

Original Article

A Survey of a Cholera Epidemic in Aran va Bidgol City in Summer 2011

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Abstract

Background and purpose: Cholera is an endemic disease in Iran and in some cases each year from around the country report. The aim of this study was to evaluate the prevalence of the disease cholera among people suffering from acute diarrhea in the Aran va Bidgol.

Materials and Methods: In this study, patients with acute diarrhea were examined for cholera detection in the city of Aran va Bidgol in summer 2011. All 294 patients with acute diarrhea referred to rectal swabs in the laboratory of health centers and in the specific microbial culture medium of thiosulfate citrate bile sucrose agar. Furthermore, some information about health behaviors, such as drinking water supply, status of food preservation, toilets status, drinks, and food consumption in the outdoors was collected from all participants in this study.

Results: Laboratory results showed that *Vibrio cholerae* isolated from 21 patient stool cultures and these patients were to have cholera disease. About 23.81% of the patients were male and 76.19% were female. Fifteen patients (71.43%) were Nag form of cholera and 6 patients (28.57%) were diagnosed with Eltor form of cholera. According the completed questionnaire by patients the origin of *V. cholerae* has been announced consumption of raw vegetables (42.85%) and springs and subterranean water (38.59%).

Conclusion: Consumption of raw vegetables and water (springs and subterranean) are the important factors for mobility to cholera and it should be more considered prevention and control program and monitoring methods about using of safe water and food.

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1. Introduction

Cholera still represents a major public health problem in developing countries and considered as an indicator of social development (1-3). *Vibrio cholerae* is a Gram-negative bacterium which belongs to the Vibrionaceae family (2,4) and the incubation period of disease varies from a few hours to 5 days (5). Cholera infection is mild or without symptoms, with assuming that 90% infection are asymptomatic. Sometimes it can be severe. The primary symptom appearance with bowel movements, abdominal fullness, and growl it's them. Those looking to quickly loose stools appear with glaze consistency of rice water and sometime have the smell of fish, another symptom are vomiting (2). In primary stages, the abdominal pain is mild. The intensity of anxiety thirst, weakness, and abdominal cramps related to excretion rate and dehydration fluid. Less than 5% patients have fever (5). The main source of cholera and similar disease can be surface water and the rout of spread prevalent in epidemics is water and food polluted it often found in warm and humid places. There is a possibility outbreak in all seasons, but the incidence is higher in May-November in Iran (1,2,4,5). Causes in summer are the warm weather, which increases the ability to reproduce the *Vibrio* (5). About 1,076,372 cases of cholera and 10,098 deaths have been reported by Pan American Health Organization in 1995 which is estimated that about 0.6% diarrhea are caused by cholera (3). It means that annually occur 11 million cholera cases despite the international rules small number cases reported cholera. So at the countries worldwide by the WHO is not possible. Records of epidemics in the past and recent years in Iran represent a permanent threat to the country. A total of 16,000 persons were diagnosed with cholera in an epidemic of cholera in 1969. In the recent years, the biggest epidemic in Iran was occurred in 1998 and more than 10,000 persons were diagnosed

with cholera and 109 persons were dead. In another occurrence, 1150 cases of cholera and 11 deaths have been reported in 2005 (3). There is a healthy problem that *V. cholerae* with serotype Ogawa Eltor biotype represents in south and central of Iran especially in summer (2). There is not a published data about the prevalence of cholera in Aran va Bidgol city of Iran, and it is necessary to do a research about cholera prevalence in this city. The aim of this study is to investigation of prevalence and causes of cholera among patients with acute diarrhea in Aran va Bidgol city of Iran and its related risk factors.

2. Materials and Methods

2.1. Sample collection

This study was a descriptive and cross-sectional study, aimed to investigate the cholera infection in patients with acute diarrhea. This study accomplished in summer of 2011 in Aran va Bidgol city of Iran. The city of Aran va Bidgol has located in the North of Isfahan province. There are 90,492 people at this city. Health services are done by six urban health centers, two rural health centers, and nine health home and two hospitals. A total of 294 patients that had acute watery diarrhea and refer to the health center for sampling Eltor was examined. Sampling was done with using rectal swabs and Cary-Blair transport medium then send to microbial laboratory.

2.2. Sample examination

Samples were transferred and streaked on thiosulfate citrate bile sucrose agar (TCBS) plates in the reference laboratory. Plates for each sample incubated in 37° C for 18-24 h. If the grown microbe had yellow, smooth, and shiny colonies on TCBS plates, then microbial colony was transferred on Kligler iron agar and incubated in 37° C for 18-24 h, in the presence of acid/base reaction without gas oxidative test was performed (6,7). *V. cholerae* in stool cultures of all the people who have growth to be as positive.

2.3. Complete the questionnaire

All patients with positive stool culture were excluded and complete questionnaire involved demographic data and information about possible risk factors. How to complete the questionnaire for people in this way was that as soon as the announcements about the record of the laboratory of questionnaire cast refer to the location immediately, and at the same time, the questionnaire includes clinical information demographic, therapy and risk factors facing it: (1) travel in seven goes before the disease, (2) consumption the remaining food in the 7 days before the disease, (3) consumption of vegetables in 7 days before the disease, (4) consumption industrial ice in 7 days prior to the occurrence of disease, (5) toilet water supply location, and (6) drinking water status of residence (piping or without piping) were surveyed, and information was collected.

2.4. Statistical analysis

The gathered data were entered to the software SPSS for Windows (version 16, SPSS Inc., Chicago, IL, USA) and a percentage (%) to measure prevalence was used for statistical analysis.

3. Results

This study included patients who had a positive stool culture during this time had Eltor. A total of 21 patients were diagnosed with cholera during this time, which 15 persons of them were Nag and 6 persons were Eltor (Table 1).

Patient persons with positive stool culture are included 76.19% females and 23.81% males. Nag and Eltor *Vibrio* isolated from both male and female. Frequency distribution of positive stool culture during diagnosed with cholera disease according the sex were 52.38% and 19.05% for Nag and 23.81% and 4.76% for Eltor in female and male, respectively.

Status of risk factors involved in the disease cholera patients with positive stool culture to express themselves in this study has been listed in table 2. Among these factors the most frequent of risk factor were consumption of fruit and vegetable (42.85%) and spring-subterranean and water (38.95%). The results showed that the frequency distribution of risk factors announced by patients with positive stool culture including consumption of leftover food, consumption of apricot strips, consumption of juice, and use of factorial ice were 4.76%, 4.76%, 4.76%, and 4.76%, respectively.

4. Discussion

Vibrio species are important in threat to public health (8). Non-health care environments can cause to occur cholera disease in the world. Occurrence of cholera is the significance from ecological and epidemiological aspects. Water sources and food such as fruits and vegetables and seafood can be environmental reservoir to human. Infection due cholera starts with ingestion contaminated water or food and entrance the bacterium to the human body and colonized in intestinal epithelial cells (9,10).

Table 1. Frequency distribution of positive stool culture during diagnosed with Eltor according the sex

Patients	Female, N (%)	Male, N (%)	Total, N (%)
Positive stool culture	16 (76.19)	5 (23.81)	21 (100.00)
Nag	11 (52.38)	4 (19.05)	15 (71.43)
Eltor	5 (23.81)	1 (4.76)	6 (28.57)
Negative stool culture	207 (76.00)	66 (24.00)	273 (92.86)
Total	223 (75.85)	71 (24.15)	294 (100.00)

Table 2. Status of risk factors involved in the patient diagnosed with cholera disease through stool culture to express themselves answers in questionnaire

Risk factors	N (%)
Consumption of fruits and vegetable	9 (42.85)
Consumption of leftover food	1 (4.76)
Consumption of apricot strips	1 (4.76)
Consumption of juice	1 (4.76)
Use of spring and subterranean water	8 (38.59)
Use of factorial ice	1 (4.76)
Total	21 (100.00)

This study surveyed the prevalence and the causes of cholera among patients with acute diarrhea in Aran va Bidgol city of Iran and its related risk factors. At this study, patient persons with positive stool culture were 76.9% female and 23.1% male. But in some studies have been reported that men more than women are affected (11). In an epidemic occurrence of cholera in Gorgan city, 20 people were male and 26 people were female.⁴ It is also reported that every two sexes are affected by minor differences in epidemic of Hamadan city. It reported that 45 people were male, and 42 were female with frequency 52% and 48%, respectively (11).

Frequency of cholera disease in village patients were 28.57%, but in a survey in 2005 reported that 20% patients were rural people in Iran (3). Furthermore, health statistics in 2008 shows that 5.6% of patients living in villages of Karaj city (3). In other epidemic reported that 75% of patients living in the village of Gorgan city (12).

Several factors can affect the occurrence of cholera disease. Some studies refer the different factors in increasing incidence of emerging *Vibrio* species, especially *V. cholerae*. Environmental temperature can be considered the most important factor governing in the distribution and increasing of pathogenic vibrios and inducing the cholera disease (13). At the present study, the risk factors involve in this occurrence are more,

and they are listed in table 2. Among these factors, the most frequent of risk factor were consumption of fruit and vegetable (42.85%) and spring-subterranean water (38.95%). Rahbar et al. informed about the epidemiology of a cholera epidemic in 2005 that contamination of vegetables, especially raw vegetables that irrigated with sewage has been reported to cause disease (14). But in a survey, some researchers have studied thirty seven *V. cholerae* isolated from surface water sources at locations of Tehran and they showed that no genotyping correlation between the *V. cholerae* isolated from surface water and the clinical setting which has been announced previously by clinical laboratory (9).

Barati et al. reported a cholera epidemic in Karaj city in 2008. They announced that in all 54 patient stool cultures have been isolated *V. cholerae*. They reported that consumption of factorial ice and consumption of vegetables and fruits are the main risk factors for distribution and outbreak of cholera (3). The results showed that the frequency distribution of risk factors announced by patients with positive stool culture including history of travelling, consumption of leftover food, consumption of vegetables and fruits, consumption of unpasteurized ice cream, consumption of factorial ice, using of non-health care toilet, using of drinking water without piping and consumption of drinking water with chlorine under acceptable level are 12.96%, 14.81%, 85.19%, 38.88%, 14.81%, 7.41%, 5.55%, and 11.11%, respectively. According the results, the odds ratio for risk factors of consumption of factorial ice and consumption of vegetables and fruits are 3.35 and 4.43, respectively (3). In the present study, using of water and consumption of vegetables and fruits are the most risk factors to have high frequency distribution among patients with diagnosed cholera agent which has been isolated from stool culture in the laboratory.

In a study about an occurrence of cholera disease in Arak province of Iran reported that 16 patients were compared with 32 controls that matched for age and sex, observed between patients with inadequate heating food, consumption of unpasteurized ice cream, contact with diarrhea patients, inappropriate washing vegetables and fruits relationship existed (15). In another study on the outbreak of cholera in Sistan and Balouchestan province in 2003 reported that 20 patients and 89 controls were surveyed relation between illness and eating in banquet and consumption factorial ice, however in this study individual health as the main risk factor but not question about fruits and vegetable, from this aspect this study is not comparable to this survey and they have not been found the relation with the source and kind of drinking water (16). A similar study conducted in Golestan province and results of study have similarities, the consumption of raw vegetable as well as the study expressed as a risk factor, which induces the disease (12).

In a study, it has reported the risk factors and patterns of transmission about cholera outbreak in Southern Tanzania. They showed that there is no significant relation between disease and distance of water source, swimming in the river and consumption of dried fish. But, there is a relation between disease and other factors such as consumption of fruits and vegetables, use of under cooked food and unfiltered water (17). This result is similar to the results of the present survey about risk factors and patterns affecting in transmission of cholera and inducing the disease.

It is important to protect the public health for preventing of diagnosed with cholera disease. It should be considered controlling the risk factors through controlling program and monitoring methods for vegetables and irrigation with suitable methods and using safe food and water. However, the role of these factors in cholera and bowel disease in previous years has to take care of them to prevent future outbreaks.

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