Histopathologic Spectrum of Lymph Node Lesions in a Teaching Hospital in East Nigeria. A Nine-Year Review

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ABSTRACT

Background: The lymph node is a very important structure in the haemopoietic and lymphatic systems. The lesions are wide-ranging and include non-neoplastic conditions, benign and malignant neoplastic diseases, to metastatic deposits. Histopathology is considered the gold standard in its diagnosis. **Objectives:** To determine the spectrum of lesions in both peripheral and visceral lymphadenopathies in a tertiary hospital in Nnewi and compare it with other studies. **Methodology:** This is a retrospective study involving 207 cases of histologically diagnosed lymph node biopsies in the Department of Histopathology, Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Nigeria, over a 9-year period. Cases with incomplete biographic data such as age, sex, nature of tissue, and unrepresentative or inadequate tissue were excluded from the study. Few fine needle aspiration cytology of lymph nodes done within this study period were excluded because of inconclusive results in the majority of the cases, however, biopsies requested in those cases were used. **Results:** Two hundred and seven lymph node biopsies were studied. The age of these patients ranged from 0.9 to 89 years, with a mean age of 41.4 years (SD±20.9) and median age of 41.0 years. Females slightly outnumbered males with a ratio of 1.1:1. Neoplastic lesions were more common: comprising of 58.4% (121/207) and including metastatic deposits to the lymph nodes 31.9% (66/207), non-Hodgkin lymphoma 23.7.1% (49/207), Hodgkin lymphoma 2.4% (5/207) and one case of Kaposi sarcoma: 0.5%(1/207). Non-neoplastic lesions were the second commonest and included: majorly inflammatory lesions 41.5% (85/207) such as non-specific reactive hyperplasia accounting for 24.6% (52/207), other specific reactive hyperplasia 2.8% (6/207), 9.7% (20/207) of Tuberculous lymphadenitis, 3.4% (7/207) of other chronic necrotizing granulomatous lymphadenitis, and one case of ectopic thyroid inclusion accounting for 0.5%(1/207). **Conclusion:** Histopathology plays an important role in establishing the cause of lymphadenopathy. Among the lymph nodes examined, neoplastic lesions were the most prevalent cases in our environment, which is contrary to the popular belief, that infectious diseases of lymph nodes are more common in developing countries. This study also concluded that the cervical group of lymph nodes was the most frequently encountered palpable nodal swelling, followed by the axillary group. Further studies are also required, where extensive immunohistochemical stains and molecular studies would be applied for further classifications of lymphomas.

Keywords: Histopathologic, lymph node, reactive hyperplasia, metastasis, lymphoma.

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INTRODUCTION

Lymphadenopathy may be peripheral or visceral, independent of its locations in both children and adult can yield diagnosis of disorders. [1] Peripheral lymphadenopathy unlike visceral types are common and easily accessible palpable mass to surgeons. Among the peripheral nodes, those in the upper part of the body (cervical, supraclavicular, axillary) are preferentially biopsied than lower limb nodes (popliteal, inguinal or femoral) as the former are more likely to yield definitive diagnosis, whereas the latter are often characterized by non-specific reactive or chronic inflammatory and fibrotic changes.[2] Despite many technical advances in lympho-pathology, lymphadenectomy with complete clinical information is absolutely essential to arrive at an accurate diagnosis.[3] The lesion of lymph node ranges from benign reactive lymphadenopathies, infectious processes, metabolic disorders, congenital rests and inclusions. It also includes primary mesenchymal tumours (lipoma, vascular tumours, myofibroblastic tumours, & smooth muscle tumours), protein deposition (amyloid) and metastatic tumours, or primary lymph node neoplasms, namely; malignant lymphomas.[3] Other miscellaneous non-neoplastic lymphoproliferative disorders include Castleman disease, Rosai Dorfman disease, Kimura disease, Kikuchi Fujimoto disease and systemic lupus erythematosus (SLE).[3]

Congenital rests and inclusions include, epithelial-type Inclusions (salivary gland inclusions, müllerian inclusions, breast epithelial inclusions, thyroid inclusions), mesothelial inclusions, and benign nevus cell rests.[3]

The dearth of information on lymph node lesions at Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Nigeria has necessitated the need to study the lesions of lymph nodes and also provide the baseline data in NAUTH for further research.

METHODOLOGY

Setting

Nnamdi Azikiwe University Teaching Hospital is a federal teaching hospital located in Nnewi, a major economic hub with many manufacturing companies. Nnewi is one of the three major cities in Anambra State located in the southern part of the state about 22 kilometers south-east of Onitsha. As a referral centre it provides tertiary level health care for patients within Anambra state as well as neighbouring cities and states. Anambra state is one of the five South-Eastern states of Nigeria, with a population of 4,055,048 and population density of 840/km^2 according to the 2006 census.[4] Its boundaries are formed by Delta state to the west, Imo and River states to the south, Enugu state to the east and Kogi state to the north.

Method

This is a retrospective study which spanned over a period of 9 years involving 207 cases of both peripheral and visceral lymph node biopsies diagnosed in Histopathology department of Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi, Nigeria from January 2011–December 2019. Laboratory request forms and duplicate copies of histological reports were retrieved and relevant clinical information and histological type of the lesions were extracted. Only 207 (97.0%) had adequate records for inclusion as lymph node lesions, 7 (3.3%) cases were excluded from the study due to inadequate records ranging from unrepresentative tissue, incomplete clinical details such as age, and gender. Few fine needle aspiration cytology of lymph nodes done within this study period were also excluded because of inconclusive results in majority of the cases, however, biopsies requested on those cases were used. The tissues were initially fixed in 10% formal saline, processed and embedded in paraffin wax. They were then sectioned, and mounted on glass slide and stained with routine histochemical stain {hematoxylin and eosin (H & E)}. The slides were reviewed by the authors using multi-headed light microscope (CARL ZEISS®).

Data analysis

Data were analyzed using statistics software statistical package for the social sciences (SPSS) Incorporated,

version 21 Chicago, Illinois, USA. Quantitative continuous variables like age were summarized using mean, standard deviation while categorical variables like sex were summarized using percentage. Results were presented in table and charts. Pearson's chi-square ($\chi 2$) was used to test the association between two categorical variables and a p-value of < 0.05 was considered statistically significant.

RESULTS

A total of 207 lymph node cases that met the inclusion criteria were analyzed. It accounted for 2.9% (207/7204) of all surgical specimens in our department over the period. Out of 207 cases, there is a slight female preponderance with females having 51.2% (107 cases) and males 48.8% (100 cases) giving a female to male ratio of 1.1:1. The age range was 0.9-89 years with a mean age of 41.4 years (SD±20.9) and median age of 41.0 years. Most cases were seen in the age group of 50-60 years (39 cases, 18.8%) followed by 20-30 years (33cases, 15.9%) and the least cases were seen in the age group above 80 years (4 cases, 1.9%).

Neoplastic lesions were more common: comprising; 58.4% (121/207) and includes metastatic deposits to the lymph nodes 31.9% (66/207), non-Hodgkin lymphoma 23.7.1% (49/207), Hodgkin lymphoma 2.4% (5/207) and one case of Kaposi sarcoma 0.5%(1/207).

Non-neoplastic lesions were the second commonest and constituted 41.1% (85/207) and included reactive lesions and congenital ectopic rest of thyroid tissue. The reactive lesions included non-specific reactive hyperplasia accounting for 24.6% (52/207), other specific reactive hyperplasia 2.8% (6/207), 9.7% (20/207) of tuberculous lymphadenitis and 3.4% (7/207) of other chronic granulomatous lymphadenitis. Ectopic thyroid inclusion was among the least non-neoplastic lesions seen and accounted for 0.5%(1/207).

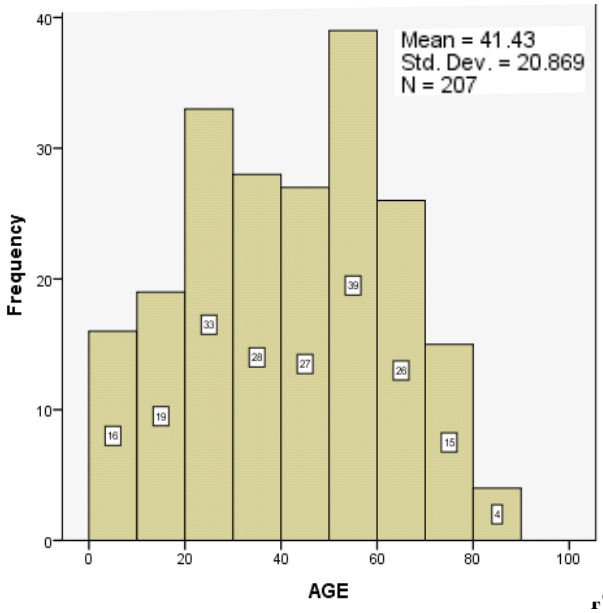

Figure 1; shows frequencies and age groups of lymph node lesions

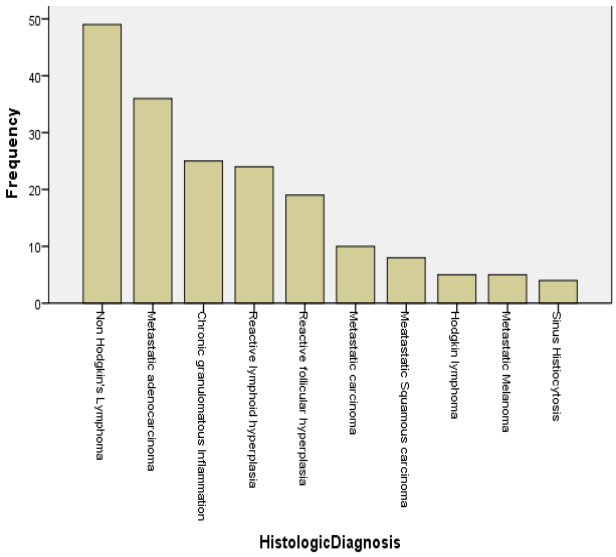

Figure 2: Distribution of different types of lesions of lymph node cases

Among the non-neoplastic lesions, reactive lesions were far most common accounting for 41.5% (86/207). There was female preponderance (F=47: M= 38) with female to male ratio of 1.2:1. Common age group affected was 31-60 years. Among the non-specific reactive hyperplasia, majority were combinations of the patterns 30.2% (26/86cases), followed by: follicular hyperplasia, 23.1% (20/86 cases), sinus histiocytosis 4.7% (4/86) and 2.3% (2/86 cases) were paracortical hyperplasia. The rest 38.4% (33/86) had other specific patterns of reactive hyperplasia and included 23.3% (20/86) of tuberculous lymphadenitis, 8.1% (7/86) of other chronic necrotizing granulomatous inflammations, 2.3% (2/86) of Rosai Dorfman disease, and one case (1.2%; 1/86) each of infarcted node, dermatopathic lymphadenopathy, human immunodeficiency virus associated lymphadenopathy and Kikuchi Fujimoto disease. (Table 1)

Combination of reactive patterns (reactive lymphoid hyperplasia) were the commonest histologic pattern of non-neoplastic lesions and occurred more common in age groups 21-30 and 51-60 with 5 cases each (5.8%) followed by follicular hyperplasia and tuberculous lymphadenitis comprising 20 cases each (23.3%) and occurred more common in ages 11-20 years and 31-40 years respectively. (Table 1)

Among the neoplastic lesion, metastases were the commonest malignancies representing 31.9% (66/207) of the total lymph node biopsies and 54.5% (66/121) of all malignancies. Out of these, 65.1% (43/66 cases) occurred above age 50 years. The majority of cases were found within the age group 51-60 years (22 cases, 33.3%). There is a female preponderance with females having 74.2% (49/66 cases) and males 25.8% (17/66 cases) giving a female to male ratio of 3:1. Out of 66 cases, metastatic adenocarcinoma were the commonest lesions and constituted 54.5% (36/66) with majority of cases being adenocarcinoma from the breast (22 cases). Metastatic carcinoma {papillary thyroid carcinoma (n=4), nasopharyngeal carcinoma (n=4), muco-epidermoid carcinoma (n=2)} was the second commonest and constituted 16.7% (10/66 cases) followed by Squamous cell carcinoma, 12.1% (8/66 cases); malignant melanoma 7.6% (5/66 cases); and 1 case (1.5%) each of, small round cell tumour {nephroblastoma (n=1), alveolar rhabdomyosarcoma (n=1) and Ewing sarcoma (n=1)}, malignant phylloides, gastrointestinal stromal tumour (GIST), endometrial stroma sarcoma, and sarcoma not otherwise specified (NOS). (Table 2)

Table 1: **Age group and percentage distribution of different types of non-neoplastic lesions of lymph node biopsy**

Histology sub-types	Age Groups									
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
Follicular Hyperplasia	2	5	2	2	2	4	2	-	1	20
Sinus Histiocytosis	1	-	-	-	-	-	2	1	-	4
Paracortical hyperplasia	-	-	1	-	1	-	-	-	-	2
Combination of patterns	2	3	5	2	2	5	4	3	-	26
Tuberculous lymphadenitis	-	-	-	10	6	4	-	-		20
Other chronic Necrotinizing granulomatous inflammations	-	-	-	4	1	2	-	-	-	7
Rosai Dorfman disease	1	-	-	-	-	1	-	-	-	2
Infarcted node	-	-	-	1	-	-	-	-	-	1
Dermatopathic lymphadenopathy	1	-	-	-	-	-	-	-	-	1
Kikuchi Fujimoto disease	-	-	-	-	-	1	-	-	-	1
Human-immunodeficiency virus-associated lymphadenopathy	-	-	1	-	-	-	-	-	-	1
Ectopic thyroid inclusion	-	-	-	-	1	-	-	-	-	1
Total	7	8	9	19	13	17	8	4	1	86

Lymphomas constituted the second commonest malignancies. Non-Hodgkin lymphomas (NHL) were far more common and constituted 90.7% (49/54) of all cases of lymphomas and 23.7% (49/207) of all lymph node lesions in this study. Out of 49 cases, 51.0% (25/49 cases) occurred after the age of 40 years and peaked between the ages of 41 and 50 years with male preponderance (M: F = 2:1). Only 5 cases of Hodgkin lymphomas (HL) were seen and accounted for 2.4% (5/207) of all lymph node biopsies and 9.3% (5/54) of all lymphomas. Three cases out of five occurred in age group 51-60 years. Four out of five cases were seen in female.

Only one case of Kaposi sarcoma was seen in this study and constituted the remaining malignancies representing 0.5% (1/207) of total lymph node biopsies and 0.8% (1/121) of all neoplasm seen in this study. (Table 2)

Study shows yearly trend of the lymph node lesions in NAUTH, Nnewi with 2016 and 2018 having the highest prevalence while 2013, 2015, and 2017 had equal distributions. The least represented year was 2011. (Figure 3)

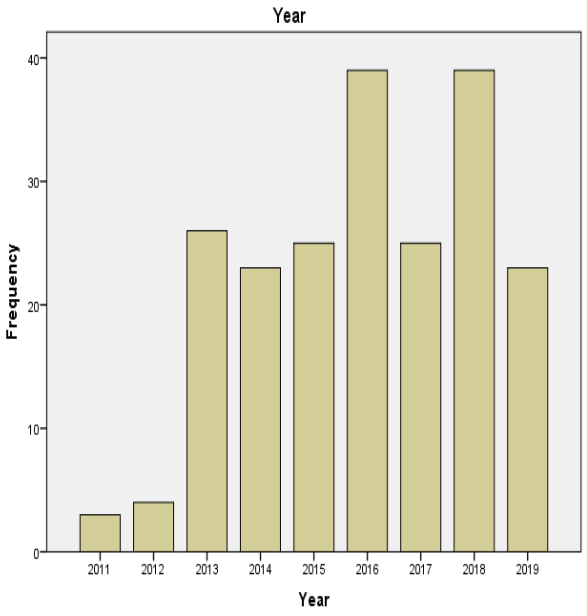

Figure 3: Annual distribution of lymph node lesions in NAUTH, Nnewi

Table 2: Age and gender distribution of histologic subtypes of neoplastic lesions

Histology sub-types		Age Groups										
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total	
Non-Hodgkins Lymphoma	**M**	2	7	7	3	5	5	2	1	-	32	49
	F	0	1	1	3	6	1	4	1	-	17	
Hodgkin lymphoma	**M**			1			-				1	5
	F			1			3				4	
Kaposi sarcoma	**M**			-							0	1
	F			1							1	
Metastatic Squamous cell carcinoma	**M**						1	2	1		4	8
	F					1	2		1		4	
Metastatic-Alveolar Rhabdomyosarcoma	**M**		1								1	1
	F										0	
Metastatic adenocarcinoma	**M**						1	3			4	36
	F			1	8	3	13	5	2		32	
Metastatic malignant phylloides	**M**										0	1
	F							1			1	
Metastatic carcinoma	**M**	1			1		3		1		6	11
	F			1	1			2	1		5	
Metastatic Endometrial stromal sarcoma	**M**										0	1
	F		1								1	
Metastatic Ewing sarcoma	**M**										0	1
	F		1								1	
Metastatic GIST	**M**										0	1
	F					1					1	
Metastatic Melanoma	**M**			1							1	5
	F						2			2	4	
Metastatic Nephroblastoma	**M**	1									1	1
	F										0	
Total		4	11	14	16	16	31	19	8	2	121	121

Cervical group of lymph nodes were the commonest groups accounting for 26.0% (54/207) of the lymph node lesions. The majority of cases were found within the age group 21-30 years (14 cases, 6.8%). There is a male preponderance with M: F ratio of 1.2:1. This was followed by axillary group of lymph nodes with 24.6% (51/207), inguinal 21.3% (44/207). Age groups 51-60 years had the highest axillary and inguinal cases of lymphadenopathy with 14 and 12 cases respectively. In all age groups, 51-60 years' group had the highest lymph node lesions with 41 cases followed by age group 21-30 years with 34 cases. (Table 3)

The most common anatomic site of lymph node lesions in female was axilla with 19.8% (41/207) while cervical 14.0% (29/207) and inguinal 12.1% (25/207) were the most common locations of lymph node lesions seen in male in this study. (Table 4)

Table 4Sex and gender distribution of anatomic sites of lymph node lesions

		SEX		Total
		F	M	
location	Axilla	41 (80.3%)	10 (19.7%)	51
	Cervical	25 (46.2%)	29 (53.7%)	54
	Pre & Post auricular	2 (66.7%)	1 (33.3%)	3
	Peri-Gastric	1 (25.0%)	3 (75.0%)	4
	Inguinal	19 (43.2%)	25 (56.8%)	44
	Retroperitoneal	4 (57.1%)	3 (42.9%)	7
	Mesenteric	5 (29.4%)	12 (70.6%)	17
	Not specified	4 (23.5%)	13 (76.5%)	17
	Supraclavicular	4 (44.4%)	5 (55.6%)	9
	Umbilical	1 (100%)	0 (0.0%)	1
	Total	107 (51.7%	100 (48.3%	207

Table 3: Age groups and anatomic distribution of histologic subtypes of lymph node lesions

Anatomic site	Age group									
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
Axilla	1 (1.9%)	1 (1.9%)	7 (13.7%)	10 (19.6%)	9 (17.6%)	14 (27.5%)	6 (11.8%)	3 (5.9%)	0 (0.0%)	51
Cervical	8 (14.8%)	8 (14.8%)	14 (25.9%)	12 (22.2%)	3 (5.6%)	5 (5.6%)	2 (3.7%)	2 (3.7%)	0 (0.0%)	54
Pre & Post-auricular	2 (50.0%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3
Peri-Gastric	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	2 (50.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	4
Inguinal	3 (6.8%)	5 (11.4%)	5 (11.4%)	1 (2.2%)	3 (6.8%)	12 (27.3%)	8 (18.2%)	5 (11.4%)	2 (4.5%)	44
Retroperitoneal	1 (14.3%)	1 (14.3%)	1 (14.3%)	0 (0.0%)	2 (28.6%)	0 (0.0%)	2 (28.6%)	0 (0.0%)	0 (0.0%)	7
Mesenteric	3 (17.6%)	1 (5.9%)	1 (5.9%)	2 (11.8%)	2 (11.8%)	4 (23.5%)	2 (11.8%)	2 (11.8%)	0 (0.0%)	17
Not specified	0 (0.0%)	0 (0.0%)	4 (23.1%)	3 (23.1%)	1 (7.7%)	2 (15.3%)	4 (30.8%)	0 (0.0%)	0 (0.0%)	17
Supraclavicular	0 (0.0%)	2 (22.2%)	1 (11.1%)	1 (11.1%)	3 (33.3%)	1 (11.1%)	1 (11.1%)	0 (0.0%)	0 (0.0%)	9
Umbilical	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100%)	0 (0.0%)	0 (0.0%)	0 (75.0%)	1
Total	18	19	34	29	24	41	26	12	5	207

DISCUSSION

Lymph nodes are small, bean-shaped organs, a component of lymphatic system which participates in filtration and identification of foreign agents that causes infections. [1,3] The function of lymph node plays essential role in predisposing them to numerous lesions ranging from infections to neoplasms. This formed the bases to discuss this seemingly small but important organ of the body. Though fine needle aspiration cytology is commonly used to establish the etiological diagnosis, excision biopsy of the lymph node remains the "gold standard" for diagnosis.[5]

Our study, shows a mean age of 41.4 years (SD±20.9) with a male to female ratio of 1:1.1. The mean age agreed with studies from Benin City (39.2 years), Ibadan (41.1.4 for female and 34.5 years' male), Owerri 37.41 years, Democratic Republic of the Congo 42.47 ± 15.64 years and South Africa (40 years). [6-10] The gender ratio was similar to observations in Ibadan (M: F 1: 1.4), Nepal (M: F 1:1.29), Dhule India (M: F 1:1.4), Owerri M: F 1:1.2) and South Africa where 55% of cases were recorded for female.[7,8,11,12,10] but several other reports including studies from Uyo Akwa Ibom & Mangalore India maintained marked male preponderance. [13,14] This slight female preponderance may be attributed to increase nodal metastasis of breast carcinoma because of advanced stage of presentations in most parts of Nigeria.

Cervical group of lymph nodes lesions were the commonest groups found in this study accounting for 26.0% (54/207), this is followed closely by axillary group of lymph nodes with 24.6% (51/207), inguinal 21.3% (44/207), Mesenteric 8.2% (17/207), Supraclavicular 4.3% (9/207), and retroperitoneal 3.4% (7/207). Cervical lymphadenopathy is the leading regional lymph node enlargement in most studies ranging from 58.5% in Benin city, 57.6% in Uyo Akwa Ibom, 26.7% in Owerri, to 30.4% in Saudi Arabia.[7,8,13,15]

Similarly, Congo, Nepal, South Africa and India had reported the same in their studies.[9-11,14] However, Ibadan reported axillary lymphadenopathy as the commonest group of lymph node lesions, contrary to the above studies which indicated axillary group of lymph nodes as the second commonest group involved by the lesions.[7] In Texas, USA, Lu *et al*. reported that malignancies are more likely to be diagnosed from a supraclavicular, retroperitoneal and intra-abdominal group of lymph nodes.[16]

This study also observed that the commonest cause of lymphadenopathy was neoplasm with metastasis being the major cause and accounted for 31.9% (66/207) followed by NHL 23.7% (49/207) HL 2.4% (5/207) and Kaposi sarcoma 0.5% (1/207). Metastatic adenocarcinomas constituted 54.5% (36/66) of cases with 22 cases diagnosed as metastatic adenocarcinoma of the breast. Several reports from Nigeria; Lagos (LUTH), Ibadan, and Owerri showed an increase in the involvement of lymph nodes by either primary or secondary neoplastic diseases. [7,8,17-18] LUTH reported malignancy as the commonest lesion with primary neoplasm of lymph node; NHL (23.3%) topped the group followed by metastasis (19.1%) and HL (8.6%) while Roy et al in India was the only researcher in that region who reported neoplastic lesion (53%) as the commonest cause of lymphadenopathy with NHL having 32.1% and HL 12.4%. [17, 18] Meanwhile, the Owerri study, reported metastatic cancer (50.0%) as their commonest cause of lymphadenopathy in tandem with our study. [8] However, some reports from Nigeria such as Benin City and Specialist laboratory in Lagos by *Oguntunde O.A et al* reported non-neoplastic lesions as the commonest cause of lymphadenopathy followed closely with metastasis. [6,19] In Ibadan metastatic cancer and reactive hyperplasia form equal distributions as the commonest cause of lymphadenopathy in their report. [7] The marked increase in the secondary carcinoma to the lymph nodes in this study and other studies in Africa, may be attributed to increase rate of breast cancer and other malignancies in Africa secondary to Westernized life style and increase industrial pollutions in our environment. Nnewi is a major economic hub with

many manufacturing companies expelling unquantifiable chemical waste into the atmospheres. Again most cases of breast cancers present at an advanced stage with nodal extensions in our clime. The study showed metastatic adenocarcinoma constituting 54.5% (36/66) with majority (22/36) of cases emanating from breast cancers. In this study, we also observed that most of the people affected by secondary neoplasm were in their 6th decades while those with primary neoplasm were seen in their 5th decade of life. Similar results were seen in the Owerri study. [7]

Reactive hyperplasia was the second commonest lymphadenopathy in our study and constituted 41.5% (85/207). Non-specific reactive hyperplasia (25.1%) was far more common than specific reactive lesions (15.9%). Studies from Owerri, Benin City, Democratic Republic of the Congo, and Saudia Arabia reported reactive lesions as the second commonest cause of lymphadenopathy with frequencies of 17.9%, 25.4%, 27.8% and 23.5% respectively. [6,8,9,15,] Roy *et al* in Puducherry India reported non-neoplastic lesions (47%) as the second commonest cause with 21.6% non-specific reactive hyperplasia while in the United States, non-specific reactive hyperplasia is a common cause of lymphadenopathy comprising nearly half of all cases.[17,20] This may be attributed to early diagnosis of malignancies before nodal invasions and relative absence of tuberculosis in the Western world. Our study also showed that reactive lesions were seen more at younger age group, whereas those with malignant etiology were present in older individual, this is similar to most studies.

The primary malignancies of the lymphoid system were the third commonest cause of lymphadenopathy in this study and constituted 26.6%(55/207) and included 23.7% NHL, and 2.4% HL. Report from Kano and Benin City revealed that lymphoma constituted 24% and 26.3% of cases respectively. [6,21] However, recent report by Egejuru R.O *et al* in Owerri revealed lower frequency of 8.9%. Meanwhile, higher frequencies were reported from studies in Democratic Republic of Congo and Saudi Arabia with Lymphoma being the commonest cause of lymphadenopathy and constituting 47.2%, and 44.3% 44.5% respectively followed by reactive hyperplasia.[8,9,15] In the Western world NHL is reported to be 3 to 4 times more common than HL and studies in the United States documented higher incidence among Whites than Blacks, this may be attributed to racial and genetic factors.[22]

Chronic granulomatous inflammations constituted 13.4% of cases with tuberculous lymphadenitis comprising 9.7% in this study. Although, tuberculosis has been reported by several authors as the predominant cause of lymph node enlargement in adults in the tropics. In our study, tuberculous lymphadenitis was the fourth common cause of lymphadenopathy, this is in tandem with recent report from Egejuru R.O *et al* in Owerri where tuberculous lymphadenitis constituted 14.29% making the fourth most common cause of lymphadenopathy.[8] Roy A *et al* in South India also showed tuberculous lymphadenitis as the third common cause of lymphadenopathy closely similar to our study.[17] Reports from Western countries, showed infections like tuberculosis becoming rare with increasing cases of malignancies especially lymphoma as the predominant causes of lymphadenopathy.[24]

The paradigm shift observed in our study with decrease in tuberculous lymphadenitis may be attributed to increase awareness of the disease, decreased poverty level in the South-eastern Nigeria and availability of drugs for the treatment of tuberculosis. However, studies from Uyo Akwa Ibom, Benin city Teaching Hospital Nigeria, Nepal Medical College, Kannur and Mangalore, India reported tuberculosis as the leading cause of lymphadenopathy followed by either reactive hyperplasia or metastasis. [2,6,11,13,14] In Dhule India, although reactive hyperplasia formed the commonest cause of lymphadenopathy, tuberculous lymphadenitis was still common and formed second commonest cause.[11]

This study also observed two rare cases of lymph node lesions; ectopic thyroid inclusion and Kaposi sarcoma. Kaposi sarcoma constituted 0.8% (1/121) of the remaining malignancies and 0.5% (1/207) of all lymph node lesions under review. *Reddy. D. L et al* in University Teaching Hospital, Witwatersrand and Johannesburg South Africa, reported 2.5% of Kaposi sarcoma(KS) in lymph node pathology in his sample showing lower frequency as observed in our study.[9] This study also shows yearly distributions of lymph node lesions with 2016 and 2018 having the highest prevalence while 2011 was least represented. This may be attributed to increase in awareness, easy accessibility to health facilities, and increase in number of pathologists as well as decreased turnaround time encouraging influx of specimens in our institution.

CONCLUSION

Lymph node biopsy plays an important role in establishing the cause of lymphadenopathy. Neoplastic lymphadenopathies mostly metastases were the leading cause of lymph node enlargement in our environment unlike in most developing world. This paradigm shifts from infectious lymphadenopathy to metastatic should form the basis for awareness of these lesions for possible early interventions. Further studies are also required where extensive immunohistochemical stains and molecular studies would be applied for further classifications of lymphomas.

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Data availability: The data used to support the findings of this study are available from Histopathology laboratory records and laboratory request forms, in the department of Histopathology Nnamdi Azikiwe University Teaching Hospital, Nnewi.

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REFERENCES

1. Robbins S, Cotran R. Diseases of the immune system. In: Kumar V, Abbas AK, Sausto N, Aster JC (eds). Robbins and Cotran pathologic basis of disease.8th edn. Philadelphia: Elsevier Saunders, 2010: 235-249.
2. Ferrer R. Lymphadenopathy: Differential diagnosis and evaluation. *Am Fam Physician* 1998; 58: 1313-20.
3. Change KL, Arber DA, and Weiss LM. Lymph node. In Weidner. N, Cote. R.J, Suster. S, Weiss L.M (eds). Modern Surgical Pathology. 2nd edn. Philadelphia: Elsevier Saunders. 2009; 1432-1500.
4. Report of the Nigeria's National Population Commission on the 2006 Census. *Popul. Dev. Rev* 2007; 33:206-210.
5. Moore SW, Schneider JW, Schaaf HS. Diagnostic aspects of cervical lymphadenopathy in children in the developing world: A study of 1877 surgical specimens. *Pediatr Surg Int* 2003; 19: 240-244.
6. Olu-Eddo AN, Ohanaka CE. Peripheral lymphadenopathy in Nigerian adults. *JPMA* 2006; 56:405

7. Aramide K, Ajani MA, Oluwasola O. Ten-year review of peripheral lymphadenopathy in tertiary Hospital in South Western Nigeria. *The Pan African Medical Journal* 2016; 23:73.
8. Egejuru RO,Nnadi IG, Nwokeji CM. Changing Trends in Lymph Node Lesions in Owerri, South East Nigeria. *Ann Med Health Sci Res* 2018; 8:11-14.
9. Kakisingi C , Mukuku O , Manika M , Kashal M , Kyabu V , Kasamba E , *et al.* Peripheral Lymphadenopathy: A Descriptive Study from a Tertiary Care Centre in Lubumbashi (D.R.C). *Open Access Library Journal*. 2016; 3**:** 1-9. doi: 10.4236/oalib.1102771.
10. Reddy DL, Venter WDF, Pather S. Patterns of Lymph Node Pathology; Fine Needle Aspiration Biopsy as an Evaluation Tool for Lymphadenopathy: A Retrospective Descriptive Study Conducted at the Largest Hospital in Africa. *PLoS ONE* 2015; 10(6): e0130148.doi:10.1371.
11. Tiwari M, Aryal G, Shrestha R, Rauniyar SK, Shrestha HG. Histopathologic diagnosis of lymph node biopsies. Nepal Med Coll J 2007; 9:259-261.
12. Rajshri P Damle, Kishor H Suryawanshi, Dravid N V, Newadkar D V, Prashant N Deore. A Descriptive Study of Histopathological Patterns of Lymph Node Biopsies. In A Tertiary Care Hospital. *Pacifice J* 2017; 4: 2.
13. Abudu E. K, Samuel A. O. Spectrum of inflammatory lesions in superficial lymph node biopsies in Uyo, Nigeria (2007 to 2015). *Ibom Medical J* 2018; Vol 11: 1.
14. Panchal Jaimin and Pushpalatha Pai. Spectrum of pathologic lesions in superficial lymph node biopsies –A one and half year study. *IJBAR* 2014; 05: 09
15. Albasri AM, El-Siddig AA, Hussainy AS, Alhujaily AS. Pattern of lymph node pathology in Western Saudi Arabia. *Asian Pac J Cancer Prev.*2014; 15:4677-4681.
16. Lu H, Pundole X, Palla S, Vu K. Baseline characteristics predictive of malignancy among patients presenting with lymphadenopathy:A cancer center experience. *Clin Cancer Investig J* 2013; 2:325-329.
17. Roy A, Kar R, Basu D, Badhe BA. Spectrum of histopathologic diagnosis of lymph node biopsies: A descriptive study from a tertiary care center in South India over 5½ years. *Indian J Pathol Microbiol* 2013; 56:103-108.
18. Bolarinwa, Abiola; Adedotun Adebayo. *Spectra of Lymph Node Lesion in LUTH and the Various Challenging Issues: A 10-Year Retrospective Study.* American Journal of Clinical Pathology suppl. 1*; Chicago .2018;150S113. DOI:10.1093/ajcp/aqy097.274.*
19. Oguntunde OA, Ikeri NZ, Igbokwe U, Abdulkareem FB, Banjo AF. Histopathologic spectrum of lymph node disease in a lagos facility. *Ann Trop Pathol* 2019; 10:114-118. Available from: https://www.atpjournal.org/text.asp?2019/10/2/114/272431
20. Henry P, Longo D. Enlargement of lymph nodes and spleen. In: Braunwald E, Hayser SL, Fauci AS, Longo DL, Kasper DL, Jameson JL, editors. Harrison's Principles of Internal Medicine. 16 th ed. New York: McGraw-Hill. 2005; 343-348
21. Vidyadhar R, Prakash CSR, Philip KS. Histopathological study of Lymph node lesions. *Journal of International Medicine and Dentistry* 2016; 3:24-33.
22. Ochicha O, Edino ST, Mohammed AZ, Umar AB, Atanda AT. Pathology of peripheral lymph node biopsies in Kano, Northern Nigeria. *Ann Afr Med* 2007; 6:104-108
23. Groves FD, Linet MS, Travis LB, Devesa SS. Cancer surveillance series: Non-Hodgkin's lymphoma incidence by histologic subtype in the United States from 1978 through 1995. *J Natl Cancer Inst* 2000; 92:1240-51.
24. Freidig EE, McClure SP, Wilson WR, Banks PM, Washington JA 2 nd .Clinical-histologic-microbiologic analysis of 419 lymph node biopsy specimens. *Rev Infect Dis* 1986;8:322-328