Statistical study of hereditary blood diseases in Wasit Governorate

Sura Emad Jassim¹, Sabrin Hadi Hanash¹, Thuraya khaled abdulwahed², Mustafa Kazem Obeis³, Umalbanin sharif Juma³

¹ Department of Medical Laboratory Techniques, Kut University College, Al kut, Wasit, Iraq, 52001
² Nursing department, Kut University College, Al kut, Wasit, Iraq, 52001
³ College of Science, Wassit University

Sura.emad@alkutcollege.edu.iq

ABSTRACT: The use of statistical methods is fundamental to any research endeavor, and the number of textbooks written on the topic can easily fill a small library. Instead, the goals are to discuss the role of the statistician in hematology research and to present some of the basic study designs, statistical terms, and statistical methods that are frequently used. For additional information. In order to be able to reach the best model for predicting the number of patients in Wasit Governorate, this was achieved through the data we obtained for the period 2017-2020, which were obtained from Al-Karama and Al-Zahra Hospital and the Hematology Center, Statistics Division. The final results of the analysis of the evidence identified the appropriate model for that data. This statistic indicates that the districts of Kut, and then the districts of northern Waist, are more numerous in the number of patients with hemophilia and leukemia, while the districts of Badra are the least. While the highest percentage of transmission for holders of blood type O was diagnosed with thalassemia, while holders of blood type AB recorded the lowest percentage, as well as the most important factors associated and related to these diseases, which is the heredity factor.

Key words: Statistics, Descriptive statistics, leukemia, hemophilia, thalassemia

INTRODUCTION

Statistics have often been misunderstood in Medicine, but it is indispensable knowledge both for the experimenter and the reader. Statistical methods allow to study diseases, patients, and epidemiological events. The modern researcher cannot refuse to know and to use statistics (Piantadosi, 2017). A deeper understanding is required to prepare a research project and to avoid colossal mistakes of misleading (Romano and Gambal., 2013). The necessity to apply statistics to any scientific problem leads the researcher to assume the burden of a deeper knowledge in this science. Medicine often uses probabilistic statistics that could be far away from the scientific method (Romano and Gambal., 2013). Data are used and analyzed in order to highlight trends or to make a provision for the validity of a diagnostic method, a therapy or a prognosis of a disease. When an event is pointed out in a large amount of cases, a descriptive method is used to identify the potential basic mechanism, the data from the study of a subset of the population, the sample, are collected and then subjected to statistical analysis, there are two branches of statistical analysis: description and inference.

Descriptive statistics use data to describe numerically and graphically the observations in the sample. Instead, inferential statistics use the identification of patterns in data to draw inferences about the population (Franzese and Gambale., 2019). Statistical analysis might identify the presence of a relationship between variables. The purpose of using medical statistics is to provide an overview of common epidemiological and statistical terms and concepts that can be useful to the practitioner and clinical researcher (Stempliuk et al, 2005).
To review the calculations for common epidemiological measures and statistical tests (Rosner, 1990). And to provide examples from the published literature of uses of statistics in medical care and research (Bailar et al., 2012). Medical Uses of Statistics has served as one of the most influential works on the subject for physicians, physicians-in-training, and a myriad of healthcare experts who need a clear idea of the proper application of statistical techniques in clinical studies as well as the implications of their interpretation for clinical practice, it still uses the simple methods such as tests or chi-square tests remain in common usage (Chetlen, 2017).

Statistics is a branch of mathematics that studies random events. Opposite to factual sciences, where the knowledge is based on observation and experimentation, Statistics is a formal science that studies abstract structures and obtains new knowledge through logic reasoning (Schurz, 2014). This formal science is under continuous development, and provides a knowledge which is essential in factual sciences for decision-making in uncertain settings. In particular, Statistics play a crucial role in research, planning and decision-making in health sciences, by providing essential information about the random structure of health phenomena (Nicholls, 1999; Zager et al., 2004). Progress in technologies and continued research in computational statistics has enabled us to implement sophisticated mathematical models within software that are easily handled by non-specialists (Buchan, 2000). Such accessibility has undoubtedly made a major contribution towards the dissemination and transfer of mathematical know-how to other disciplines and, in particular, towards practical applications within health research.

If we fail to understand fully these fundamental statistical concepts and principles if our statistical reasoning is faulty then we are more likely to reach wrong scientific conclusions. Wrong conclusions based on faulty reasoning is shoddy science; it is also unethical (Bird, 2020; Siegfried, 2010).

Statistics have often been misunderstood in Medicine, but it is indispensable knowledge both for the experimenter and the reader. Statistical methods allow to study diseases, patients, and epidemiological events. The modern researcher cannot refuse to know and to use statistics (Good and Hardin, 2012). A deeper understanding is required to prepare a research project and to avoid colossal mistakes of misleading. The necessity to apply statistics to any scientific problem leads the researcher to assume the burden of a deeper knowledge in this science (Brown et al., 2018). Medicine often uses probabilistic statistics that could be far away from the scientific method. Data are used and analyzed in order to highlight trends or to make a prevision for the validity of a diagnostic method, a therapy or a prognosis of a disease (Zhou et al., 2008). When an event is pointed out in a large amount of cases, a descriptive method is used to identify the potential basic mechanism, the data from the study of a subset of the population, the sample, are collected and then subjected to statistical analysis, there are two branches of statistical analysis: description and inference.

MATERIALS AND METHODS

Data collection
As the first step we arranged the permission paperwork from Responsible for Thalassemia Department in the blood bank and from the doctor specialized in hematology at Al-Karama Teaching Hospital and responsible for the Department of Self in order to have access to the data base of the referred cases to the hospital. All data regarding the cases referred to this hospital during the year 2017-2020 was recorded. Blood samples were also taken from the disease states mentioned in the patients’ register.

Disease records
The data were categorized according to the diseases diagnosed in the referred cases. Recorded diseases included: Hereditary and non-hereditary diseases such as thalassemia, hemophilia and leukemia.
record of treatments
We took information on the data regarding treatment programs in this province. Information regarding diseases were and discussed.

Sample analysis
Random samples were taken for some leukemia patients and analyzed by light microscope after adding some dyes (Lishman stain & Girmsa stain) and the size of the lens is (100 x 10 x 40) where the light microscope first focuses a beam of light on or through an object, and the lenses Convex objectivity to enlarge the formed image. In the majority of optical microscopes, the image is viewed directly through the binoculars that act as a secondary lens in the form of a magnifying glass to observe the displayed image. These instruments are called "combining microscopes," and the total magnification is the sum of the objective magnification and lens magnification. The magnification range spans from ×10 to ×1000, with a resolving power of the order of 0.2 µm, depending on the type and numerical aperture (the area available for the passage of light) of the objective lenses.

RESULTS
It was discovered after checking the number of people with leukemia, thalassemia and hemophilia in Wasit, based on the information recorded at the Hematology Center and Al Karama Teaching Hospital in Wasit, for the period 2017-2020.

Table 1: Percentage of the number of patients out of the total population of Wasit Governorate

<table>
<thead>
<tr>
<th>Hematology</th>
<th>No. P</th>
<th>Total%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leukemia</td>
<td>740</td>
<td>0.053</td>
</tr>
<tr>
<td>Thalassemia</td>
<td>653</td>
<td>0.047</td>
</tr>
<tr>
<td>Hemophilia</td>
<td>55</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Table 2: Number of infected cases according to the governorate's regions.

<table>
<thead>
<tr>
<th>position</th>
<th>No. Patient</th>
<th>Total%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL-Kut</td>
<td>295</td>
<td>39.8</td>
</tr>
<tr>
<td>Al-hayi</td>
<td>153</td>
<td>20.7</td>
</tr>
<tr>
<td>North waist</td>
<td>197</td>
<td>26.6</td>
</tr>
<tr>
<td>Badra</td>
<td>53</td>
<td>7.2</td>
</tr>
<tr>
<td>Sheikh saad</td>
<td>42</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Table 3: Number of males, females and children with thalassemia.

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. Patient</th>
<th>Total%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>319</td>
<td>48.8</td>
</tr>
<tr>
<td>Female</td>
<td>330</td>
<td>50.5</td>
</tr>
<tr>
<td>Children or adult</td>
<td>4</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Table 4: Ratio of thalassemia in wasit according to distribution of blood group

<table>
<thead>
<tr>
<th>Blood groups</th>
<th>No. Patient</th>
<th>Total%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A group</td>
<td>184</td>
<td>28.2</td>
</tr>
<tr>
<td>B group</td>
<td>192</td>
<td>29.4</td>
</tr>
<tr>
<td>AB group</td>
<td>55</td>
<td>8.4</td>
</tr>
<tr>
<td>O group</td>
<td>222</td>
<td>34</td>
</tr>
</tbody>
</table>
Table (3-5) shows the injuries according to the RH.

<table>
<thead>
<tr>
<th>Type</th>
<th>No. Patient</th>
<th>Six</th>
<th>Location</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>290 Male</td>
<td>Wasit</td>
<td>90.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>301 Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Children or adult</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>29 Male</td>
<td>Wasit</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>29 Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Children or adult</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Incidence of hemophilia in Wasit Governorate

<table>
<thead>
<tr>
<th>Position</th>
<th>No. Patient</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL-Kut</td>
<td>20</td>
<td>36.3</td>
</tr>
<tr>
<td>Al-hayi</td>
<td>14</td>
<td>25.4</td>
</tr>
<tr>
<td>North waist</td>
<td>17</td>
<td>30.9</td>
</tr>
<tr>
<td>Badra</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Sheikh saad</td>
<td>2</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Table 7: Incidence of hemophilia by type of disease in Wasit Governorate

<table>
<thead>
<tr>
<th>Hemophilia type</th>
<th>NO. patient</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>42</td>
<td>76.3</td>
</tr>
<tr>
<td>B</td>
<td>13</td>
<td>23.6</td>
</tr>
</tbody>
</table>

DISCUSSION

After investigating the number of patients with thalassemia, hemophilia and leukemia in Wasit Governorate, it was found that the information recorded in the records of the Hematology Center (Blood Bank), Al Karama Teaching Hospital and Al Zahra Teaching Hospital in Kut for the period from 1/6/2017 to 1/1/2020 The number of patients is about 1448 patients, their ages ranged from (8 months - 75 years). It was noted in the light of the information that the age groups (36-75) are the most vulnerable group to leukemia, if the highest percentage of infected patients was recorded at 39.7% in Kut and the lowest rate was 5.6% in Sheikh Saad.

The exact cause of leukemia is unknown, but it is thought to involve a combination of genetic and environmental factors (Conway O’Brien et al., 2014). Leukemia cells acquire mutations in their DNA that cause them to grow abnormally and lose the function of typical white blood cells. However, several factors have been identified that may increase your risk (Watanabe, 2019). These include:

- Exposure to ionizing radiation is the risk of developing multiple subtypes of leukemia, exposure to benzene is a risk factor for adult leukemia (Puumala et al., 2013).
- A history of any hematological malignancy is also a risk factor for developing another subtype of leukemia later in life. A family history of leukemia is a blood disorder, such as myelodysplastic syndrome, sometimes called "preleukemia". (Koeffler and Leong, 2017)
The statistics study showed that the disease is spread throughout Iraq in varying proportions, as the capital, Baghdad, recorded in 1999 a number of cases of the disease (187), which represented (34.8%) of the total number of infected people (Adah, 2014), while the number of cases in Wasit Governorate reached (740), which represents 39.8% of the number of injured in Kut (Issa, 1978). Perhaps the high number of injuries in Kut is due to the high population density in these years.

The statistic of thalassemia patients was also taken, as the latest statistics conducted for the residents of the Wasit Governorate for the above-mentioned years showed the presence of many infected cases and genetic carriers of the disease, and type O carriers are the most affected as a result of consanguineous marriage. For thalassemia patients (653) infected and pregnant, group (O) constituted 34% of the total number of patients, while group (A and B) amounted to 28.2% and 29.4%, respectively.

Thalassemia is the most common hereditary hemoglobinopathy, affecting males and females equally and the majority of patients dying before the age of 20 (Kadhim et al., 2017). In Wasit Governorate, there is little data on the epidemiology and burden of thalassemia. This study aimed to identify the epidemiological characteristics of Thalassemia patients in Wasit Governorate, estimate its prevalence and prevalence, and identify its trends during the period 2016-2020.

Basra Governorate recorded a prevalence rate of thalassemia in approximately 2015-2020 (74/100,000 people). While Wasit Governorate recorded 653 patients, thalassemia results from a decrease in the production of at least one chain of polypeptide globin, which leads to the synthesis of unbalanced hemoglobin (Kan et al., 1972). When an individual has one or two mutation(s) on chromosome number 11 (alpha thalassemia) and one mutation on chromosome number 16 (thalassemia beta thalassemia) (Galanello Galanello and Cao., 2011). It is caused by a genetic defect that affects the production of hemoglobin, and this defect is genetically transmitted from parents to children (Kan et al., 1972).

Thalassemia occurs when there is an abnormality or mutation in one of the genes involved in the production of hemoglobin. You inherit this genetic abnormality from your parents (Cao and Galanello., 2010).

In addition, the statistic was taken for hemophilia patients, and after checking the number of patients with hemophilia type (B) and hemophilia type (A), based on the recorded information, it was found that hemophilia of both types is widespread in Iraq, and according to the statistics of Al-Karama Teaching Hospital, the number of infected patients during the period 2017-2020 was (55) and their ages ranged between 55-30 years and in light of the information, it was found that the number of hemophilia patients type (A) is (42) and a rate of 76.3%, and the number of hemophilia type (B) patients was (13) and at a rate of 23.6%. Al-Kut recorded the highest percentage of 36.3%, while the lowest percentage was in Badra 1.8%, as it is known that this disease occurs as a result of a defect or genetic mutation in the genes responsible for clotting factors (Peyvandi et al., 2006).

This defect occurs largely in the coagulation factor VIII that causes type A, and it gives a greater proportion of this type of this disease (Castaman and Matino., 2019). It is considered the most dangerous and most common type, as it represents 58% of hemophilia infections (Peyvandi et al., 2006). As for type B, which is caused by factor IX deficiency, it constitutes 15% and is considered less dangerous of the first type (Dixon et al., 2011). In addition, there are two other types that make up a small percentage or are rare: hemophilia S and hemophilia factor and Lebrand Hemophilia is a disease restricted to males as a result of factor VIII deficiency, and no woman will develop hemophilia, or rarely (Kizilocakd and Young., 2019) as it is known that this disease is caused by recessive genes linked to the X chromosome, and for a female to become infected, she must have two genes linked to the X chromosome (Anderson-Cohen et al., 2003).
CONCLUSION
In this research, we got some conclusions that can be concluded as follows:
1- Field survey to Wasit Governorate
2- Knowing the infection rates in the governorate and comparing it with other governorates
3- Knowing the focus of infection and the causes of the disease
4- These diseases are still a serious problem in Iraq and for the different age groups of Iraqi society and for both sexes, which need concerted efforts to find the right ways to reduce them.

REFERENCES
11. JALIL, A. T., DILFY, S. H., KAREVS
12. HEPATITIS in Dhi-Qar Province: Demographics and Hematological Characteristics of Patients. International Journal of Pharmaceutical Research, 12(1)


42. Romano, R., & Gambale, E. (2013). Statistics and medicine: the indispensable know-how of the researcher. Translational Medicine@ Unisa, 5, 28.