Patterns of lymphoma in Misan city, Iraq: A retrospective observational study [version 1; peer review: awaiting peer review]

Haider Saadoon Qasim Alhilfi, Omer Mansib Kassib Kassib, Husam Jihad Imran Jihad, Ahmed Salih Hussien Alshewered

Department of Medicine, Faculty of Medicine, University of Misan, Misan, Iraq
Internal Medicine, Department of Medicine, Al-Sadder Teaching Hospital, Misan Health Directorate, Ministry of Health/Environment, Misan, Iraq
Radiotherapy and Clinical Oncology, Misan Radiotherapy Center, Misan, Iraq

Abstract

**Background:** Lymphomas represent a biologically and clinically heterogeneous group of neoplasms. They have historically and clinically been divided into two groups, Hodgkin's lymphoma (HL) and non-Hodgkin's lymphoma (NHL). This study aimed to identify patterns in lymphomas in Misan city, Iraq, and evaluate the characteristics of this disease.

**Methods:** A retrospective, observational, single-center study was conducted at Al-Shifaa Oncology Center, Al-Sadder Teaching Hospital, Misan city, Iraq, between 1 April 2016 and 30 April 2018. A total of 80 Misanian participants (48 (60%) men and 32 (40%) women) who had lymphoma were involved in this study. The sources of information were patient files, histopathology reports, and patients' oncologist reports.

**Results:** The mean age (±SD) of participants was 36 ±12.8 years. The male to female ratio was 1.5:1. NHL cases were three times more prevalent than HL. The most frequent stage at presentation was stage IV, in 34 (42.5%) participants. The classical subtypes of HL were present in 14 (70%) of HL cases. The diffuse large B-cell lymphoma (DLBCL) subtype was the most common NHL subtype, being recorded for 44 (73.3%) of participants.

**Conclusion:** Lymphomas were more frequent in men. NHL was more common than HL; one HL case was diagnosed for every three NHL cases. The most common histopathology of HL was mixed cellularity, while DLBCL was the most common subtype of NHL. Most cases presented at an advanced stage, resulting in a late diagnosis.

**Keywords**
Non Hodgkin lymphoma, Hodgkin lymphoma, Misan, Lymphoid cells, Iraq
Corresponding author: Ahmed Salih Hussien Alshewered (ahmedalshewerd@gmail.com)

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Introduction

The term lymphoma refers to a heterogeneous group of neoplasms that originate from lymphoid cells. The majority (85%) of lymphomas originate from mature B-cells, and 15% derive from the T-cell lineage. Historically and clinically, lymphomas have been divided into two groups, Hodgkin’s lymphoma (HL) and non-Hodgkin’s lymphoma (NHL). HL is characterized by the presence of Reed–Sternberg cells, which arise in a single lymph node or chain of lymph nodes and typically spread in a stepwise fashion to anatomically contiguous nodes. The crude incidence of HL among Europeans is 2.3 per 100,000 individuals. Young adults aged 20 to 40 years are most commonly affected. Histologically, classical HL accounts for 95% of all HL cases. The subtypes of classical lymphomas include nodular sclerosis (the most common subtype, comprising 60–65% of cases), mixed cellularity (15–30%), lymphocyte-rich (5%), and lymphocyte-depleted (1%) subtypes. HL patients present with peripheral lymphadenopathy, with nodes that are not tender, and with no overlying skin changes. NHL are neoplastic transformations of mature B-, T-, or natural killer cells. In children, diffuse large B-cell lymphoma (DLBCL), Burkitt’s lymphoma, and lymphoblastic lymphoma are most common. DLBCL is the most common histological subtype in adults. The incidence increases with age, while a family history of lymphoma, autoimmune disease, human immunodeficiency virus infection, hepatitis C virus seropositivity, and a high body-mass as a young adult have all been identified as risk factors of DLBCL.

Here, we describe a study designed to show patterns of lymphoma among patients in Misan who presented at our center. Since this group of neoplasms are curable diseases, we need to obtain more information about them to get a significant and timely picture about the current lymphoma situation in Iraq, and in Misan in particular.

Methods

Study design

This was a retrospective, observational, single-center study carried out in Misan city, Iraq to identify any patterns in lymphoma prevalence in this governmental administrative area.

Setting

The study was conducted at Al-Shifa Oncology Center, Al-Sadder Teaching Hospital, Faculty of Medicine, Misan University, Misan city, Iraq, from 1 April 2016 to 30 April, 2018. The recruitment dates began on the tenth day of each month and continued to the thirtieth day of that month. The period from the first day of the month until the ninth day was the time of patient follow-up. Data were collected on the last day of each month of the study.

Participants

A total of 80 participants (48 men and 32 women) from Misan who were diagnosed with lymphoma were included in this study. The age of participants ranged from 10 years to 80 years. Each patient had been previously diagnosed with lymphoma.

Figure 1. Al-Shifa Oncology Center, Al-Sadder Teaching Hospital at the Faculty of Medicine. Imagery ©2019 Maxar Technologies.
and attended our center for chemotherapy. We included all patients diagnosed with lymphoma without any selectivity (the patients must live in Misan city). Sources of information included patient files, histopathology reports, and patient oncologist reports (these contained all of a patient’s data written by his/her oncologist). Participant follow-up was performed on any day of nine days following a chemotherapy cycle.

Variables
History and investigation results were documented and recorded for each participant in his/her file, including age, type of residency, occupation, sex, diagnosis, stage of lymphoma, subtype of lymphoma, and class of lymphoma.

Data sources/measurement
The main sources of data were patient files and histopathology reports. Data written in the files included a patient’s baseline characteristics, lymphoma baseline characteristics, and all investigations done.

Study size
We obtained this number of participants because we included all individuals with lymphoma without any selection methods.

Ethical considerations
Written informed consent was obtained from all participants, or the parents of those aged less than 18 years, to participate in this study. The Medical Ethical Committee at Al-Shifa\'a Oncology Center, Al-Sadder Teaching Hospital, Faculty of Medicine, Misan University approved this study (code: 1000552).

Statistical analysis
We used Microsoft Excel (v. 2010) to calculate frequencies and percentages of variables, and also to calculate means and standard deviations (SDs). This study did not have any missing data.

Results
All 80 participants included in this study were examined for eligibility and completion of follow-up. The mean age (±SD) of participants was 36±12.8 years. Half of the participants were in the 31–60 year age group, 24 (30%) of participants were aged >60 years, and just 16 (20%) belonged to the 10–30 year age group. Most participants (53; 67.5%) lived in rural areas, while 27 (32.5%) lived in urban regions. The majority of patients were employed (58; 72.5%). The male to female ratio was 1.5:1 (48 males and 32 females).

NHL was three-times more prevalent than HL, with 60 (75%) and 20 (25%) cases, respectively. Participants most frequently presented with stage IV, in 34 (42.5%) of cases, followed by stage III in 24 (32.5%), stage II in 12 (15%), and stage I in 8 (10%) cases. The classical subtypes of HL were most common, occurring in 14 (70%) cases, respectively, which is consistent with the results of a study conducted in Erbil city, in the north of Iraq\(^2\). The majority of HL cases presented as the classical subtype (70%), while 30% of cases encountered were of the nodular subtype (30%). The subtypes of classical HL included the nodular sclerosis (NS) subtype (14.3%) and the lymphocyte-rich subtype (28.6%), although the majority of cases comprised the mixed cellularity subtype (57.1%). The most frequent histological subtype of HL was mixed cellularity, which differs from earlier reports from the north of Iraq\(^3\), but is consistent with earlier reports from nearby countries and India\(^4\). This changing pattern differs from more recent reports from Saudi Arabia, Jordan, United Arab Emirates (UAE), and Kuwait, where higher relative rates of NS HL were reported, approaching levels seen in the USA and in European countries\(^12\).-17.

With regard to NHL subtypes, we found that the majority comprised DLBCL, followed by mantle cell, follicular cell, peripheral T-cell, and Burkitt’s lymphoma. According to WHO classifications, DLBCL was also the most common diagnosis

Discussion
In our study, HL and NHL were recorded in 25% and 75% of cases, respectively, which is consistent with the results of a study conducted in Erbil city, in the north of Iraq\(^2\). The majority of HL cases presented as the classical subtype (70%), while 30% of cases encountered were of the nodular subtype (30%). The subtypes of classical HL included the nodular sclerosis (NS) subtype (14.3%) and the lymphocyte-rich subtype (28.6%), although the majority of cases comprised the mixed cellularity subtype (57.1%). The most frequent histological subtype of HL was mixed cellularity, which differs from earlier reports from the north of Iraq\(^3\), but is consistent with earlier reports from nearby countries and India\(^4\). This changing pattern differs from more recent reports from Saudi Arabia, Jordan, United Arab Emirates (UAE), and Kuwait, where higher relative rates of NS HL were reported, approaching levels seen in the USA and in European countries\(^12\).-17.

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Table 1. Characteristics of patients with lymphoma in Misan city, Iraq, April 2016 to April 2018.

<table>
<thead>
<tr>
<th>Variable (n=80)</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td></td>
</tr>
<tr>
<td>10–30</td>
<td>16 (20)</td>
</tr>
<tr>
<td>31–60</td>
<td>40 (50)</td>
</tr>
<tr>
<td>≥ 60</td>
<td>24 (30)</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>53 (67.5)</td>
</tr>
<tr>
<td>Urban</td>
<td>27 (32.5)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Not employed</td>
<td>22 (27.5)</td>
</tr>
<tr>
<td>Employed</td>
<td>58 (72.5)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>48 (60)</td>
</tr>
<tr>
<td>Female</td>
<td>32 (40)</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
</tr>
<tr>
<td>Hodgkin’s lymphoma (HL)</td>
<td>20 (25)</td>
</tr>
<tr>
<td>Non-Hodgkin’s lymphoma (NHL)</td>
<td>60 (75)</td>
</tr>
<tr>
<td>Staging</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>8 (10)</td>
</tr>
<tr>
<td>II</td>
<td>12 (15)</td>
</tr>
<tr>
<td>III</td>
<td>26 (32.5)</td>
</tr>
<tr>
<td>IV</td>
<td>34 (42.5)</td>
</tr>
<tr>
<td>HL (n=20)</td>
<td></td>
</tr>
<tr>
<td>Nodular</td>
<td>6 (30)</td>
</tr>
<tr>
<td>Classical (CHL)</td>
<td>14 (70)</td>
</tr>
<tr>
<td>NHL (n=60)</td>
<td></td>
</tr>
<tr>
<td>Diffuse large B-cell</td>
<td>44 (73.3)</td>
</tr>
<tr>
<td>Follicular cell</td>
<td>4 (6.6)</td>
</tr>
<tr>
<td>Mantle cell</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Burkett's</td>
<td>2 (3.4)</td>
</tr>
<tr>
<td>Peripheral T-cell</td>
<td>4 (6.6)</td>
</tr>
<tr>
<td>CHL (n=14)</td>
<td></td>
</tr>
<tr>
<td>Nodular sclerosis</td>
<td>2 (14.3)</td>
</tr>
<tr>
<td>Lymphocyte rich</td>
<td>4 (28.6)</td>
</tr>
<tr>
<td>Mixed cellularity</td>
<td>8 (57.1)</td>
</tr>
</tbody>
</table>
worldwide, at 52.2%, followed by T-cell rich lymphoma. The relative proportion of DLBCL seen in the current study is almost twice the proportion seen in the USA and Europe, and is much higher than the proportion reported in India, UAE, Kuwait, Jordan, and Turkey.

We found that the majority of lymphomas occurred in those aged 31 to 60 years, which was the same as findings in the USA and other countries.

The majority of cases in our study presented at stage III or stage IV. Stage IV comprised 42.5% of cases and stage III 32.5%, while the remainder were stage II (15%) and stage I (10%). These results are in agreement with the results of a study by Robert et al.

Limitations of this study include that it was a single-centre study, with a small number of participants, and the participants represent residents of the Misan government administrative area only.

Conclusions
This study showed that in Misan city, Iraq, lymphoma occurs most frequently among males. NHL is more common than HL, and the most common histopathology of HL is mixed cellularity, while DLBCL is the most common histopathology for NHL. Most cases presented with stage III or IV, which reflects delays in diagnosis, and decreases the chance of complete recovery, reflecting a more aggressive course and behavior of the disease.

Data availability

References
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