International Journal of PharmTech Research
CODEN (USA): IJPRIF, ISSN: 0974-4304, ISSN(Online): 2455-9563
Vol.11, No.04, pp 329-350, 2018

# A 4 year retrospective study of 141 cases of Non Hodgkin's Lymphoma in AL-Mouwasat University Hospital classified according to the 2008 WHO classification

**Safaa Qatleesh***

***Department of Pathology, Faculty of Medicine, Syrian Private University, Damascus, Syria**

**Abstract :** The distribution of Non-Hodgkin lymphoma(NHL) subtypes varies in the different geographical locations according to Word Health Organization(WHO) classification and there is no accurate epidemiologic study of Non-Hodgkin Lymphoma. The aim of the study was to: determine the different types of Non-Hodgkin Lymphoma in all groups and finds its relation to sex and lymph node involvement and analyze the anatomic distribution (nodal and extranodal) of NHL. This is a retrospective descriptive study of 141 cases of nodal and extranodal NHL retrieved from archives(cords) of all patients diagnosed with NHL at department of pathology of AL-Mouwasat University Hospital during the period between 2013 and 2016. The diagnosis was assessed with immunohstochemical results, categorized and reclassified according to the WHO classification of lymphoid neoplasms( 2008 , 2016 inorder). Out of 201 patients diagnosed with malignant lymphoma(ML),141 (70%) had NHL and 60 (30%) had Hodgkin Lymphoma, out of 141 patient who had NHL a male predominance was observed (92/141 ,65%). B-cell lymphoma were the most frequent type of NHL (119/141 ,84%).Diffuse large B cell lymphoma(DLBCL) was the most common pattern o Total of 141 cases (42%)were nodal and (58%)were extranodal. Cervical lymph nodes were the most common site s(29/59 ,49%) followed by axillary These data are in agreement with those reported in Yemen and Lebanon. The relative proportion of follicular in this study is much lesser than that reported in Lebanon . The relative proportion of DLBCL in this study is much higher than that reported in European and American , while proportion of CLL/SLL and plasma cell neoplasms is similar.
**Key wowds :** NHL, WHO classification of lymphoid neoplasms.

## Introduction

Hodgkin lymphoma (NHL) comprises a heterogeneous group of malignancies arising from lymphoid tissue, with varied clinical and biological features[1].Epidemiologic studies have shown substantial differences in



**DOI: http://dx.doi.org/10.20902/IJPTR.2018.11405**

the relative frequencies of NHL subtypes in different geographic regions[2], may be indicative of environmental or host risk factors in a particular region[3].

The incidence of lymphomas has been increasing worldwide the past several decades[4] .

At national level, NHL is 4th most common malignancy in males accounting for 6.1%[5].

Recent revolution of advances in immunology, genetics, and molecular biology have resulted in extensive changes in the classification of these tumor(Table 1)[6,7]

**Table 1:Sequence of lymphoid tissue neoplasms classifications:[6]**

| **Hodgkin Report** | **1932** |
|---|---|
| Classification of Malignant Lymphoma | 1940 |
| Rappoport Classification | 1966 |
| Lukes and Colins Classification | 1974 |
| Kiel Classification | 1978 |
| Working Formulation of Non Hodgkin Lymphoma | 1982 |
| Real Classfication | 1994 |
| New WHO Classification | 2001 |
| WHO Classification | 2008 |
| Revised WHO Classification[7] | 2016 |

Rappaport system was based on morphologic features and categorized NHL intonodular and diffuse type[8].

Both Lukes- Collins and Kiel classifications were based on determination of the immunologic origin of NHL by histological features[9].

In the Working Formulation the NHL has been subcategorized into low grade, Intermediate grade and high grade[10].

Revised European American Lymphoma classification (REAL) emerged where immunophenotyping of lymphocyte was done to differentiate B and T-cell lineage[8].

The WHO classification system is currently considered the "gold standard" for classifying all hematopoietic neoplasms[1]

Later some updates have been made, and a new WHO manual was released in 2016(Table2)[7]

**Table2:Some changes to the 2008 classification according to The 2016 revision of WHO classification lymphoid neoplasms:[7]**

| **Lymphomas with new names(Rename)** | **New provisional entities** | **Lymphomas with some changes** | **Lymphomas without changes or additions** |
|---|---|---|---|
| -EBV+ DLBCL of the elderly(2008 WHO )…… EBV+ DLBCL,NOS(2016 WHO).<br><br>-EATL,Type2(2008 WHO)…..<br>Monomorphic | MBL<br>In situ follicular neoplasia<br><br>Duodenal-type follicular lymphoma<br><br>Pediatric-type | MGUS, IgM<br>MGUS,IgGlA<br>CLLlSLL<br>LPL<br>HCL<br>MCL<br>FL<br>DLBCL,NOS<br>BL | B-PLL<br>SMZL<br>WM<br>PCM<br>Solitary plasmacytoma of bone<br>Extraosseous plasmacytoma<br>MALT lymphoma |

| | | | |
|---|---|---|---|
| epitheliotropic intestinal T-cell lymphoma(2016 WHO). | follicular lymphoma | T-LGL | NMZL<br>Pediatric NMZL |

**2016 WHO classification definition**:

A revision of the nearly 8-year-old World Health Organization classification of the lymphoid neoplasms clarifies the diagnosis and management of lesions, details the expanding genetic/molecular landscape of numerous lymphoid neoplasms and refers to investigations leading to more targeted therapeutic strategies.

**Experimental***:*

This is a retrospective descriptive study of Non-Hodgkin's lymphomas retrieved from the archives of Department of Pathologyin Al-Mouwasat University Hospital of all patients diagnosed with NHL during the period between 2013 and 2016.

The related data were abstracted from patient medical records based on clinical, histological, and immunohistochemical staining results using a special form designed for this purpose.

The clinical data of patients included gender, age, lesion location, date of diagnosis, family history, personal history.

The pathological diagnostic criterion was the "2008 WHO classification for hematopoietic and lymphoid neoplasms"

The pathological classification was determined based on the tissue section with haematoxylin-eosin (H&E) staining and immunohistochemistry as well as the clinical characteristics.

All the biopsy samples were fixed in 10% buffered formalin and grossed according to the guidelines by the pathology residents.

Tissue sectionsof 5 M thickness from paraffin‐embedded tissue.

The detected immune phenotype markers included CD3, CD5, CD15, CD20, CD23, CD30, CD43, CD45, CD56, CD68, CD79α, EMA, bcl-2,etc(Table 3) Statistical analysis: data were processed and analyzed using SPSS (Statistical Package for Social Science).

**Table 3:The main antibodies used in immunohistochemistry :**

| | |
|---|---|
| CD20 | Monoclonal |
| CD79a | Monoclonal |
| CD3 | Monoclonal |
| CD30 | Monoclonal |
| CD15 | Monoclonal |
| CD10 | Monoclonal |
| CD68 | Monoclonal |
| CD138 | Monoclonal |
| Bcl 2 | Monoclonal |
| TdT | Polyclonal |
| LCA | - |

Discoverer: DAKO,BioSB

**Table4:Distrubution of type of malignant lymphoma(ML).**

| Percentage | Number | Type of lymphoma |
|---|---|---|
| 70% | 141 | NHL |
| 30% | 60 | HL |
| 100% | 201 | Total |

## Results and Discussion:

In general: a total of 201 cases of ML were included in this study. NHL was diagnosed in 141/201 cases (70%) and HL in 60/201 cases (30%)(Table 4).

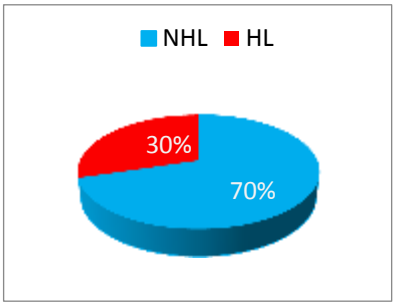



**Figure1: Distribution of types of malignant lymphoma(ML).**

**Non-Hodgkin's lymphoma:**

**Sex: The study showed male predominance**

Among 141 cases of NHL, 92/141 patients were male (65%)and 49/141 were female (35%) patients, and male-to-female ratio was 3.2:1,t he age range was 6-95years (Table 5).

**Table 5: The frequency of NHL according to sex .**

| Percentage | Number | NHL according to sex |
|---|---|---|
| 65% | 92 | Male |
| 35% | 49 | Female |
| 100% | 141 | Total |

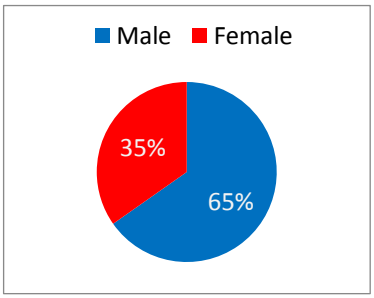



**Figure2: The frequency of NHL according to sex.**

Age: We observed a wide age range from 6 to 95 years

peak incidence was during the 6th decade of life ( 31/141,22%) followed by two peaks during the 4th and 5th (25/141,18% for each).

In female :peak incidence was during the 6th decade of life.

In male: peak incidence was during the 7th decade of life(Table 6).

**Table 6: Distribution of age groups according to sex.**

| Females n(%) | Males n (%) | Total cases n(%) | Age group |
|---|---|---|---|
| 0(0%) | 1 (1%) | 1 (1%) | 1th |
| 0(0%) | 9 (10%) | 9 (6%) | 2th |
| 9(19%) | 10 (11%) | 19 (13%) | 3th |
| 5(10%) | 7 (8%) | 12 (8%) | 4th |
| 8(16%) | 17 (18%) | 25 ( 18%) | 5th |
| 17(27%) | 18 (19%) | 31 (22%) | 6th |
| 6(12%) | 19 (22%) | 25 (18%) | 7th |
| 4(8%) | 1 (10%) | 14 (10%) | 8th |
| 3(6%) | 1 (1%) | 4 (3%) | 9th |
| 1(2%) | 0 (0%) | 11(%) | 10th |
| 49(100%) | 92(100%) | 141 (100%) | Total |

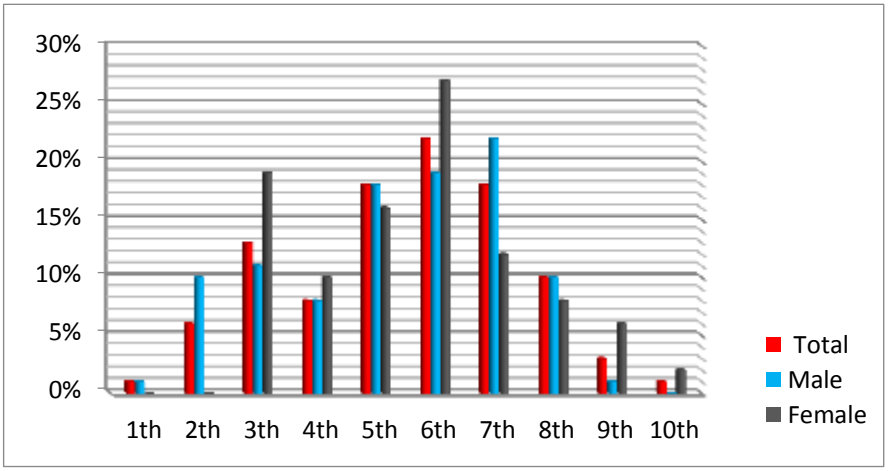



**Figure 3: Distribution of age groups according to sex.**

**Table 7: Site distribution of NHL( nodal and extranodal).**

| Number (%) | Site distribution of NHL |
|---|---|
| 59 (42%) | Lymph nodes |
| 82 (58%) | Extra nodal |
| 141 (100%) | Total |

**Table 8: Site distribution of extra nodal NHL(Primary & secondary involvement).**

| Number (%) | Site distribution of extra nodal NHL( Primary & secondary) |
|---|---|
| 39 (48%) | Bone marrow |
| 8(10%) | Stomach |
| 5(6%) | Respiratory trac |
| 5(6%) | Tonsils |
| 4(5%) | Orbit |
| 3(4%) | Spleen |
| 3(4%) | Skin |

| | |
|---|---|
| 3(4%) | Mediastinum |
| 3(4%) | Testis |
| 2(2%) | Spinal cord |
| 2(2%) | Tongue |
| 1(1%) | Thyroid gland |
| 1(1%) | Pancreas |
| 1(1%) | Breast |
| 1(1%) | Liver |
| 1(1%) | Parotid |
| 82(100%) | Total |

**Site distribution of lymphomas (nodal and extranodal):**

A total of 59/141 lymphomas (42%) showed lymph node involvement and 82/141 (58%) were extranodal sites including primary and secondary involvement(Table 7). The most frequent extranodal site was bone marrow"secondary involvement" (39/82 ,48%) followed by stomach (8/82 ,10%)(Table 8)

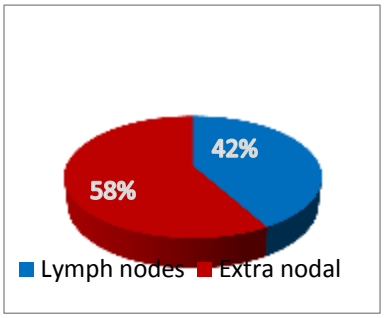



**Figure 4: Site distribution of NHL( nodal and extranodal).**

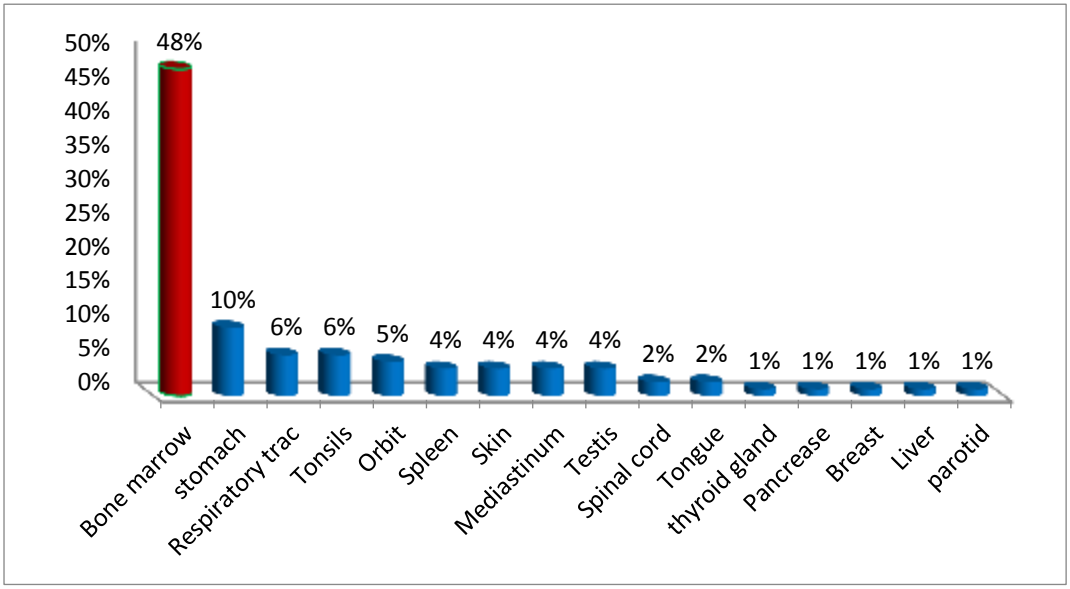



**Figure 5: Site distribution of extra nodal NHL(Primary & secondary involvement).**

**Histopathological types of non-Hodgkin's lymphomas involved in B.M(Primary & secondary):**

Secondary involvement: Highest bone marrow involvement was seen in chronic lymphocytic leukemia/small lymphocytic leukemia(CLL/SLL) 16/39(41%),followed by DLBCL 3/39 (8%).

Primary involvement: Plasma cell neoplasms were the most common 13/39 (33%)(Table 9).

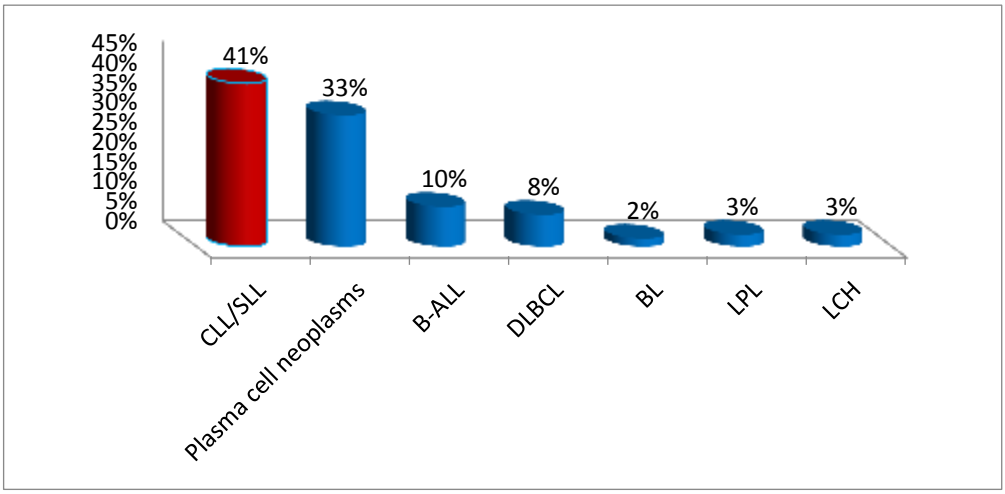



**Figure 6: Distribution Histopathological types of NHL involved in B.M. (Primary & secondary):**

**Table 9:Distribution Histopathological types of NHL involved in B.M.(Primary & secondary):**

| Number (%) | Histopathological types of NHL involved in B.M.(Primary & secondary) |
|---|---|
| 16(41%) | CLL/SLL |
| 13(33%) | Plasma cell neoplasms |
| 4(10%) | B-ALL |
| 3(8%) | DLBCL |
| 1(2%) | Burkitt,s lymphoma(BL) |
| 1(3%) | Lymphoplasmacytic lymphoma(LPL) |
| 1(3%) | Langerhans cell histocytosis(LCH) |
| 39(100%) | Total |

**Table 10: Distribution of extranodal lymphomas (primary and secondary involvement):**

| Number (%) | Distribution of extranodal lymphomas (primary and secondary involvement): |
|---|---|
| 60(73%) | Primary involvement |
| 22(27%) | Secondary involvement |
| 82(100%) | Total |

**Distribution of extranodal lymphomas (primary and secondary involvement):**

A total of 60/82 lymphomas (73%) were primary extranodal (pENL),while 22/82 (27%) were secondary involvement(Table 10).

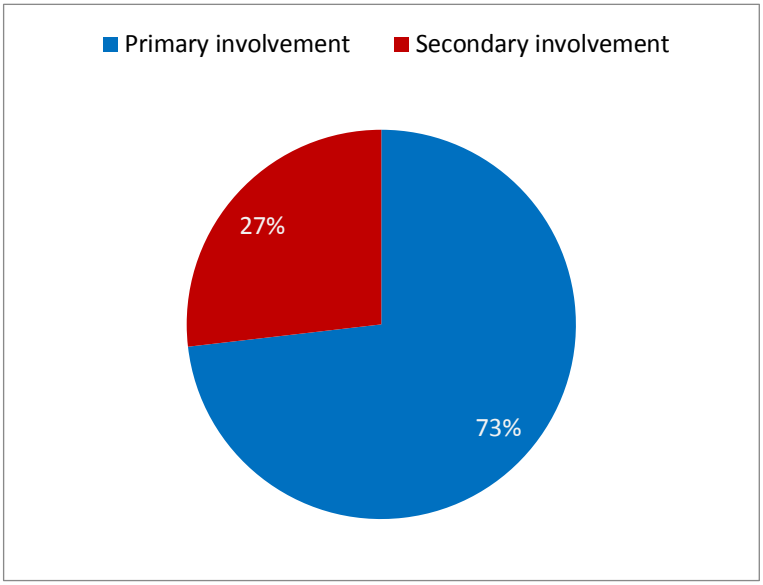



**Figure 7: Distribution of extranodal lymphomas (primary and secondary involvement):**

**Distribution according to site of lymph node involvement:**

The most frequent nodal location was in the cervical lymph nodes (29/59, 49%), followed by the axillary (12/59, 20%), the inguinal nodes (7/59, 12%), the abdominal and pelvic lymphnodes (5/59, 9%) and the mediastinal lymph nodes(4/59 , 7%)(Table 11).

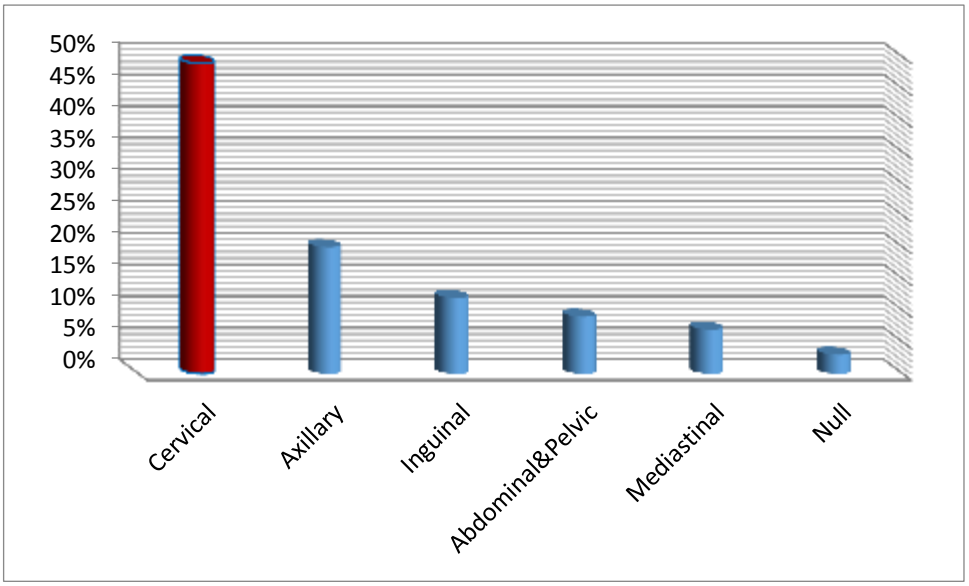



**Figure 8: Distribution NHL according to site of lymph node involvement.**

**Table 11: Distribution NHL according to site of lymph node involvement:**

| Number (%) | Distribution NHL according to site of lymph node involvement |
|---|---|
| 29(49%) | Cervical |
| 12 (20%) | Axillary |
| 7 (12%) | Inguinal |
| 5 (9%) | Abdominal &Pelvic |

| | |
|---|---|
| 4 (7%) | Mediastinal |
| 2 (3%) | Null |
| 59(100%) | Total |

**Table 12: Distribution NHL according to immunophenotypic profile.**

| Number (%) | Distribution NHL according to immunophenotypic profile |
|---|---|
| 119 (84%) | B- Cell |
| 17 (12%) | T-Cell |
| 4 (3%) | Histocyte |
| 1 (1%) | Null (B-Cell according 2016 WHO classification) |
| 141(100%) | Total |

**Distribution according to immunophenotypic profile:**

Out of 141 cases of NHL, 119 (84%) lymphomas were immunophenotyped as B‑cell lymphomas,17(12%) expressed the T‑cell immunophenotype and the remaining 4 (3%) were histocytes,

One case (1%) was null ( B-cell according 2016 WHO classification)(Table 12).

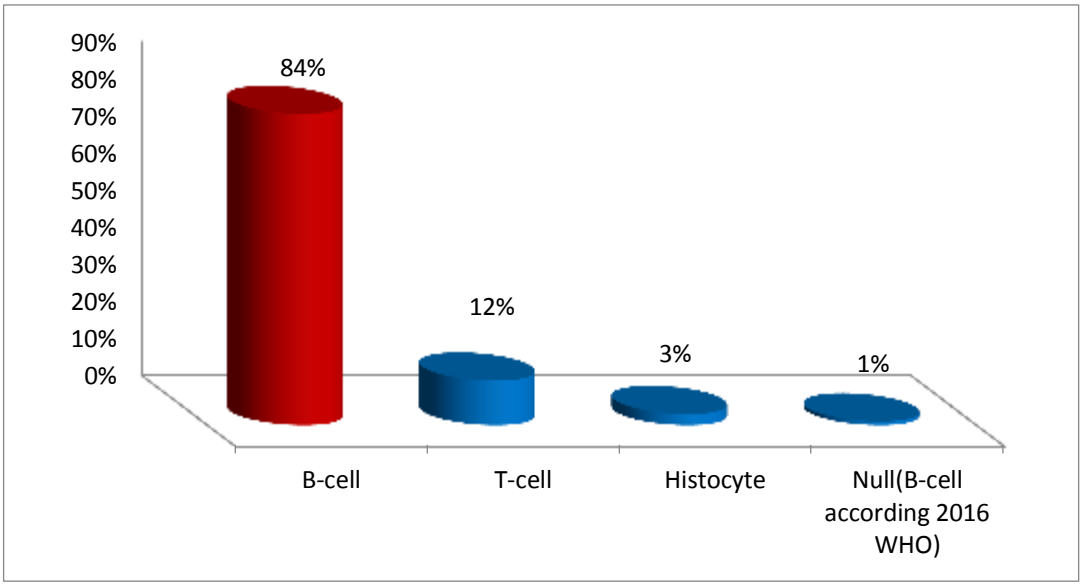



**Figure 9: Distribution NHL according to immunophenotypic profile.**

**Histopathological types of non‑Hodgkin's lymphomas in present study:**

**In general**:

Among B‑cell lymphomas, diffuse large B‑cell lymphoma (DLBCL) was the most common subtype (63/141, 44%),followed by CLL/SLL(21/141 ,15%) ,plasma cell neoplasms(18/141 ,13%) ,T-cell lymphoma(17/141 ,12%).

Follicular lymphoma,maltoma,B-ALL and langerhans cell histocytosis were similar (4/141, 3% for each), Burkitt,s lymphoma (3/141 , 2%) , lymphoplasmacytic lymphoma(2/141, 1%).

One case (1%) was reclassified gray zone lymphoma (B-cell lymphoma, unclassifiable, with features intermediate between DLBCL and classical Hodgkin lymphoma)(Table 13).

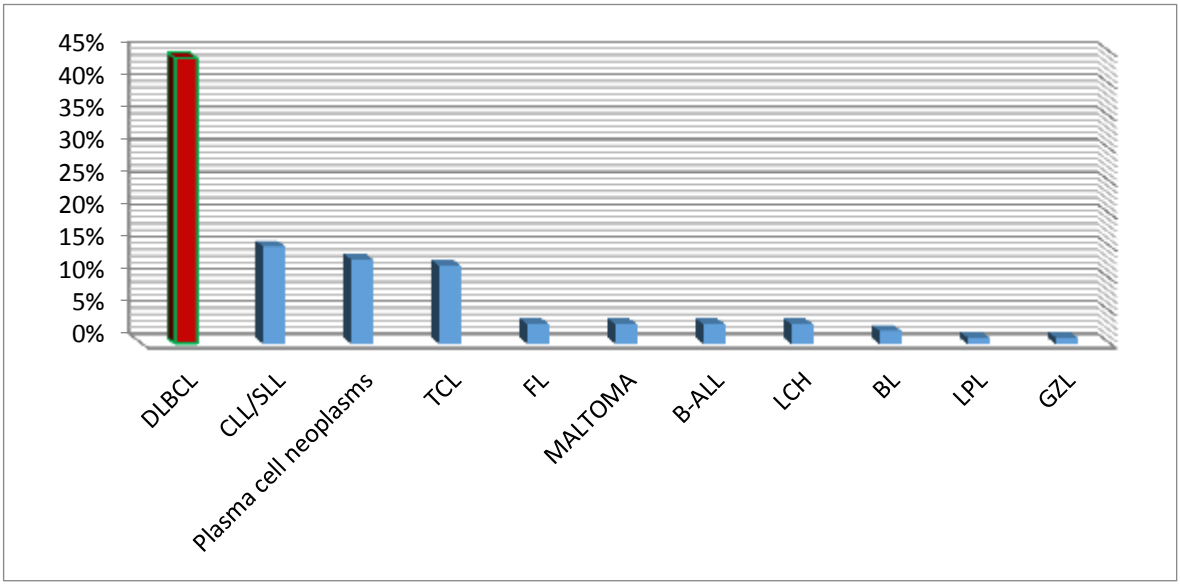



**Figure 10: Distribution histopathological types of non-Hodgkin's lymphomas in present study**

**Table 13:Distribution histopathological types of non-Hodgkin's lymphomas in present study**

| Number (%) | Histopathological types of non-Hodgkin's lymphomas in present study |
|---|---|
| 63 (44%) | DLBCL |
| 21 (15%) | CLL/SLL |
| 18 (13%) | Plasma cell neoplasms |
| 17 (12%) | TCL |
| 4 (3%) | FL |
| 4 (3%) | MALTOMA |
| 4 (3%) | B-ALL |
| 4 (3%) | Langerhans cell histocytosis(LCH) |
| 3 (2%) | BL |
| 2 (1%) | LPL |
| 1 (1%) | Gray zone lymphoma(GZL)…….B-cell,unclassifiable(2016 WHO) |
| 141(100%) | Total |

**Table 14:DLBCL distrubution of age groups according to sex.**

| Females n(%) | Males n (%) | Total cases n(%) | Age group |
|---|---|---|---|
| 0(0%) | 0 (0%) | 0 (0%) | 1th |
| 0(0%) | 6 ( 16%) | 6 (8%) | 2th |
| 4(16%) | 1 (2%) | 5 (9%) | 3th |
| 4(16%) | 3 (8%) | 7 (11%) | 4th |
| 5(20%) | 5 (13%) | 10 (16%) | 5th |
| 4(16%) | 9 (24%) | 13 (21%) | 6th |
| 1(4%) | 8 (21%) | 9 (14%) | 7th |
| 4(16%) | 6 (16%) | 10 (16%) | 8th |
| 2(8%) | 0 (0%) | 2 (3%) | 9th |
| 1(4%) | 0 (0%) | 1 (2%) | 10th |
| 25(100%) | 38 (100%) | 63 (100%) | Total |

**Diffuse Large B Cell Lymphoma (DLBCL):**

In general the pike incidence was during 6th decade of life, it was during the 6th decade in male , while it was during 5th decade in female, with male predominance (Table 14).

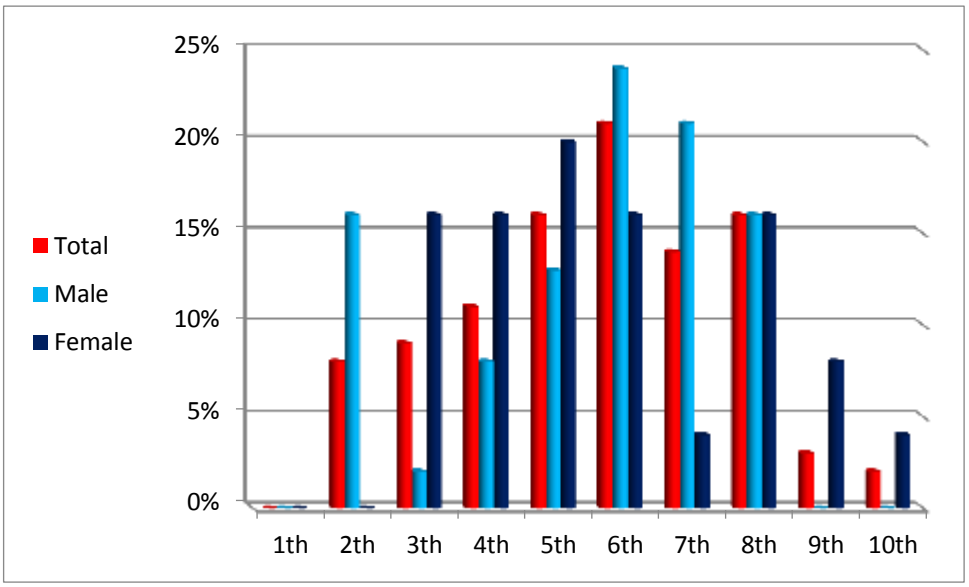



**Figure 11: DLBCL distrubution of age groups according to sex.**

Out of 63 cases of DLBCL,60 (95%) were primary ,while 3 cases (5%) were secondary involvement in bone marrow(Table 15).

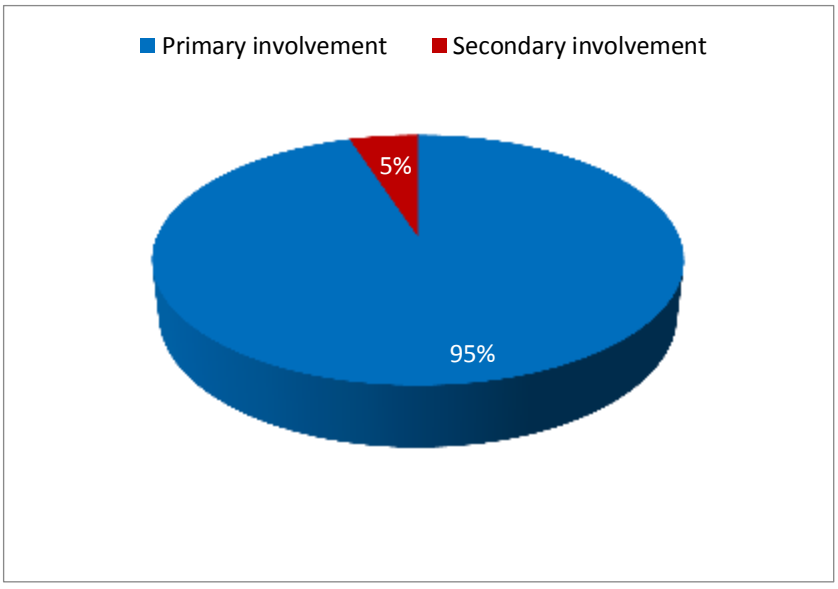



**Figure 12:Distribution of extra nodal DLBCL(Primary & secondary involvement).**

**Table 15: Distribution of extra nodal DLBCL(Primary & secondary involvement).**

| Number (%) | Distribution of extra nodal DLBCL(Primary & secondary involvement) |
|---|---|
| 60(95%) | Primary involvement |
| 3(5%) | Secondary involvement |
| 63(100%) | Total |

**Table 16: Site distribution of DLBCL( nodal and extranodal).**

| Number (%) | Distribution of DLBCL( nodal and extranodal). |
|---|---|
| 35 (56%) | Lymph nodes |
| 28 (44%) | Extra nodal |
| 63 (100%) | Total |

Out of 63 cases of DLBCL, 35 /63 (56%) were in the lymph nodes ,while 28/63(44%) were extra nodal (25/28 , 89 % primary and 3/28 , 11 % secondary)(Table 16).

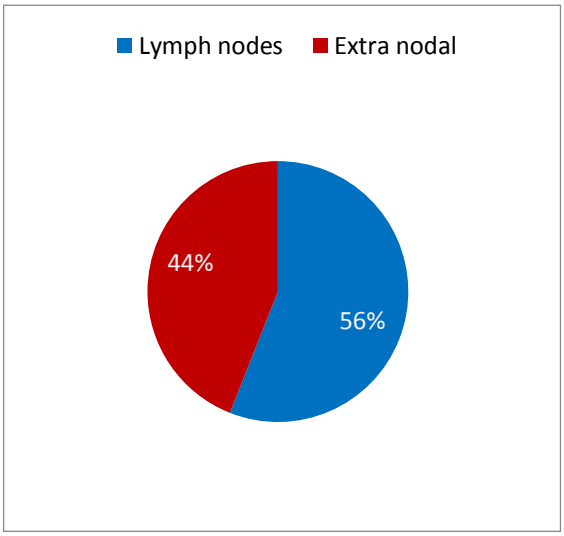



**Figure 13: Site distribution of DLBCL( nodal and extranodal).**

Gastrointestinal tract ( stomach) and tonsils constituted the most common sites of DLBCL (5/28, 18% for each ), followed by spleen (3/28, 11%) , the nasal cavity ,tonge and testis(6 patients ,7% each) while breast ,pancreas, , mediastinum, skin ,orbit and liver were similar( 3% for each)(Table 17).

**Table 17: Site distribution of extra nodal DLBCL:**

| Number (%) | Site distribution of extra nodal DLBCL |
|---|---|
| 5 (18%) | Stomach |
| 5 (18%) | Tonsils |
| 3 (11%) | Spleen |
| 3 (11%) | Bone marrow(B.M) |
| 2 (7%) | Tongue |
| 2 (7%) | Respiratory tract (nasal cavity) |
| 2 (7%) | Testis |
| 1 (3%) | Pancreas |
| 1 (3%) | Breast |

| | |
|---|---|
| 1 (3%) | Mediastinum |
| 1 (4%) | Skin |
| 1 (4%) | Orbit |
| 1 (4%) | Liver |
| 28 (100%) | Total |

**Table 18: Distribution Histopathological subtypes of DLBCL**

| Number (%) | Distribution Histopathological subtypes of DLBCL |
|---|---|
| 24 (38%) | Not Otherwise Specified(NOS) |
| 20 (32%) | T-cell rich |
| 12 (19%) | Immunoblastic |
| 7 (11%) | Anaplastic |
| 63 (100%) | Total |

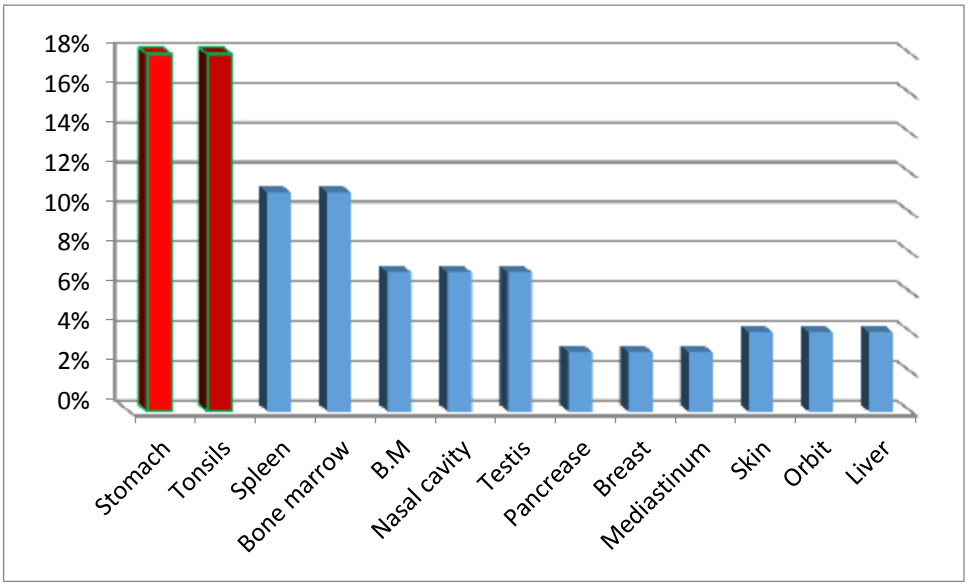



**Figure 14: Site distribution of extra nodal DLBCL(include both primary & secondary involvement).**

Diffuse large B-cell lymphoma, not otherwise specified (DLBCL,NOS) was the most common histological subtype observed in 38% (24/63), followed by T-cell rich 32%(20/63), immunoblastic subtype was seen in 19%(12/63) and anaplastic was seen in 11%(7/63)(Table 18).

**Table 19:Site distribution of DLBCL,T-cell rich subtype (nodal & extranodal).**

| Number (%) | Site distribution of T-cell rich subtype |
|---|---|
| 12(70%) | Lymph nodes |
| 6(30%) | Extra nodal |
| 20(100%) | Total |

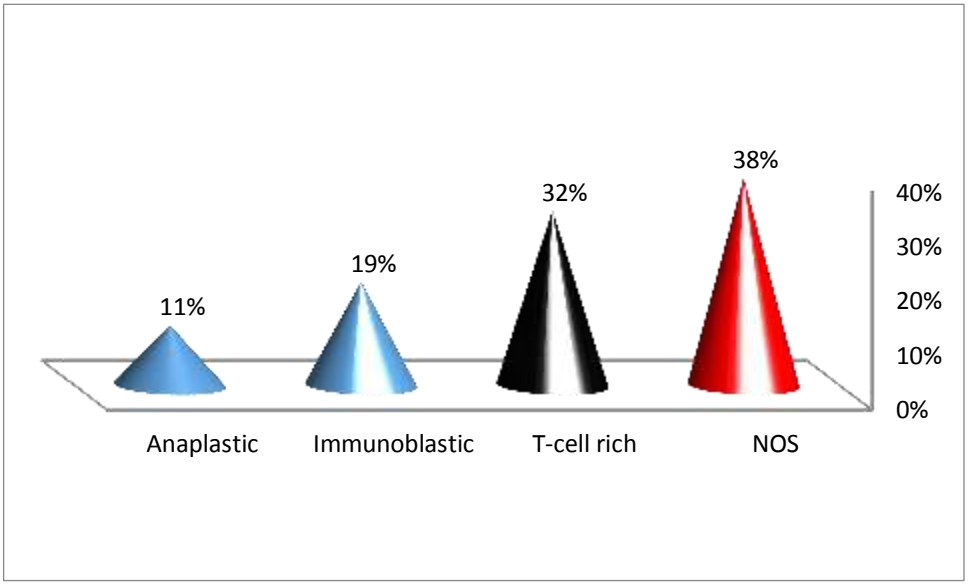



**Figure 15: Distribution Histopathological subtypes of DLBCL in present study.**

Lymph nodes constituted the most common sites of Diffuse large B-cell lymphoma ,T-cell rich (14/20 ,70%) followed by spleen as an extra nodal site(3/6 , 50%)(Table 19).

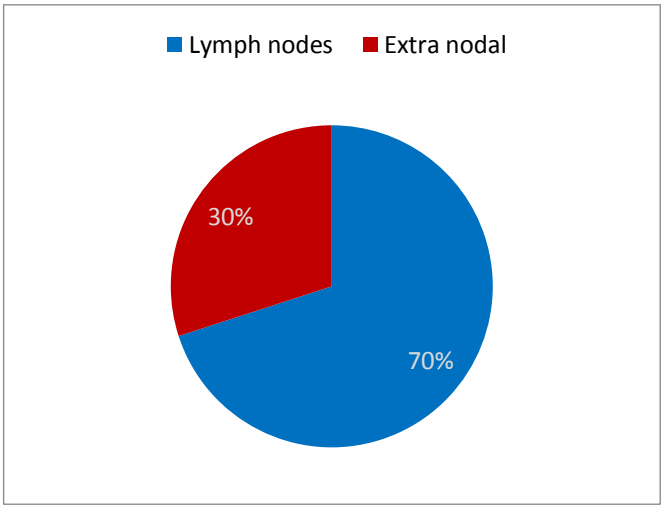



**Figure16: Site distribution of DLBCL,T-cell rich subtype (nodal & extranodal).**

**Plasma cell neoplasms:**

**Histopathological subtypes**:

Plasma cell myeloma was the most common histological subtype observed in 72% (13/18), followed byextra-osseous plasmacytoma 28%(5/18)(Table 20).

**Table 20:Distribution histopathological subtypes of plasma cell neoplasms:**

| Number (%) | Histopathological subtypes of plasma cell neoplasms |
|---|---|
| 13 (72%) | Plasma cell myeloma |
| 5 (28%) | Extra-osseous plasmacytoma |
| 18 (100%) | Total |

**Table 21: The frequency of P C Neoplasms according to sex.**

| Number (%) | Sex |
|---|---|
| 13(72%) | Male |
| 5(28%) | Female |
| 18(100%) | Total |

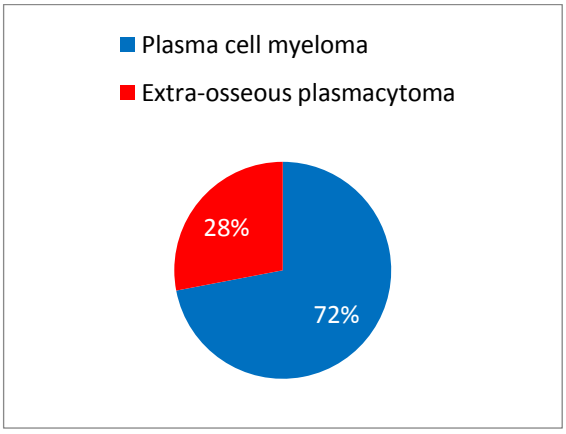



**Figure 17:Distribution histopathological subtypes of plasma cell neoplasms.**

**Sex**:

The study showed male predominance, among 18 cases of P C Neoplasms, 13/18 patients were male (72%) and 5/18 were female (28%) patients, the age range was 5$^{th}$ -8$^{th}$ decade (Table 21).

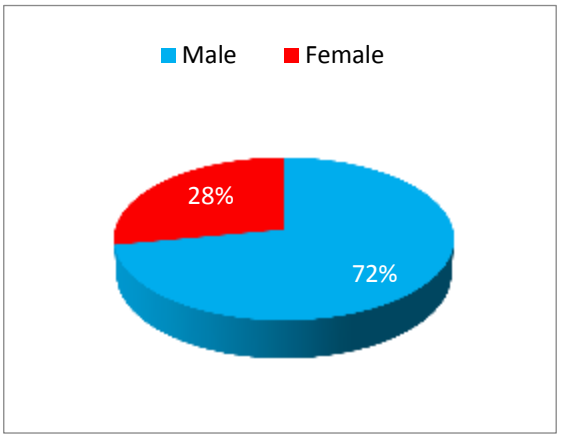



**Figure 18: The frequency of P C Neoplasms according to sex.**

Age :peak incidence was during the 6$^{th}$ and 7$^{th}$decades of life, it was during the 6$^{th}$ decade in females ,while it was during 5$^{th}$ and 7$^{th}$ decades un males(Table 22).

**Table 22: Distrubution of age groups according to sex(PC Neoplasms):**

| Females (%) | Males (%) | Total cases (%) | Age group |
|---|---|---|---|
| (0%) | (0%) | (0%) | 1$^{th}$ |
| (0%) | (0%) | (0%) | 2$^{th}$ |
| (0%) | (0%) | (0%) | 3$^{th}$ |
| (0%) | (0%) | (0%) | 4$^{th}$ |
| (0%) | (31%) | ( 22%) | 5$^{th}$ |
| (60%) | (23%) | (33.33%) | 6$^{th}$ |

| | | | |
|---|---|---|---|
| (40%) | (31%) | (33.33%) | 7th |
| (0%) | (15%) | (11%) | 8th |
| (0%) | (0%) | (0%) | 9th |
| (0%) | (0%) | (0%) | 10th |
| (100%) | (100%) | (100%) | Total |

**Table23: Distribution histopathological subtypes of T-cell lymphomas:**

| Number (%) | Histopathological subtypes of T-cell lymphomas |
|---|---|
| 7(41%) | ALCL |
| 3(18%) | LTCL |
| 1(6%) | T-ALL |
| 1(6%) | NK/T,Nasal type |
| 1(6%) | AITL |
| 4(23%) | PTCL,NOS |
| 17(100%) | Total |

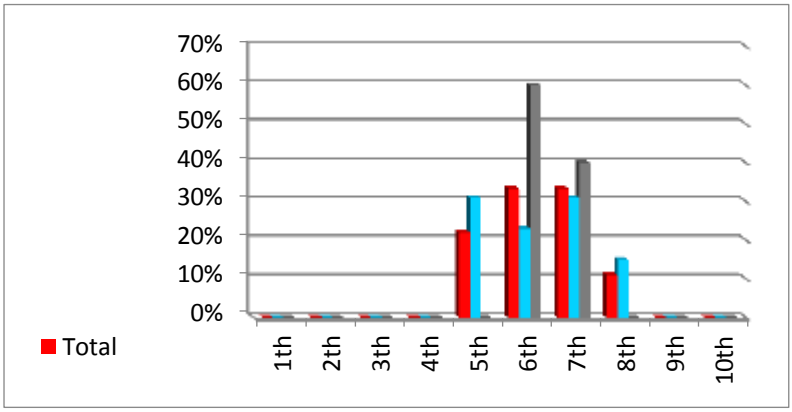
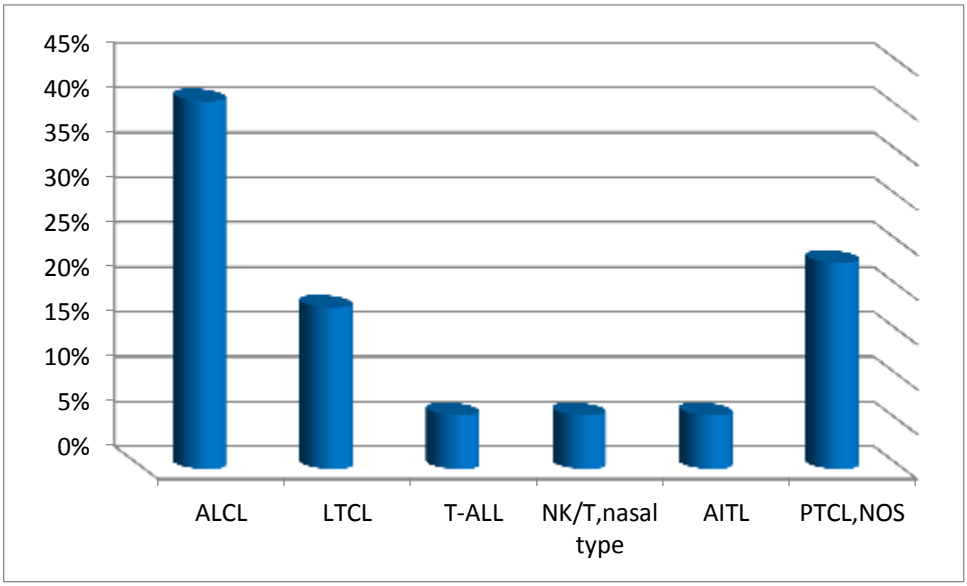



**Figure19: Distrubution of age groups according to sex(PC Neoplasms) T-cell lymphoma:**

Anaplastic large cell lymphoma was the most common histological subtype of T-cell lymphoma 7/17 (41%) , followed by peripheral T-cell lymphoma,NOS 4/17 (23%) (Table 23).




**Figuer 20: Distribution histopathological subtypes of T-cell lymphomas.**

## Discussion:

Comparsion between our study and these data in Arabic and National studies according type of lymphoma,sex,cell type ,lymph nodes involvement: our present study showed predominance of NHL ,with the majority seen in the male population,out of 141 studied subjects 84% were B-celllymphoma and 12% were T-cell lymphoma, and the cervical lymph nodes were the most frequent nodal location which is very close to the study done by Mariam A. A. Humama, Naela A. Al-Nakhbi in Hadramout University, Yemen[11] ,also these data are in agreement with those reported by Mondal SK, Mandal PK in Eastern India [12] , in Lebanon[13] made a similar observations -in study performed byClaude Sader-Ghorra, Marc Rassy, Samah Naderi- nearly except the frequency of NHL according to sex is similar.

These data were summarized in (Table 24):

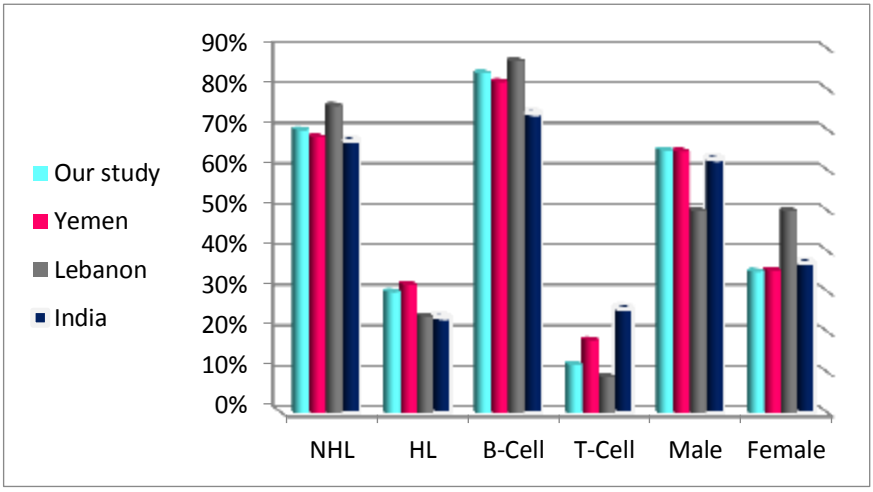



**Figure 21a: Comparsion between our study and these data in Arabic and National studies according to type of lymphoma,sex,cell type.**

**Table 24: Comparsion between our study and these data in Arabic and National studies according type of lymphoma,sex,cell type ,lymph nodes involvement:**

| India(455) | Lebanon(502) | Yemen(170) | Our study(141) | Type of ML |
|---|---|---|---|---|
| 76.3% | 76% | 68.2% | 70% | NHL |
| 23.7% | 24% | 31.8% | 30% | HL |
| | | | | Cell type |
| 74.1% | 87% | 81.9% | 84% | B-Cell |
| 25.9% | 9% | 18.1% | 12% | T-Cell |
| | | | | Sex |
| 62.8% | 50% | 64.7% | 65% | Male |
| 37.20% | 50% | 35.3% | 35% | Female |
| | | | | Lymph node involvement |
| 20.7% | - | - | 49% | Cervical |
| 14.35% | - | - | 20% | Axillary |
| 7.9% | - | - | 12% | Inguinal |
| 5.6% | - | - | 9% | Abdominal |
| 5.2% | - | - | 7% | Mediastinal |

**Table 25: Comparison between our study and these data in Arabic and National studies according to subtype of NHL.**

| USA N (112380) | Europe N (2339) | India n(455) | Lebanon N (502) | Yemen N (170) | Our study n (141) | Subtype of NHL |
|---|---|---|---|---|---|---|
| 25% | 21.10% | 35.20% | 44% | 61.1% | 44% | DLBCL |
| 19% | 15.5.% | 5.50% | - | 6% | 15% | CLL/SLL |
| 25% | 24.40% | - | - | - | 13% | PC neoplasms |
| - | 5.10% | 25.90% | - | 18% | 12% | TCL |
| 12% | 11% | 19.30% | 20% | 8% | 3% | FL |
| 1% | - | 5.80% | - | 21.1% | 2% | BL |
| - | - | 2.8% | 8% | - | - | MCL |

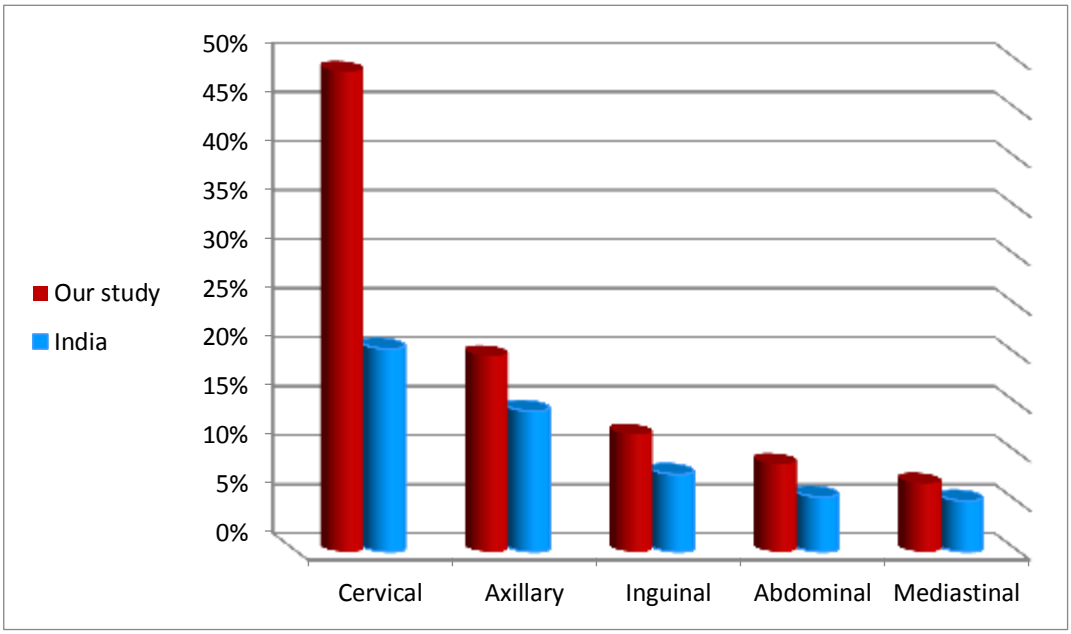



**Figure 21b: Comparison between our study and India study according to lymph nodes involvement**

**Comparison between our study and these data in Arabic and National studies according to subtype distribution of malignant lymphoma(ML):**

Asians typically have relatively higher proportions of mature T/NK cell lymphomas and MAL T lymphoma and lower proportions of follicular lymphoma and than Western populations[14] The result of the 141 cases of NHL in the present study demonstrated that the highest incidence of NHL is in the 6th decade with most male patients in the 7th decade and female patients in the 6th decade. In the current study, DLBCLs represented the most common B‑cell lymphoma, followed by CLL/SLL . DLBCL has been reported to be the most common NHL in most studies worldwide and, but it varies considerably from region to region - for example, in our study that proportion of DLBCL seen similar to that in Lebanon study(neighboring country[13], while it was higher than reported in Indian[12], European[15], and American[16] studies. In Yemen[11], DLBCL is much higher than our study.

The incidence proportion of CLL/SLL in our study , the United States[16],and Europe[15] is approximate. Plasma cell neoplasms in European[15] and American[16] studies were significantly higher than in our study. Higher percentages of follicular lymphoma(FL) is seen in Indian[12] ,European[15] and American[16] studies compared to that in our study, while proportion of T-cell lymphomas were found to be high in our study and India[12] compared to European[15] and American[16] studies.

Nevertheless recognizing and diagnosing various subtype of T cell lymphomas according to WHO classification gives vital prognostic information. As generally the prognosis of T cell lymphomas is poorer than B cell Lymphomas[17]

These data were included in Table 25:

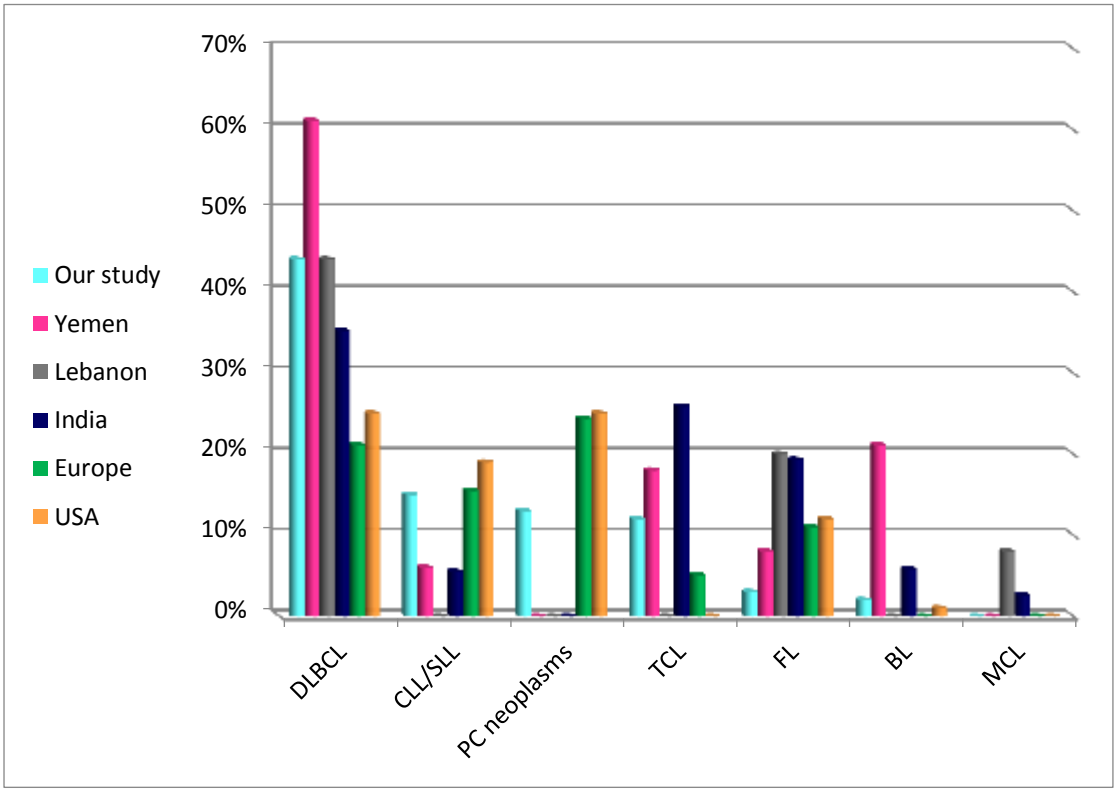



**Figure 22: Comparison between our study and these data in Arabic and National studies according to subtype of NHL.**

## Conclusion:

Our present study is performed to describe various subtypes of NHL using immunohistochemical staining and based on 2008 WHO classification of lymphoid tissue.NHL is the most common type of malignant lymphoma with male predominance.-

Diffuse large B cell lymphoma(DLBCL) was the most common among all NHL.-

These data are in agreement with those reported in Yemen and Lebanon.

The relative proportion of follicular in this study is much lesser than that reported in Lebanon .

The relative proportion of DLBCL in this study is much higher than that reported in European and American while proportion of CLL/SLL and plasma cell neoplasms is similar.

**Some cases of NHL from Pathology Department of Al-Mouassat University Hospital:**

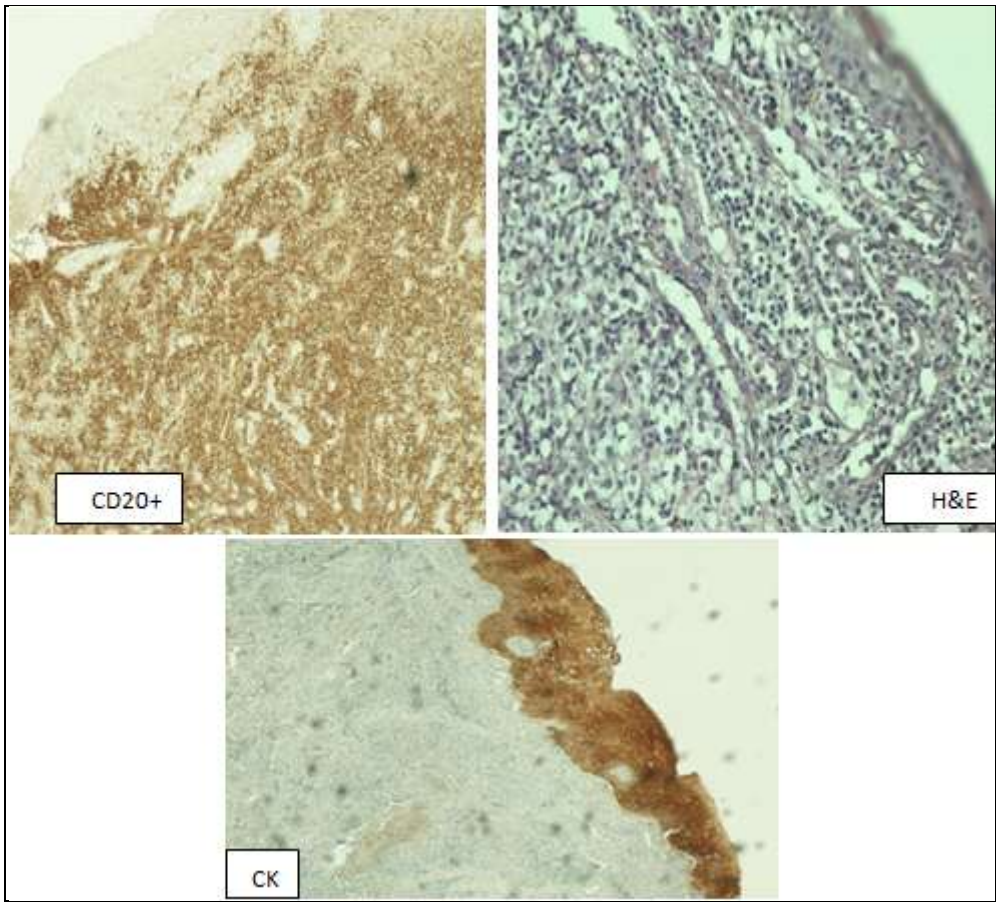



**Figure 1:DLBCL (H&E and Immunohistochemistry stains)**

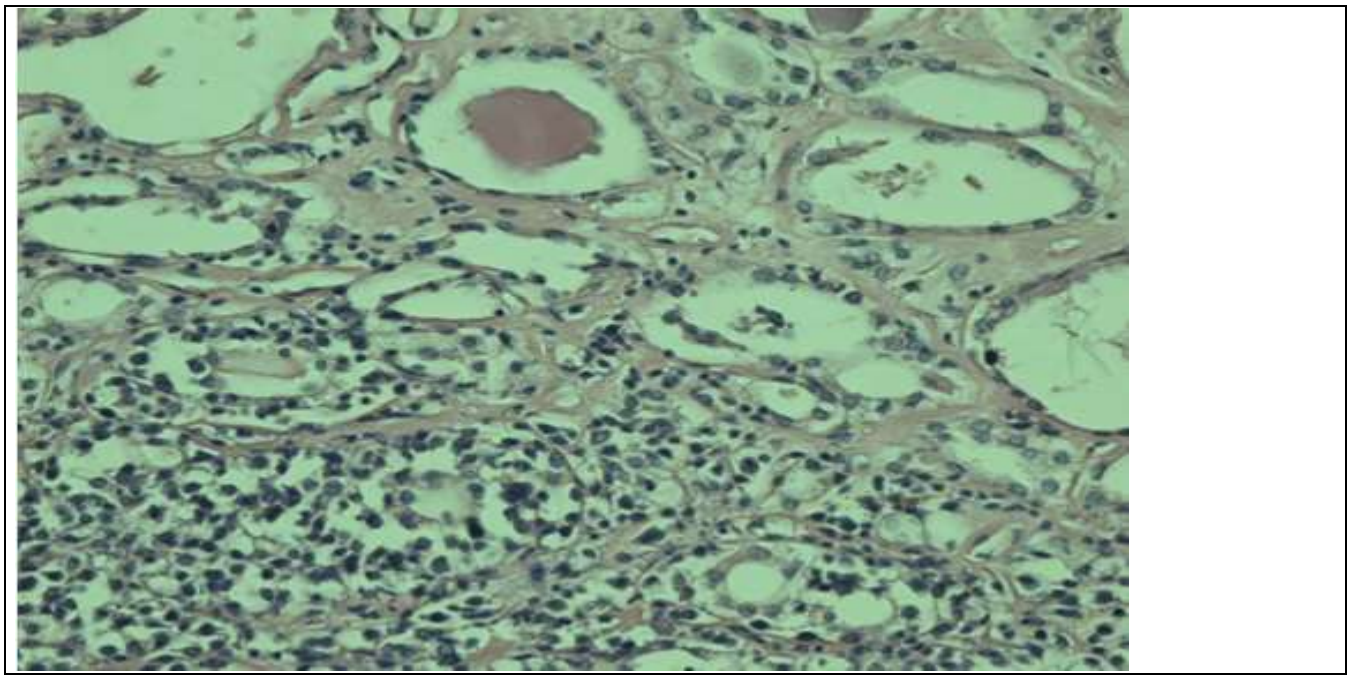


**Figure 2:Lymphoma MALT in thyroid gland.**

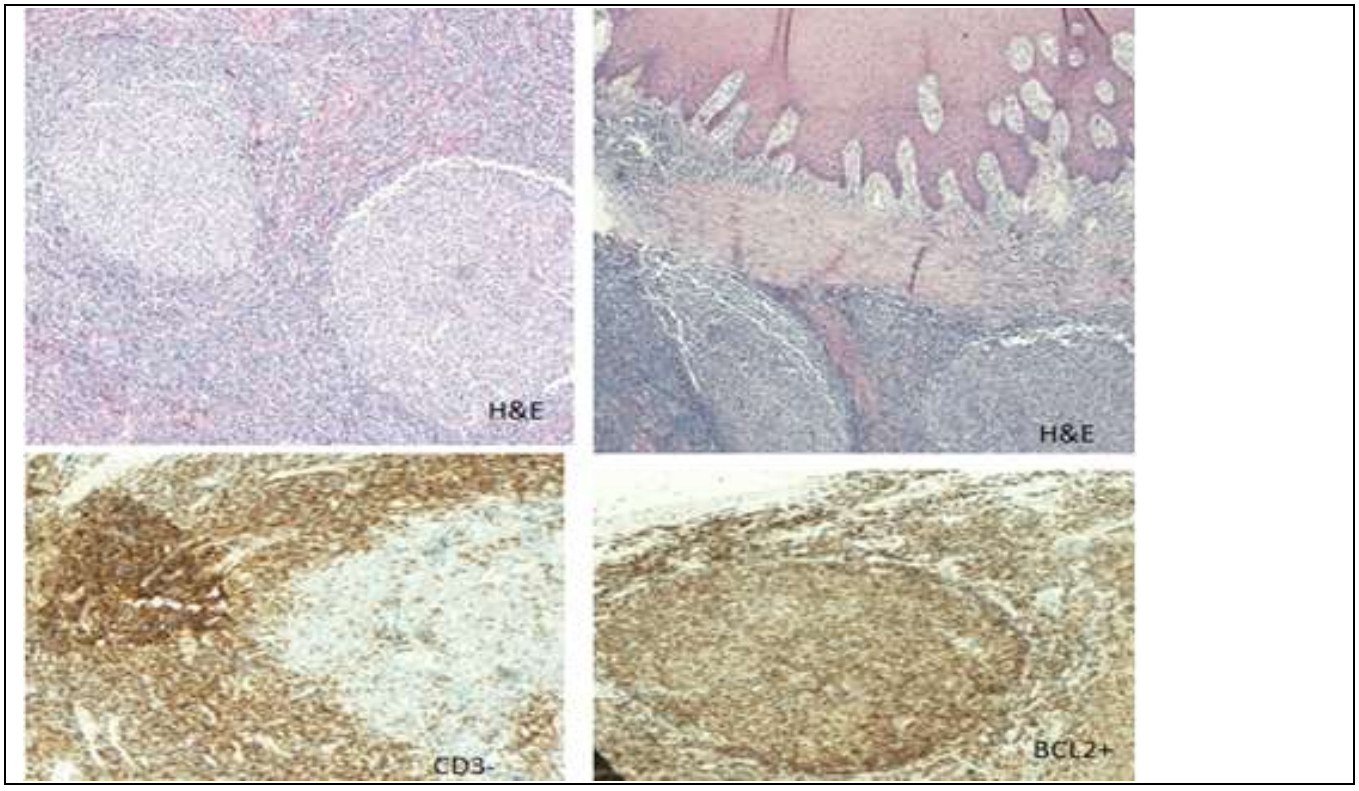



**Figure 3: Follicular lymphoma in orbit.**

## References:


1. Jaffe, E. S. H. N., Stein, H., & Vardiman, J. W. (Eds.). World Health Organization Classification ofTumours. Pathology and Genetics of Tumours of Haematopoietic and LymphoidTissues. Lyon,France: IARC Press. 2001.
2. Laurini, J. A., Perry, A. M., Boilesen, E., Diebold, J., MacLennan, K. A., Muller-Hermelink, H. K., & Weisenburger, D. D. (2012). Classification of non-Hodgkin lymphoma in Central and South America: a review of 1028 cases. *Blood*, 120(24), 4795–4801. doi:10.1182/blood-2012-07-440073.
3. Anderson, J. R., Armitage, J. O., & Weisenburger, D. D. (1998). Epidemiology of the non-Hodgkin's lymphomas: distributions of the major subtypes differ by geographic locations. Non-Hodgkin's Lymphoma Classification Project. *Annals of Oncology*, 9(7), 717–720. doi:10.1023/A:1008265532487.
4. Eltom, M. A., Jemal, A., Mbulaiteye, S. M., Devesa, S. S., & Biggar, R. J. (2002). Trendsin Kaposi's sarcoma and non-Hodgkin's lymphoma incidence in theUnited States from 1973 through 1998. *Journal of the National Cancer Institute*, 94(16), 1204–1210. doi:10.1093/jnci/94.16.1204.
5. Hanif, M., Zaidi, P., Kamal, S., & Hameed, A. (2009). Institution-based cancer incidence in a local population in Pakistan: nine year data analysis. *Asian Pacific Journal of Cancer Prevention*, 10, 227–230.
6. Juan Rosai, M. D. Rosai and Ackerman's Surgical pathology, 10$^{th}$Edition.Mosby(USA):Elsevier; (2011).
7. Swerdlow, S. H., Campo, E., Pileri, S. A., Harris, N. L., Stein, H., Siebert, R., & Jaffe, E. S. (2016). The 2016 revision of the World Health Organization classification of lymphoid neoplasms. *Blood*, 127(20), 2375–2390. doi:10.1182/blood-2016-01-643569.
8. Skarin, A. T., & Dorfman, D. M. (1997). Non-Hodgkin's Lymphomas: Current Classification and Management. *CA: a Cancer Journal for Clinicians*, 47(6), 351–372. doi:10.3322/canjclin.47.6.351.
9. Akhter, A., Rahman, M. R., Majid, N., Shermin, S., Saleheen, M. S., & Rajib, R. C. (2012). Histological Subtypes of Non-Hodgkin's Lymphoma in Different Age and Sex Groups. *Bangladesh Medical Journal*, 41(1), 32–36.
10. Armitage, J. O. (2005). Staging non-Hodgkin lymphoma. *CA: a Cancer Journal for Clinicians*, 55(6), 368–376. doi:10.3322/canjclin.55.6.368.

11. Humam, M. A. A., Al-Nakhbi, N. A., Melkat, A. A., Almontaser, T. M., & Binnabhan, A. S. (2016). Malignant lymphoma in Hadhramout Sector, Yemen a retrospective study of 170 cases classified according to the WHO classification. *Journal of Current Medical Research and Practice*, 1(2), 6–11. doi:10.4103/2357-0121.192538.
12. Mondal, S. K., Mandal, P. K., Roy, S. D., Chattopadhyay, S., Roy, S., & Biswas, P. K. (2014). Malignant lymphoma in Eastern India:A retrospective analysis of 455 cases according to World Health Organisation classification. *Journal of Cancer Research and Therapeutics*, 10(2), 354. doi:10.4103/0973-1482.136639.
13. Claude Sader-Ghorra, Samah Naderi, Joseph Kattan. (2014). Type Distribution of Lymphomas in Lebanon: Five-Year Single Institutionxperience. *APJCP*, 15, 5825.
14. Yoon, S. O., Suh, C., Lee, D. H., Chi, H.-S., Park, C. J., Jang, S.-S., . . ., & Huh, J. (2010). Distribution of lymphoid neoplasms in the Republic of Korea: analysis of 5318 cases according to the World Health Organization classification. *American Journal of Hematology*, 85(10), 760–764. doi:10.1002/ajh.21824.
15. Leo, Q. J. N., Ollberding, N. J., Wilkens, L. R., Kolonel, L. N., Henderson, B. E., Le Marchand, L., & Maskarinec, G. (2016). Nutritional factors and non-Hodgkin lymphoma survival in an ethnically diverse population: the Multiethnic Cohort. *European Journal of Clinical Nutrition*, 70(1), 41–46. doi:10.1038/ejcn.2015.139.
16. Teras, L.R., DeSantis, C.E., Cerhan, J.R., Morton, L.M., Jemal, A., & Flowers, C.R. (2016). 2016 US Lymphoid Malignancy Statistics by World Health Organization Subtypes. *CA: a Cancer Journal for Clinicians*, 66(6), 443–459. doi:10.3322/caac.21357.
17. Devesa, S. S., & Fear, T. (1992). Non-Hodgkin's lymphoma time trends: United States and international data. *Cancer Research*, 52, 5432–5440.

*****