Epidemiologic Features of Cholera Epidemic In Al Hilla City-Babylon Province-Iraq 2015

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Abstract
Background: Cholera is a diarrheal disease, if untreated, leads to high morbidity and mortality. It has economic and social impact, several epidemics occurred in Iraq during the last years.

Objective: To describe the cholera epidemic in a person place, and time epidemiologic model

Methodology: This is a descriptive cross sectional study (describe the occurrence of disease in person, place, and time descriptive epidemiologic approach). Data were collected using records of patients admitted to merjan and pediatric teaching hospitals in Hilla city who were diagnosed and confirmed by stool culture (according to the central public health laboratory results) during the period of the last epidemic (from the first of August through November 2015). The duration of this study started from the beginning of February to the end of May 2016. A sample of 150 confirmed cholera cases were selected in a systematic random sample technique, the missed data of these cases were completed by phone after getting the verbal consents of patients or their families.

Results: This study revealed that the peak frequency incidental cholera cases was on September, and most of cholera cases occurred in Al-Tajea district. The most affected age group was (5-20), no significant difference was reported according to gender. Most of the cases were illiterate, lived in overcrowded houses. The disease is more common in internally displaced persons and those who drink water from wells and rivers.

Conclusion: Cholera cases were at highest incidental rate in September and in Al-Tajea district, the most affected age group was (5-20years), the disease was more common among illiterate people, living in overcrowded houses. Internally displace and those who use river and well water.

Keywords: Epidemiologic features, cholera epidemic, AlHILLA, Babylon province, Iraq

الخلاصة

خلفية البحث: مرض الهضبة هو مرض معدي يصيب الأنسان بالإسهال، إذا لم يتم علاجه بصورة صحية وسرعة يؤدي إلى الموت ولله تبعات اقتصادية واجتماعية. فعات وبائية لمرض حقيقي حصلت في العراق في السنوات الأخيرة.


هذ لبيانات جمعت من سجلات المرضى الراقدين في مستشفى مرجان التعميمي ومستشفيات الأطفال في مدينة الحمة تم تأكيد الحالات اعتمادا على نتائج الزرع الجرثومي من مختبر الصحة العامة المركزي في بغداد. استمرت هذه الدراسة من الأول من شهير شباط 2016 إلى الثلاثين من شهير أيار من نفس السنة، وتتم هنا أختيار عينة منهجية عشوائية شملت 150 حالة مؤكدة من المصابين بمرض الهضبة.

النتائج: عينة معدل انتشار للإصابة كانت في منطقة الناحية. وأظهرت هذه الدراسة أن أعلى نسبة من الإصابات سجلت في شهر أيلول وفقت أعلى لإصابات في الفترة العشوائية (5-20) سنة، لا يوجد فرق إحصائي معنوي للإصابة بين الإناث والذكور (p>0.05). بنية الدراسة أن الأميين هم الأكثر تعرضا لخطر هذا المرض ويحمل إصابات بحالة معدية (p<0.05). وقد الواضح في هذه الدراسة أن الإزاحة في المنزل مرتبط بانتشار المرض حيث كان الساكن في البيت المزدحم والمنزل الغير مغلق أكثر عرضة للإصابة., تبين ترتيب هذه الدراسة أن المهجرين هم الأكثر استعدادا للإصابة بالمرض وشريحة ماء الديه والإيران هي أشد عوامل تغيير في الوباء.
Introduction

Cholera is an acute diarrheal disease caused by the bacterium, vibrio cholerae; it is an infection in the intestine that can kill even a healthy adult in a matter of hours (WHO, 2016).

It is considered to be endemic in many countries and the pathogen causing cholera cannot currently be eliminated from the environment (Ali et al., 2012).

The disease can spread by contaminated water or food leading explosive epidemics (Southwick, 2015).

Regions of the world where cholera is currently prevalent are Africa, Asia and parts of the Middle East including Iraq (Gaffga et al., 2007).

Iraq is at risk of epidemic spreading from neighboring countries because it lies on the way of pilgrimage to Mecca and contains a number of holy Shrines. During the epidemic of 1820 when cholera first spread to Basra, there were a great number of deaths and many sectors of the city were completely depopulated (Al-Wardi A, 1969).

Cholera is considered to be endemic disease in many parts of Iraq (Abdul-Shaheed 2005; Al-Shok and Baiee, 2009; AL-Naddawi and Khalid, 2009; WHO country profile, 2010; Noaman et al., 2011; Alauadi, 2014).

The recent outbreak that occur in Iraq during August-November 2015, a total of 2,810 laboratory confirmed cases of vibrio cholera O1 Inaba had been confirmed in Iraq at the central public health laboratory (Al-Abassi and Anema, 2015).

In Babylon 675 cholera cases were confirmed, this is the highest number of cases among other provinces in Iraq (WHO, Emergencies preparedness response, 2015).

This study was conducted to describe the epidemiological feature of the last cholera epidemic in Hilla city using the person, place, and time model.

Methodology of Data Collection

Descriptive cross sectional study was applied to describe the disease information about cholera patients during the last epidemic (that occurred during the year 2015) in Hilla city- Babylon province. A person, place, and time epidemiological model was used to achieve this task in; person (age and sex and other demographic characteristics such as living in crowded houses, level of education, beside the behavioral characteristic of patients, place of residence at districts and sub districts levels, and the time trend of disease occurrence by (months). A systematic random sample group of patients was selected from three referral teaching hospitals (Merjan and pediatric teaching hospitals in Al- Hilla city) using records of patients admitted who were diagnosed and confirmed by stool culture (according to the results of central laboratory of public health in Baghdad) during the period of the cholera epidemic from the first of August through November 2015. The duration of this study started from the beginning of February, 2016 through the end of May of the same year. The inclusion criteria for cholera cases are the following.

Those with signs and symptoms of cholera that confirmed by stool culture from the central public health laboratory in Baghdad. (Al-Abassi and Anema, 2015) All ages both sexes, patients who are living in Hilla city were included in this study.
Statistical analysis was carried out using SPSS version 20. Categorical variables were presented as frequencies and percentages.

The Pearson's chi-square test ($x^2$) test (goodness of fit) was used to determine the associations between variables. A p-value of $\leq 0.05$ was considered as statistically significant.

**Results**

Regarding the time factor of this epidemic it was started on August and continued through December 2015. The peak frequency of incidental cholera cases was on September. Fig (1)

![Figure (1): Distribution of cholera cases during epidemic according to months in Al Hilla city](image)

Regarding the place, most of cholera cases occur in Al-Tajea with a rate of 55/10000 followed by Al-Thawra district with a rate of 36/10000. While the lowest rate was in the city center with a rate of 1/10000 as shown in Figures (2) and (3).

![Figure (2): Distribution of cholera cases rates by districts of Hilla city](image)
Figure (3): Map chart distribution of 150 confirmed cholera cases during 2015 cholera epidemic in Al-Hilla city by number of cases. (5-20) years, they constituted 42% of cases, while the lowest age group was < 1 years, constitute about 0.07% of cases as shown in figure (4). With no significant difference observed between males and females.
Table (1) shows that most of cholera patients live in urban area (64%). Illiterate people were highly and significantly affected by cholera $p<0.05$.

Table (1): Demographic characteristics (age, sex, residence, educational level) for cholera cases

<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients (n=150)</th>
<th>N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>79 (52.7)</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>Female</td>
<td>71 (47.3)</td>
<td>df=1</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban area</td>
<td>96 (64.0)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Rural area</td>
<td>54 (36.0)</td>
<td>df=1</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>7 (4.7)</td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>50 (33.3)</td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>29 (19.3)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Secondary school</td>
<td>26 (17.3)</td>
<td>d.f=4</td>
</tr>
<tr>
<td>University/diploma</td>
<td>38 (25.3)</td>
<td></td>
</tr>
</tbody>
</table>

*p value $\leq 0.05$ is significant

Some socioeconomic characteristic of cases are shown in table (2) where members who are illiterate appear to be more likely to have cholera than others.
Crowding families with family members $\geq 6$ members have a significantly higher rate of cholera than non-crowded, and those live in houses $< 3$ rooms also have a statistically significant higher rate of disease. Displaced families members appear to be at risk of getting the disease they constituted about one third of the reported cases. Drinking water from river and wells was highly associated risk with cholera, about one sixth of cases mentioned that they drink water from rivers or wells.

Table (2) : Some socio–economic characteristics (crowding, family income, displaced family and source of water supply) for cholera cases.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients (n=150)</th>
<th>N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$&lt; 6$ members**</td>
<td>61 (40.7)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>$\geq 6$ members</td>
<td>89 (59.3)</td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not enough</td>
<td>99 (66)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Enough</td>
<td>51 (34)</td>
<td></td>
</tr>
<tr>
<td>Displaced family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes**</td>
<td>49 (32.7)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>No</td>
<td>101 (67.3)</td>
<td></td>
</tr>
<tr>
<td>House rooms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$&lt; 3$ rooms**</td>
<td>132 (88.0)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>$\geq 3$ rooms</td>
<td>18 (12.0)</td>
<td></td>
</tr>
<tr>
<td>Source of water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>River &amp;Well**</td>
<td>23 (15.3)</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Tap water</td>
<td>11 (7.)</td>
<td></td>
</tr>
<tr>
<td>RO</td>
<td>116 (77.3)</td>
<td></td>
</tr>
</tbody>
</table>

* p value $\leq 0.05$ is significant.

Discussion

This study was conducted to describe epidemiological features of the last cholera epidemic in Al Hilla city, that took place in 2015 and to identify some associated factors related to this epidemic.

Describing the occurrence or distribution of the disease epidemiologically is the first important step in prevention and control of future similar epidemics through paving the way to generating hypothesizes and identifying the important preventable and modifiable risk factors (Gordis, 2015).

This study explains the time trend of cholera epidemic, The type of this epidemic is a point source epidemic showing its peak in September and disappear in December of the same year, this finding reflects the role of environmental factors (whether) on the distribution of this disease in our city according to time factor (seasonal variation),the effect of climate on occurrence and distribution of cholera cases could be related mainly to increase temperature of water to certain degree(around 24 degree
centigrade) which is suitable for the growth of this microorganism (Louis et al., 2003; Vezzulli et al., 2015; Semenza, 2015; Lugomela et al., 2015; Esteves, 2015) and this usually leads to explosive epidemic due to highly polluted water and to increase of chances of exposure to high doses of the causative agent, this finding is similar to what had been reported by other study conducted in Iran (Moradi, 2016) while the peak epidemic in Africa occurs in rainy season (Munyuli, 2013).

This study reveals that most of cholera cases occur in poor places (districts and sub districts) of the city such as shanty towns and informed settlement places. Al-Tajea has the highest rate of cases followed by Al-Thawra district. These two districts were over crowded with poor housing, with poor environmental sanitation.

The study shows that most common cases of cholera in this epidemic occurred in the age group (5-20) years. This finding is similar to the findings of other investigator (Dickson et al., 2015) in the Buea health district of Cameroon in the year 2015 who found that most of cholera cases were below 21 years old while the lowest age group affected the age < 1 years, infants are immune from getting this diarrheal disease due to breast milk feeding and their infrequent chance of exposure to polluted water as compared to other age grow.

The finding of this work shows that there is no significant difference in frequency of getting the disease of cholera between males and females, this finding agrees with the findings of other researchers (Shultz et al., 2009; Rosewell et al., 2013; Moradi, 2016) and disagrees with the findings of others (AL-Abbassi et al., 2005; Al-Shok and Baiee, 2009; Deepthi et al., 2013) who reported that females were more liable to have this disease than males.

This study explains that the majority of patients are urban inhabitants, this finding is similar to the finding of a study conducted in Kirkuk province - Iraq, and to the findings of other two studies conducted outside Iraq in Iran and in Ghana (Noaman, 2011; Moradi, 2016).

Our study documented that the internally displaced people are liable to have this disease, this expected finding can be explained by the unhealthy situations they face (poor sewage disposal, inadequate save water supply, stresses and shortage of preventive health services, this finding is similar to that reported by (Rosewell et al., 2010) in Papua New Guinea in the year 2012 who proved that displaced peoples were more susceptible to cholera.

The study shows that about one sixth of patients drinks water from wells and river, this finding goes with the findings of other investigators (Rosewell et al, 2012; Sasaki et al., 2008), this reflects the important role of provision of safe and adequate water supply for prevention, control and elimination of this endemic disease in our country.

In conclusion cholera cases were at highest incidental rate in September and in Al-Tajea district, the most affected age group was (5-20 years), the disease was more common among Illiterate people, living in overcrowded houses, internally displaced persons and those who use river and well water as a source for drinking water.

**Recommendations**

Education programs that can target poor and uneducated people should be put in place using different types of mass media in addition to enhancing the role of religious and community leaders in transmitting the healthy knowledge to protect people at risk especially the poor people.

Improving the sanitation and healthy environment is highly requested to prevent further similar future epidemics.
A multi disciplinary team work strategy (including all related sectors in the province) should be urgently started to reduce and solve this high priority public health problems.

Development and improvement of active and passive surveillance successful and sustainable program is essential to prevent and control this neglected disease in our country.

References


