Incidence of Typhoid Fever Among Patients Attending Aminu Kano Teaching Hospital Laboratory, Tarauni Local Government, Kano State, Nigeria

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ABSTRACT
The study was conducted to estimate the incidence of typhoid fever among patients attending Aminu Kano Teaching Hospital (AKTH) Laboratory, Kano, Nigeria, in the month of October, 2011. 115 Patients blood sample from various units of the Hospital where used. These units include GOPD, D/care, POPD, A/E etc. The Serum Were prepared from the blood samples and widal test was carried out using slide screen method for the detection of agglutination in serum samples. The results obtained are; (87 %) are positive to typhoid fever infection, (13%) are negative. Statistical analysis has shown that there was no significant difference between females and males typhoid fever positive on the bases of sex distribution of the patients attending Aminu Kano Teaching Hospital laboratory, for typhoid fever diagnosis in October, 2011.

Key Words: Agglutination, Serum, Slide Screen Method, Typhoid fever, Widal Test

INTRODUCTION

Typhoid Fever
Typhoid fever, also called enteric fever, is a contagious, potentially life-threatening bacterial infection. Typhoid fever is caused by the bacterium Salmonella enteric serotyphi (also known as Salmonella typhi), which is carried by infected humans in the blood and digestive tract and spreads to others through food and drinking water contaminated with infected feces. Symptoms of typhoid fever include fever, rash, and abdominal pain. Typhoid fever is the result of systematic infection mainly S.typhi found only in man. The disease is clinically characterized by a typical continuous fever for 3 to 4 weeks. Relative bradycardia with involvement of lymphoid tissues and considerable constitutional symptoms. The term “enteric fever” include both typhoid and paratyphoid fever [¹]. Typhoid fever, also known as typhoid [²], is a common
Worldwide illness, transmitted by the ingestion of food or water contaminated with the feces of an infected person, which contain the bacterium Salmonella enterica, serovar typhi. The bacteria then perforate through the intestinal wall and are phagocytosed by macrophages. The organisms are a gram-negative short bacillus that is motile due to its peritrichous flagella. Bacterium grows best at 37°C/ 98.6°F – human body temperature.

This fever received various names, such as gastric fever, abdominal typhus, infantile remittent fever, slow fever, nervous fever, phytopgenic fever, etc. The name of “typhoid” comes from the neuropsychiatric symptoms common to typhoid and typhus (from Greek “stupor”) [3]. The impact of this disease fell sharply with the application of modern sanitation techniques. In 2004, World Health Organization estimates the global typhoid fever disease burden at 21 million cases annually, resulting in an estimated 21600-600,000 deaths per year, predominantly in children of school age or younger [1]. Typhoid fever is characterized by a slowly progressive fever as high as (104°F), profuse sweating and gastroenteritis. Less commonly, a rash of flat, rose-coloured spots may appear [4] There exist an older killed whole-cell vaccine that is still used in countries where the newer preparations are not available, but this vaccine is no longer recommended for use, because it has a higher rate of side effects(mainly pain and inflammation at the site of the injection) [8]

Resistance to ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole and streptomycin is now common, and these agents have not been used as first line treatment now for almost 20years. Typhoid that is resistant to these agents is known as multidrug-resistant typhoid (MDR typhoid). It has also been suggested azithromycin is better at treating typhoid in resistant populations than both fluoroquinolone drugs and ceftriaxone [6]. Azithromyciin significantly reduces relapse rate compared with ceftriaxone.

**AIMS AND OBJECTIVES**

**Aims:**
The aims of the research is to study the incidence of typhoid fever among patient’s attending Aminu Kano Teaching Hospital (AKTH) Laboratory in October, 2011.

**Objectives:**
At the end of the research, the results will be used to;
Determine the incidence of typhoid fever among the patients attending Aminu Kano Teaching Hospital (AKTH) Laboratory in October, 2011.
Determine the Age and Sex Distribution of the disease.
To make an appropriate Recommendation.

**Materials and Methods**

**Study Area**
Kano state is state located in northern Nigeria, created on May 27, 1967 from part of the Northern region. Kano has a total area of 201311 km² (7,772.6 sq. mi) and rank an area of 20th of 36 states in the country.
According to the 2006 census figures from Nigeria, Kano has a total population totaling to 9,383,682 and rank out the first out of 36 states in terms of population. The area is fall mostly within the savannah zone in the South and the Sahelian zone to the North. It is also located in the northern high plain of Hausa land and about latitude 12° to 12° 15 North and longitude 8°30 to 8°45 East, which has an elevation of about 525 meters above the mean sea level [7].

**Sampling Site**
The study area for this project work is Aminu Kano Teaching Hospital (AKTH), which is located at Tarauni local government area of Kano State. The work was conducted in serology laboratory with the approval of Ethical Committee of the Hospital.

**Sample Collection**
Obtain all equipment and materials for venipuncture sample collection.
Label all tubes with name and or specific identification number, date and time of collection [8]
Take the vacutainer, which is a sample collection material that can be used instead of syringe, near to you.
Remove the cover of the vacutainer needle opening.
Position the patient correctly so that the arm is hyper-extended.
Position the hand with tourniquet and select the appropriate vein as large as possible.
Clean the site with 70% alcohol swab.
Insert the prepared vacutainer and its needle.
Insert the vacuum tube into the upper opening of the vacutainer.
Allowed the blood to fill at least 2/3 of the tube volume.
Remove the vacutainer from the patient’s vein gently.
Cover the punctured site with cotton wool or dry swab for a few minutes until bleeding stops. [8]
Insert the needle into the syringe needle destroyer to destroy the needle.
Insert the remaining unburned part of the needle into the needle cover, until it is fixed well. Care has to be taking to avoid recarfing.
Loose the needle and dispose it into the safety box [8].

**Sample Processing**
Place the vacuum tube containing blood sample collected into the test tube rack. After 45 minutes, the blood will clot automatically resulting in the serum formation at the upper layer of the container, if not, then centrifuge for five (5) minutes 5500 RPM (Revolution per minute. The serum is the only recommended part for Widal test [9].

**Serum Formation**
Serum is the clear straw coloured fluid that is left after blood has clotted. When the blood is shed or collected in a container. It clots in this process, the fibrinogen is converted into fibrin and the
blood cells are trapped in this fibrin forming the blood clot [10]. After about 45 minutes, a straw coloured serum oozes out of the blood clot [10]. Serum is separated from blood cells and clotting elements by centrifuging. Serum has an approximately the same volume with plasma (55%) [10]. It is different from plasma only by the absence of fibrinogen, i.e. serum contains all the other constituent of plasma only by the absence of fibrinogen [10].

**Test Principle**

Principle of the Method: When the coloured, smooth, attenuated widal antigen suspensions are mixed with patient serum, anti-salmonella antibodies present serum react with the antigen suspensions to give agglutination. Agglutination is a positive test result, indicating presence of anti-salmonella antibodies in the patient serum. No agglutination is negative test result indicating absence of anti-salmonella antibodies [11]

**Reagent Composition**

Widal contains ready to use concentrated, smooth antigen suspensions of the bacilli; S.typhi ‘O’, S. typhi ‘H’ S. paratyphi ‘AO’ S.paratyphi ‘BO’, S. paratyphi ‘BH’, S.paratyphi ‘CO’, and or polyspecific positive control reactive with these antigens [12].

Reagent Preparation and Storage

The sample can be stored at 2-8˚C if not immediately used.

The shelf life of reagents is as per the expiry dated [12].

**Widal Test Procedure**

Place one drop of patient’s serum on to each of the required number of reaction circles.

Add one drop of appropriate Widal antigen suspension to the reaction circles containing the patient’s serum [13]

Mix contents of each circle uniformly over the entire circle with separate mixing sticks.

Rock the slide gently back and forth, and observe for agglutination macroscopically after (1) one minute [13].

**RESULT AND DISCUSSION**

The results of the incidence were tabulated based on Age and Sex distribution. A null hypothesis and alternative hypothesis were drawn to test the relationship between typhoid fever positive and negative based on sex using chi-square ($\chi^2$) test.

**Table 4.1: Incidence and Age group Distribution of Typhoid Fever;**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No of Samples</th>
<th>No of Positive (%)</th>
<th>No of Negative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>12</td>
<td>10 (8.7%)</td>
<td>2 (1.7%)</td>
</tr>
<tr>
<td>11-20</td>
<td>33</td>
<td>29 (25.2%)</td>
<td>4 (3.5%)</td>
</tr>
<tr>
<td>21-30</td>
<td>31</td>
<td>28 (24.3%)</td>
<td>3 (2.6%)</td>
</tr>
<tr>
<td>31-40</td>
<td>21</td>
<td>18 (15.7%)</td>
<td>3 (2.6%)</td>
</tr>
<tr>
<td>Sex</td>
<td>No of Samples</td>
<td>No of Positive</td>
<td>No of Negative</td>
</tr>
<tr>
<td>--------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Male</td>
<td>56</td>
<td>46 (40%)</td>
<td>10 (9%)</td>
</tr>
<tr>
<td>Female</td>
<td>59</td>
<td>54 (47%)</td>
<td>5 (4%)</td>
</tr>
<tr>
<td>Total</td>
<td>115</td>
<td>100 (87%)</td>
<td>15 (13%)</td>
</tr>
</tbody>
</table>

Table 4.2: Incidence and Sex Distribution of Typhoid Fever

Table 3.1: Chi-square Calculation Table

<table>
<thead>
<tr>
<th>Sex</th>
<th>No of Positive</th>
<th>No of Negative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>46 (a)</td>
<td>10 (b)</td>
<td>56 (a+b)</td>
</tr>
<tr>
<td>Female</td>
<td>54 (c)</td>
<td>5 (d)</td>
<td>59 (c+d)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (a+c)</td>
<td>15 (b+d)</td>
<td>115 (a+b+c+d)=N</td>
</tr>
</tbody>
</table>

Calculations:

Number of column (c ) = 2

Number of rows (r ) = 2

degree of freedom (df) = (r-1) (c-1)=(2-1)(2-1)=1×1=1

For a $12\times2^1$ (two column, two row or two by two) contingency table, the $x^2$ value can be calculated directly without finding the expected frequency. (Visweswara and Seenayya, 1993)

$$x^2 = N \frac{(ad-bc)^2}{(a+b)(c+d)(a+c)(b+d)}$$

With 1 df

Where;

$x^2$ = Chi-square

N=a+b+c+d= Total frequency

a= Frequency of male positive

Statistical Analysis

Null Hypothesis:
There is no difference between the incidence of typhoid fever in males and females are attending Aminu Kano Teaching Hospital (AKTH), laboratory.

Alternative Hypothesis:
There is difference between the incidence of typhoid fever in males and females attending AKTH, laboratory.
b= Frequency of male negative
c= Frequency of female positive
d= Frequency of female negative
a+c= Total number of positive
b+d= Total number of negative
a+b= Total number of males
c+d= Total number of females

Then,

\[ \chi^2 = \frac{(46 \times 5 - 10 \times 54)^2}{(56 \times 59 \times 100 \times 15)} \]
\[ \chi^2 = 2.23 \]

Since the exact distribution of \( \chi^2 \) in 2x2 table is discrete, a correction for continuity is to be made [14]. The formula for corrected \( \chi^2 \) is given by;

\[ \chi_c^2 = N \left( \frac{|ad - bc|}{2} - \frac{N}{2} \right) \]
\[ \begin{align*}
& (a+b) (c+d) (a+c) (b+d) \\
& \text{With 1 df}
\end{align*} \]

\[ \chi_c^2 = \frac{115 \left( |46 \times 5 - 10 \times 54| - 115/2 \right)^2}{(56 \times 59 \times 100 \times 15)} \]
\[ \chi_c^2 = 0.03 \]

It can be noticed that the correction for continuity reduces the \( \chi^2 \) value [14]

The value of Chi-square is compared with its theoretical values at 5 percent or 1 percent levels of Significance [14]

Referring \( \chi^2 \) table, \( \chi^2_{0.05} \) for 1 df = 3.84.

Where;

P (Probability level) = 0.05 = 5/100 = 5% (Five Percent)

Calculated value of \( \chi^2 \) is lower than the theoretical value of \( \chi^2 \) per cent level. Hence the observed difference is not significant at 5 percent level (P>0.05).

Since the calculated value is less than the theoretical value, the null hypothesis will be rejected and alternative hypothesis is accepted that is there is a significant relationship between the sexes of the typhoid fever positive which is more pronounced in females.
CONCLUSION

The incidence of typhoid fever in the month of October, 2011, for patients attending AKTH, Laboratory was found to be 87 per month per 100.

Recommendations

Drinking water should be boiled as a means of reducing the occurrence chance of the disease. Children should be vaccinated against typhoid fever.

Extra care should emphasized by the parents to their children to ensure that they washed their hands before and after meal & Government should emphasize Public health enlightens campaign about cooking strategies which involve the proper handling of water to minimize its contamination.

Indiscriminate defecation of urine and faeces should be avoided to minimize the transmission of typhoid fever & Environmental and personal hygiene should adequately be implemented.

REFERENCES


