78 and CVR= 0.76 were calculated.

Reliability of the questionnaire in the current study Cronbach’s alpha coefficient for each section of the questionnaire was calculated 0.83, 0.87, 0.78 and 0.81, respectively. The reliability of total questionnaire 0.91 so its reliability was proved.

3.4. Statistical Analysis

For analysis of data descriptive statistics (Mean ± SD for continues variables, Frequency and percentage for categorical variables) and analytical statistics (T-test, Pearson correlation, ANOVA and Tukey) were used. Normality of the data was evaluated using Kolmogorov-Smirnov test and data were normal, so statistical parametric tests were used for comparing the variables. SPSS v.16 was used for data analysis. In this study for analyzing the data and comparison confidential interval (CI) was 95% and P<0.05 was considered significant.

3.5. Ethical Consideration

He research requires an ethical declaration for the research as human subjects are participated and has been approved by the Committee of Medical Ethics. At first the aim and importance of the study was explained to the students and they were assured that their confidentiality is maintained and there is no need to write their names. Students were provided with an explanation to acquire their consent before filling out the questionnaire. Then the questionnaires were distributed among students 11 times in the library and central site of university. After completion, the questionnaires were collected for statistical analysis.

4. Findings

All the 324 questionnaires were included in the analysis after completion by students. Response rate was 100%. The results showed that the participants’ age was between 19 and 25 with the mean age of 23.37±11.64. The majority of the participants were females (63.88%).

There was significant correlation between knowledge score with department (p= 0.001), education level (p= 0.001), college year (p= 0.013) and education level of parent’s (p= 0.001).

So that medical and nursing students had a higher knowledge score compared to other students. PhD students and students with higher college year had also a higher knowledge score than others.

According to the T-test results, there was not significant correlation between knowledge level with students’ gender (P=0.63). Pearson correlation results showed no significant correlation between students’ knowledge and their age and family income (P>0.05). (Table 1).

Table 1. Demographic characteristics of surveyed students

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, year (mean)</td>
<td>23.37±11.64</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td></td>
</tr>
</tbody>
</table>
Study results showed that students’ average knowledge score about CCHF was 67.42±10.92 and most of them (72.53%) had a moderate level of knowledge (Table 2).

**Table 2. Knowledge level of students about Crimean-Congo hemorrhagic fever (CCHF)**

<table>
<thead>
<tr>
<th>Levels of knowledge</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>68</td>
<td>20.98</td>
</tr>
<tr>
<td>Moderate</td>
<td>235</td>
<td>72.53</td>
</tr>
<tr>
<td>High</td>
<td>21</td>
<td>6.48</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>100</td>
</tr>
</tbody>
</table>
Among each sections of knowledge, the highest knowledge score was about prognosis and treatment with the average score of 28.41±5.56 and the lowest score was about prevention with the average score of 8.33±1.87 (Table 3).

Table 3. Mean distribution of Each of the areas of knowledge about Crimean-Congo hemorrhagic fever (CCHF) in students

<table>
<thead>
<tr>
<th>Compass of knowledge</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission ways</td>
<td>11.31±2.39</td>
</tr>
<tr>
<td>Signs and symptoms</td>
<td>19.37±4.91</td>
</tr>
<tr>
<td>Preventive measures</td>
<td>8.33±1.87</td>
</tr>
<tr>
<td>prognosis and treatment</td>
<td>28.41±5.56</td>
</tr>
<tr>
<td>Total</td>
<td>67.42±10.92</td>
</tr>
</tbody>
</table>

Statistical analysis showed that the knowledge scores were highest among medical students, nursing students and public health students with the mean scores of 69.48±4.23, 69.26±2.36 and 68.81±1.65, respectively. (Table 4)

Table 4. Knowledge levels scores of students by departments

<table>
<thead>
<tr>
<th>Field of study</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>69.48±4.23</td>
</tr>
<tr>
<td>Dentistry</td>
<td>68.70±1.27</td>
</tr>
<tr>
<td>Health education</td>
<td>64.23±3.16</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>58.11±2.34</td>
</tr>
<tr>
<td>Nursing</td>
<td>69.26±2.36</td>
</tr>
<tr>
<td>Midwifery</td>
<td>67.52±2.20</td>
</tr>
<tr>
<td>Operating room</td>
<td>65.28±1.53</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>64.36±1.58</td>
</tr>
<tr>
<td>Public health</td>
<td>68.81±1.65</td>
</tr>
<tr>
<td>Environmental health</td>
<td>66.65±1.78</td>
</tr>
</tbody>
</table>

According to the results, 22 (6.80%) of the students mentioned the fever as the most common sign of CCHF. 198 (61.11%) of them mentioned the contact with contaminated blood and tissues as the most common way of transmission of CCHF and 133 (41.00%) students mentioned not disinfecting the diagnostic and treatment equipment’s as a risky behavior about CCHF. Most of the units stated that examination and treatment of the live animal is an effective preventive measure and also reported educating the community as the most effective way for prevention of CCHF. About the treatment section most of the students 198 (61.11%) had knowledge about supportive therapy, blood replacement and CCHF drugs. (Table 5)

Table 5. Frequency distribution and percentage of students about Crimean-Congo hemorrhagic fever (CCHF)

<table>
<thead>
<tr>
<th>Sections/Questions</th>
<th>Completely agree</th>
<th>agree</th>
<th>Slightly agree</th>
<th>disagree</th>
<th>Completely disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I know all the risk factors for CCHF</td>
<td>24(7.40)</td>
<td>138(42.60)</td>
<td>71(21.90)</td>
<td>67(20.70)</td>
<td>24(7.40)</td>
</tr>
<tr>
<td>The most common presenting symptom of Crimean Fever in the</td>
<td>22(6.80)</td>
<td>134(41.40)</td>
<td>72(22.20)</td>
<td>72(22.20)</td>
<td>24(7.40)</td>
</tr>
</tbody>
</table>
animal before slaughtering is fever.
Ulcer in extremities is the main symptom of Crimean Fever and symptoms occur abruptly

<table>
<thead>
<tr>
<th>Ways of transmission</th>
<th>23(7.10)</th>
<th>69(21.30)</th>
<th>73(22.50)</th>
<th>134(41.40)</th>
<th>25(7.70)</th>
</tr>
</thead>
</table>

Contact with the excrement, viscera, blood and urine of the infected animal is the most common way of transmission of CCHF

<table>
<thead>
<tr>
<th>Contact with patients’ blood and other secretion is the most common way of transmission of CCHF.</th>
<th>198(61.11)</th>
<th>46(14.19)</th>
<th>45(13.88)</th>
<th>27(8.33)</th>
<th>8(2.46)</th>
</tr>
</thead>
</table>

Cutaneous contact is the common way of transmission of CCHF virus.

<table>
<thead>
<tr>
<th>Insects bite is the cause of transmission of CCHF</th>
<th>25(7.70)</th>
<th>24(7.40)</th>
<th>67(20.70)</th>
<th>72(22.20)</th>
<th>136(42.00)</th>
</tr>
</thead>
</table>

The most common risky behavior in being infected by CCHF is not disinfecting the diagnostic and treatment equipment

<table>
<thead>
<tr>
<th>Handing with infected patient can cause the transmission of CCHF</th>
<th>24(7.40)</th>
<th>71(21.90)</th>
<th>28(8.60)</th>
<th>68(21.00)</th>
<th>133(41.00)</th>
</tr>
</thead>
</table>

Using infected patient’s personal items causes the transmission of CCHF

<table>
<thead>
<tr>
<th>Preventive measures</th>
<th>137(42.30)</th>
<th>73(22.50)</th>
<th>67(20.70)</th>
<th>23(7.10)</th>
<th>24(7.40)</th>
</tr>
</thead>
</table>

Examination and treatment of the live animal is the preventive measure

<table>
<thead>
<tr>
<th>Wearing long clothing,</th>
<th>70(21.60)</th>
<th>69(21.30)</th>
<th>135(41.70)</th>
<th>26(8.00)</th>
<th>24(7.40)</th>
</tr>
</thead>
</table>
masks and gloves is the best way for prevention 
Educating the community is an effective way for prevention of CCHF 
Vaccinating the community is an effective way for prevention of CCHF 
The visitation of slaughterhouses by the ministry of health is a preventive measure of CCHF 
Brochures can be the best tool for educating general population of the community 
TV can be the best tool for educating general population of the community 
Families can be the best tool for educating general population of the community 
Friends can be the best tool for educating general population of the community 
Health centers can be the best tool for educating general population of the community 

Prognosis and treatment
The most effective way Fatality rate of CCHF in human is 100% When infected with CCHF virus, one can recover by complete rest Supportive therapy, blood replacement and antiviral therapy is necessary for treating the
5. Discussion
This study was conducted with the aim of investigation of the evaluation of knowledge medical sciences collegians about protection against Crimean-Congo hemorrhagic fever. The students’ mean knowledge score was 67.42±10.92 which is at the medium level. In a study conducted by Rahnavardi et al. in Isfahan and Systan and Balouchestan provinces the health care workers’ (HCWs) mean knowledge score was 50.34±28.14 of 100 and participants from Isfahan province had higher knowledge than those from Systan and Baluchistan province (3). The reason behind the lower knowledge in the latter can be attributed to the lower socio-economic level in this group. In Sheikh et al.’s study in Pakistan HCWs’ knowledge about the clinical presentations and ways of transmission of the CCHF reported to be poor (22). Ozer and his colleagues found a mean knowledge score of 54.6±14.8 in nursing and midwifery students which was quite low (21) but it seems that the mean knowledge level in Turkey is higher than Iran.
In the current study, there was a significant correlation between the students’ field of study and their knowledge score; medical and nursing students had the highest knowledge score and the surgery room and anesthesiology students had the lowest. In Saffie et al.’s study the highest knowledge score was reported to be in the physicians and the lowest was in the laboratory staff (23). Ozer et al. reported a higher knowledge score in nursing students than in midwifery students which is in accordance with the results of the current study (21). The medical and nursing students’ higher knowledge than other students is probably due to their direct contact with the patients and passing more credits about the diseases, diagnostic measures, treatment and drugs whereas other students don’t have direct contact with patients. The medical students’ higher knowledge than nursing students can be attributed to that they are the first line in diagnosing and treating patients. There was also significant correlation between students’ college year and educational level and their knowledge level so that students with higher college year and higher educational level had a higher knowledge about CCHF. Parents’ educational level was significantly correlated with students’ knowledge level.
The most common way of transmission of CCHF is the tick bite. Direct contact with patients’ blood or contaminated tissues or secretions is another way of transmission (4). In Iran, however, the most common way of transmission is direct contact with patients’ blood or contaminated tissues or secretions (5). In the current study 61.1% of the participants stated that direct contact with patients’ blood or contaminated tissues or secretions is the most common way of transmission. In Saffie et al.’s study 77.1 % of the participants (23) and in Çığdem et al.’s study 58.6% of the students and stated that direct contact with infected person’s secretions is a way of transmission of CCHF (24), the latter being at the same level as the results of the current study but the higher knowledge in Saffie et al.’s study is probably because of their higher educational level and having a history of work or contact with patients; about 80% were doctors or nurses and the remaining were medical assistants, emergency medical technicians or laboratory personnel whereas all the participants in the current study were univeristy students. In Ozer et al.’s study 75.8% and 73.3% of the students knew that CCHF could be transmitted by exposure to the blood of infected animals or contact with the infected patient’s body fluids, respectively (21), which is a higher level of knowledge than the results of the current study.
In signs and symptoms section, 42.6% of the students stated that they know the risk factors of the CCHF and 41.4% stated that the most presenting symptom in the animal before slaughtering is fever. In Safiye et al.’s study all the participants knew that fever is a symptom in CCHF (23).

Supportive therapy (fluid/electrolyte replacement, blood replacement and administration of vasopressors in cases of shock) and ribavirin against the pathogen can help the patient recover faster but there is no specific treatment for CCHF (13, 25). In the present study the students’ best knowledge was about prognosis and treatment; 61.11% of the students stated that supportive therapy, blood replacement and antiviral therapy is necessary for the patients. Ozer et al. reported the students’ knowledge about the treatment of CCHF to be low; 76.2% of the students stated that supportive therapy is necessary and 44.4% and 59.6% stated blood replacement and antiviral therapy is necessary, respectively (21). However, the students’ knowledge about the treatment options in their study seems to be higher than those in current study.

Prevention is the most effective way of preventing the disease from transmission and using protective clothing and gloves when working with patients are effective in prevention. In the current study the worst knowledge was about prevention; 41.7% of the students believed wearing long clothing, masks and gloves is the best way for prevention. In Ozer et al.’s study 90.1% of students mentioned wearing gloves whereas 73.5 and 34.1% mentioned wearing a mask and wearing protective suits, respectively (21). In Çiğdem et al.’s study 98.6% and 61.4% of the students believed one should wear gloves during the contact with the patients and 61.4% stated that wearing a mask is a way for prevention (24). Also, in the prevention section students of the current study had a significantly lower knowledge about the ways for prevention of CCHF than other studies and this shows that it is necessary to pay more attention to increasing the students’ knowledge about CCHF in this province by performing educatory classes or seminars or any other kind of education in order to achieve this goal.

Considering the students’ poor knowledge about the ways of transmission and ways for prevention of CCHF and also considering that Systan and Baluchistan is endemic for CCHF, performing educatory courses can help increase these students’ knowledge. Further studies including more students are recommended to evaluate students’ knowledge more accurately. It is also recommended to evaluate and educate the students regularly and periodically and all the planning’s be based on the students’ knowledge and the results from their evaluation.

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Authors Contributions
Azizollah Arbabisarjou was project supervisor and designer of the research. Enam Alhagh Charkhat Gorgich and Sanam Barfrushan collaborated in analyzing data, prepared the literature review and writing the draft. Ayub Abedi collaborated in collecting data.

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