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Clinicopathological Spectrum of Head And Neck Masses In Children

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Abstract : *This prospective study was conducted on 60 patients upto 14 years of age who presented with head and neck masses in the Department of Otorhinolaryngology& Head and Neck Surgery, Govt. Medical College Jammu for a period of one year from November 2011 to October 2012. The aim of the study was to find the age and sex distribution, frequency of occurrence and the site of presentation of various head and neck masses in children. In this study, it was found that maximum number of cases (25%) were in the age group of 6 to 9 years. Out of 60 cases, 33 (55%) were males while 27 (45%) were females. Inflammatory swellings formed the largest group (66.6%) followed by congenital lesions (18.3%), benign neoplasms (11.7%), malignant neoplasms (1.7%) and non inflammatory benign lesion (1.7%). Majority of the masses (38, 63.3%)were situated in the anterior triangle of neck followed by posterior triangle (16.6%), both anterior and posterior triangles (11.7%), cheek , preauricular region and nose.*

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I. Introduction

It is not uncommon for children to present to the otolaryngologist for evaluation of masses in the head and neck region. The majority of these lesions are inflammatory in nature, but other etiologies include congenital, benign non inflammatory, benign neoplastic and malignant neoplastic lesions

There are myriad etiologies of neck masses, but they can usually be divided into three categories 1) Congenital 2) Inflammatory 3)neoplastic Congenital lesions are usually first noted in children but they can present in adulthood also. These lesions includes Branchial cleft cyst, thyroglossal cyst, Dermoid cyst, Lymphangiomas, hemangiomas, teratoma, Bronchogenic cyst, thymic cyst and myelomeningocele. Out of these, thyroglossal duct abnormalities represent most common pediatric congenital mass followed by branchial apparatus anomalies (Guarisco JL 1991) Inflammatory masses usually present with erythema, induration and tenderness and these include reactive lymphadenopathy, Granulomatous lymphnodes usually tubercular, suppurative lymphadenitis, sialadenitis, Thyroiditis, catsratch disease and masses of undetermined etiology. Non Inflammatory benign lesion include inclusion cyst, Fibromatosis and keloid.

Neoplastic lesions may be benign or malignant. Benign neoplasms include neurofibromatosis, lipoma, lipoblastoma, paraganglioma, goiter, osteoblastoma. Malignant neoplasm include lymphomas - hodgkin and non hodgkin, Thyroid Carcinoma, rhabdomyosarcoma, neuroblastoma, fibrous histiocytoma, histiocytosis X and chloroma. Lymphomas are the most common malignant neoplasms. Of these, non Hodgkin lymphomas are predominant (sengupta et al, 2009) In children, majority of the neck masses are benign in nature (15% malignant) as compared to adults in whom 85% of neck masses are malignant. The various neck masses may also be classified as anterior and posterior triangle masses The anterior triangle masses are thyroglossal cyst, Branchial cyst, Dermoid, thyroid and salivary gland masses. The posterior triangle masses are vascular malformations (cavernous hemangiomas, portwine stain), lymphatic malformations (cystic hygroma & lymphangiomas) and lipoma. Lesions present in either triangle of neck are infantile hemangioma, lymphadenitis, abscesses, rhabdomyosarcoma, lymphoma and neuroblastoms (Turkington et al, 2005).

Some of the studies shows congenital neck masses to be the most common in children (torsiglieri et al, 1988) while others show the commonest head and neck masses to be inflammatory lesions (Agarwal et al, 2002). The most important diagnostic tool is careful history and a complete head and neck and general physical examination . FNAC has been show to be extremely helpful in evaluation of neck masses (M-Jain et al 1999). It is sensitive and minimally invasive first line investigation in the diagnosis of head and neck masses in children. It is highly accurate in isolating and determining potentially neoplastic lesions thus guiding the way for cases which truly require excision biopsy. Fine needle cytology is a procedure which provides material for definitive cytological diagnosis without the disadvantages of open surgical biopsy. Aspiration cytology because of its simplicity, early availability of result, minimal trauma and minimal chances of dissemination is now considered as a valuable diagnostic tool for benign lesions, lymphomas and metastatic carcinomas (Aslam et al, 2000). FNAC is of particular relevance in head and neck region because of the easy accessibility of target sites . In the

hands of a skilled and commited cytologist accuracy exceeds 92% with a few false negatives and very occasionally a false positive report (Stell and Maran, 2000). Other Laboratory examinations which are essential for diagnosis of head and neck masses in children are complete blood count, Routine Urine examination, Liver function tests , Mantoux test , serological test for syphilis and Thyroid function tests . The other investigations which may be needed while evaluating a neck mass are Radiographic examinations like X ray soft tissue neck and chest.

Ultrasonography has proved useful in imaging neck masses. It can identify the location, extent and internal characteristics of a mass (Friedman et al, 1983). Sonography is valuable for localising a mass and demonstrating its relation to other structures with in the neck (Sherman et al, 1985)

Neck Ultrasound is a valuable initial screening tool because it is minimally in vasive, lacks radiation exposure, does not require sedation and is low in cost.

CT and MRI scan should be used in relevant cases. It has been shown that CT scan evaluates lymphadenopathy better than MRI. MRI imaging is preferred for soft tissue lesions and neurovascular structures while delineating soft tissue planes where bony involvement is not a concern such as in lymphangiomas or vascular malformations Positron Emission Tomography (PET) is another modality for evaluating the patient with a neck mass especially with metastasis. PET is a functional study based on the uptake of 18-fluoro deoxy glucose in cells proportional to their rate of glycolysis. PET scans have the ability to survey the whole body and detect primary tumors that would not otherwise be visualized. It is routinely used to detect an occult primary and in the evaluation of recurrent disease after treatment (Lee et al, 2008).

Ancillary imaging studies like thyroid scan, bone scan and Panendoscopy may be helpful but should not be ordered in "shotgun" fashion

It is important to evaluate the patient with a lump in neck using a logical and cost effective approach. With a thorough work up, etiology of mass can be determined prior to neck dissection incision which should be the last step in the diagnostic procedure.

II. Aims And Objectives

- To study the age & sex distribution of various head and neck masses in children.
- To study the frequency of occurrence of various head and neck masses in children.
- To study the site of presentation of various head and neck masses in children.

III. Materials And Methods

This prospective study was conducted on 60 patients upto 14 years of age presented with head and neck masses in the Department of otorhinolaryngology, Head and Neck surgery, SMGS hospital; Govt. Medical College Jammu for a period of one year from November 2011 to October 2012.

Children of this age group presenting with preauricular sinus, preauricular fistula, postauricular fistula, postauricular abscess, branchial fistula and traumatic head and neck swellings were excluded from the study. All such patients with head and neck masses were subjected to detailed history including family and past history. A detail general physical and local examination of the patient was done.

Investigations such as Hemogram, Urine Routine Examination, Radiography, (X-ray chest, X-ray soft tissue neck) were done in all such cases . Special investigations like USG neck, CT scan, Thyroid profile, MRI, was done in relevant cases. Treatment protocol of the patients decided as guided by the various investigations. All the cases were subjected to fine needle aspiration cytology. Surgical biopsy was done in 52 cases only. The cases where surgery was not done were 3 cases of colloid goiter with hypothyroidism, 2 cases of chronic lymphocytic thyroiditis, 2 cases of chronic parotitis and 1 case of sternocleidomastoid tumour

IV. Observations

Age distribution:-

The distribution of cases in various age groups is shown in table 1.

Table 1 : Age distribution **.**

Age in years	No. of cases	Percentage(%)
0 – 3	9	15
>3 – 6	14	23.3
>6 – 9	15	25
>9 – 12	9	15
>12 – 14	13	21.6
Total	**60**	**100**

The maximum number of cases i.e , 15 cases (25%) were in the age group of 6 – 9 years. The youngest patient was of 1 month age.

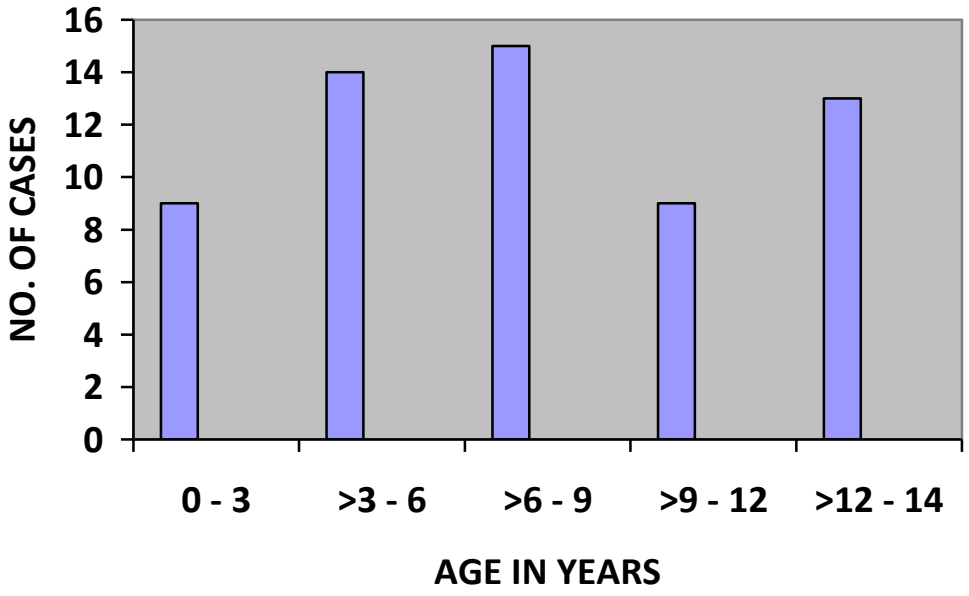

Fig.1 : Bar chart showing distribution of cases according to age.

Sex distribution

Table 2 showing sex distribution of 60 children with head and neck masses.

Sex	No. of cases	Percentage(%)
Males	33	55
Females	27	45
Total	**60**	**100**

.In our study, 33 (55%) children were males while 27 (45%) were females.

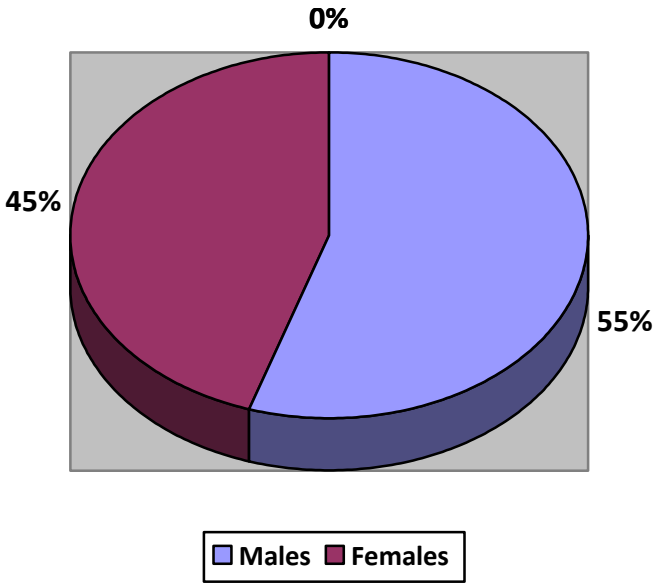

Fig.2: Pie chart showing sex distribution of head and neck masses in children.

Frequency of occurrence of various head and neck masses

Table 3 showing the frequency of occurrence of various head and neck masses in children based on cyto/histopathology

Type of swelling	No. of cases	Percentage(%)
Inflammatory	40	66.6
Congenital	11	18.3
Benign neoplasm	7	11.7
Malignant neoplasm	1	1.7
Non-inflammatory benign lesion	1	1.7
Total	**60**	**100**

In our study, the Inflammatory swellings formed the largest group (66.6%). Next in frequency were the congenital lesions (18.3%), benign neoplasms (11.7%), malignant neoplasms (1.7%) and non inflammatory benign lesion (1.7%) respectively.

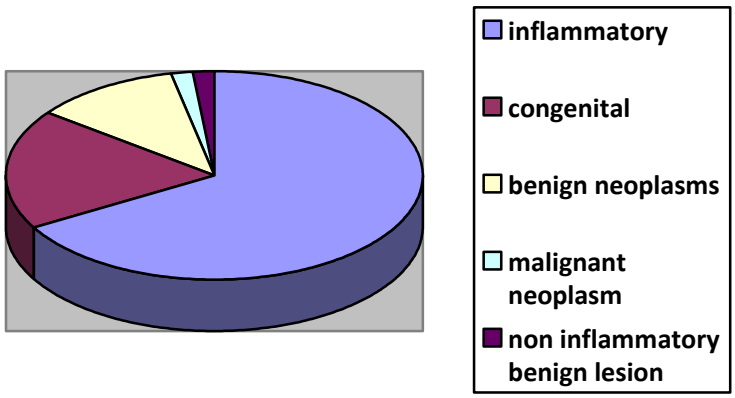

Fig3: Pie chart Showing frequency of swellings according to the cyto/histopathology.

Table 4 showing the frequency of Different Inflammatory lesions .
Total patients with inflammatory lesions 40.
out of the 40 inflammatory lesions, 22 (55%) are the reactive lymph nodes and 11 (27.5%) are granulomatous (tubercular) lymph nodes, 5 cases (12.5%) are chronic sialadenitis and 2 cases (5%) are chronic lymphocytic thyroiditis.

TYPE OF INFLAMMATORY LESIONS	NUMBER OF PATIENTS	PERCENTAGE
Reactive lymphadenitis	22	55
Granulomatous lymphadenitis	11	27.5
Chronic sialadenitis	5	12.5
Chronic lymhocytic thyroiditis	2	5
TOTAL	**40**	**100**

Table 5 showing different types of congenital lesions .
Total number of patients with congenital lesions 11.

Type of congenital lesions	Number of cases	Percentage
Lymphangiomas	3	27.3
Dermoid	3	27.3
Hemangioma	2	18.2
Thyroglossal cyst	2	18.2
Branchial cyst	1	9
TOTAL	**11**	**100**

Out of 11, 3(27.3%) are lymphangiomas , 3(27.3%) are dermoids ,2 (18.2%) are hemangiomas , 2 (18.2%) are thyroglossal cysts and one case of branchial cyst(9%).

Table 6 showing frequency of various benign neoplasms .
Total number of patients with benign neoplasms 7.

Types of Benign Neoplasms	Number of cases	Percentage
Colloid goiter	6	85.7
Aneurysmal bone cyst	1	14.3
Total	**7**	**100**

Out of these, 6 cases (85.7%) were of colloid goiter and one case (14.3%) was of aneurysmal bone cyst. Malignant neoplasms constitute only one case (1.6%) of Rhabdomyosarcoma.

Table 7 showing Age Range of children with various head and neck nasses .

TYPE OF SWELLING	AGE RANGE
Reactive lymphadenitis	2 – 14 years
Tubercular lymphadenitis	3 – 14 years
Chronic sialadenitis	4 – 14 years
Lymphangiomas	1m – 3 years
Dermoid cysts	4m – 12 years
Hemangiomas	5 – 6 years
Thyroglossal cysts	6 – 9 years
Thyroid swellings	4 – 14 years

In our study, reactive lymphadenitis were seen in the age range of 2 – 14 years, tubercular lymphadenitis in 3 – 14 years, chronic sialadenitis in 4 – 14 years, lymphangiomas in 1m – 3 years , dermoid cysts in 4m – 12 years, hemangiomas in 5 – 6 years, thyroglossal cysts in 6 – 9 years and thyroid swellings in the age range of 4 – 14 years.

Sex distribution of various head and neck masses

Table 8 showing sex distribution of various head and Neck masses in children

Type of swelling	Total cases	Males	Females
Reactive lymphadenitis	22	15(68.2%)	7(31.8%)
Tubercular lymphadenitis	11	4(36.4%)	7(63.6%)
Thyroid swellings	8	2(25%)	6(75%)
Chronic sialadenitis	5	4(80%)	1(20%)
Lymphangiomas	3	2(66.7%)	1(33.3%)
Dermoid cysts	3	2(66.7%)	1(33.3%)
Hemangiomas	2	1(50%)	1(50%)
Thyroglossal cysts	2	1(50%)	1(50%)
Branchial cyst	1	0	1
Sternocleidomastoid tumor	1	1	0
Aneurysmal bone cyst	1	0	1
Rhabdomyosarcoma	1	1	0
Total cases	**60**	**33**	**27**

The majority of the patients in our study were having reactive lymphadenopathy(n = 22). Out of these 22 patients, 15(68.2%) were males and 7(31.8%) were females.
Next in frequency were the tubercular lymph nodes. Out of 11 patients with tubercular lymphadenitis, 4 (36.3%) were males and 7 (63.7%) were females.
There were 8 cases of thyroid swellings, out of which 2 (25%) were males and 6 (75%) were females.

Out of 5 cases of chronic sialadenitis, 4 (80%) were males and 1(20%) female.
There were 3 cases of lymphangiomas , out of which 2 (66.6%) were males and one (33.3%) was female.
There were 3 cases of dermoid, 2 (66.6%) were males and one (33.3%) was male.
There were 2 cases of hemangiomas , both were females.
Out of 2 cases of thyroglossal cyst, 1 (50%) was male and 1 (50%) female.

Site of presentation

Table 9 showing distribution of head and neck masses according to the site of presentation.

Site of presentation	No. of cases	Percentage(%)
Anterior triangle	38	63.3
Posterior triangle	10	16.6
Both triangles	5	8.3
Neither triangles	7	11.7
Total	**60**	**100**

In our study, 38 masses(63.3%) were situated in the anterior triangle and 10 masses(16.6%) were situated in the posterior triangle. There were 5 masses (8.3%) situated in both anterior and posterior triangles. 7 masses(11.7%) were neither in the posterior nor anterior triangle and these include 2 cases of hemangiomas and one case of lymphangioma on cheek, 2 cases of dermoid involving preauricular region, one case of aneurismal bone cyst involving chin and one case of rhabdomyosarcoma involving nose and cheek.
The anterior triangle masses were reactive lymph nodes, tubercular lymph nodes, chronic sialadenitis ,thyroglossal cysts, branchial cyst and thyroid swellings.
The posterior triangle masses were reactive lymph nodes, tubercular lymph nodes, cystic hygromas and dermoid cyst.
The masses situated in both triangles were reactive and tubercular lymph nodes.

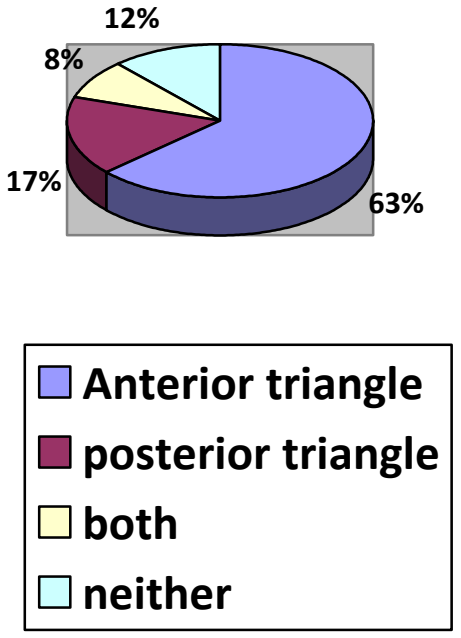

Fig.4 ; pie chart showing site distribution of head and neck masses in children.

V. Discussion

The present study was done to study the age and sex distribution , frequency of occurence and site of presentation of head and neck masses in children. The study comprised of 60 cases with head and neck swellings who attended the ENT department of SMGS Hospital, Jammu during the period November 2011 to October 2012. All the cases were subjected to detailed history and complete ENT examination, general physical examination, hematological and radiological examinations. Some special investigations were done in relevant cases e.g., CT scan , MRI, thyroid profile ,etc. All the cases were subjected to FNAC. Among 60 cases, excisional biopsy was done in 52 cases only.

1. Age distribution

In the present study, majority of the patients with head and neck masses (15,25%) were present in the age group of 6 – 9 years. The age distribution in the present study was in accordance with other studies.

Dhingra et al. (2010), in a study of 270 pediatric patients found maximum number of swellings in the age group of 7 – 14 years of age (156 cases, 57.8%). **Siddique et al. (2012),** in a study on 36 patients found most of the patients were in the age group of 6 – 8 years (10 cases, 27.8%).

In the present study, the age of distribution of various head and neck masses in children were noted . Reactive lymphadenopathy found to be common in the age group of 2 years to 14 years, tubercular lymphadenitis in 3 years to 14 years, sialadenitis in 4 years to 14 years, lymphangiomas in 1 month to 1 year, dermoid in 4 months to 12 years, hemangiomas in 5 years to 6 years, thyroglossal cysts in 6 years to 9 years and thyroid swellings in 4 years to 14 years of age. This age distribution was in accordance with the study done by **Torsiglieri et al (1988).** In the present study, majority of the reactive lymph nodes (41%) were in the age group of 3 – 6 years. Majority of the tubercular lymph nodes (45.4%) were in the age group of 12 – 14 years. Majority of the thyroid swellings were in the age group of 9 - 12 years.

``2. Sex distribution

In the study, males predominated females with a male : female ratio of 55 : 45. The male : female ratio of the present study was in accordance with the studies in the past.

Author (s)	Year	M : F
Bielicka et al.	2003	62.2 : 37.8
Laskawi et al.	2006	44.4 : 55.6
Rapkiewicz et al.	2007	69.4 : 30.6
Dhingra et al.	2010	56.6 : 43.4
Siddique et al.	2012	52.8 : 47.2
Present study	2012	55 : 45

In the present study, Male : female ratio of reactive lymph nodes was 68 : 32. Male : female ratio of tubercular lymph nodes was 36 : 64.

Male : female ratio of thyroid swellings was 25 : 75

Male : female ratio of chronic sialadenitis was 80 : 20.

Male : female ratio of lymphangiomas was 67 : 33.

3. **Site of presentation**

In the present study, majority of the head and neck masses (38, 63.3%) were situated in the anterior triangle , 10 masses (16.6%) were situated in the posterior triangle, 5 masses (8.3%) were in both the triangles and 7 (11.67%) were in neither of these two and included three swellings on cheek, one involving nose and cheek , one involving chin and two swellings in preauricular region. The distribution of the site involved in the present study was in accordance with the literature.

Al khateeb et al (2007), in their study on 252 congenital neck masses found 166 (66%) located in the midline 52 (22%) lateral and 31 (12%) entire neck masses**. Rapkiewicz et al (2012),** in their study on 85 children found majority of the lesions (45.8%) in the anterior triangle. **Siddique et al (2012)**, in their study on 36 congenital neck masses found 21 (58.33%) to be in midline.

4. Frequency of lesions

In the present study, Inflammatory lesions formed the largest group accounting for 40 (66.6%) cases. Out of 40 Inflammatory lesions, Reactive lymph nodes were the commonest forming 22 (55%) cases, followed by tubercular lymph nodes forming 11 (27.5%) cases, chronic sialadenitis forming 5 (12.5%) cases and chronic lymphocytic thyroiditis forming 2 (5%) cases. Next in frequency were the congenital lesions forming 11 (18.3%) cases which includes 3 cases of lymphangiomas (27.3%), 3 cases of dermoid cysts (27.3%), 2 cases of hemangioma (18.2%), 2 cases of thyroglossal cysts (18.2%) and 1 case of branchial cyst (9%).

Benign neoplasms constitute 7 (11.7%) of the total cases. These includes 6 cases (85.7%) of colloid goiter and 1 case of aneurysmal bone cyst (14.3%). Non inflammatory benign lesion constitute one case (1.7%) of sternocleidomastoid tumor.There was only one case (1.7%) of malignant neoplasm and that was Rhabdomyosarcoma. The frequency of occurrence of these head and neck masses in children was in accordance with the literature.

Author(s)	Reactive lymph nodes	Granulomatous lymph nodes	Thyroid swellings	Salivary gland swellings	Malignant lesions
Jain et al (1991)	48.5%	24%	3.2%	2.1%	1.5%
Liu et al (2001)	62.5%	20%	_	_	7.5%
Khan et al (2008)	55%	39.3%	_	_	5.6%
Annam v et al (2009)	58%	30%	_	_	4.5%
Agarwal et al (2010)	72%	16%	2.8%	1.8%	_
Dhingra et al (2010)	60.4%	28.1%	_	_	11.5%
Present study (2012)	36.6%	18.3%	13.3%	8.3%	1.6%

In the present study, histopathology was done in 52 patients and malignancy was found only in one case (1.9%) and rest 51 (98.1%) cases were found benign which is in accordance with the literature.

Author(s)	Malignant	Benign
Jain et al (1991)	1.5%	98.5%
Liu et al (2001)	7.5%	92.5%
Annam v et al(2009)	4.5%	95.5%
Dhingra et al (2010)	11.5%	88.5%
Present study (2012)	1.9%	98.1%

VI. Summary & Conclusion

1. In the present study, majority of the swellings (25%) were present in the age group of 6 – 9 years. The youngest patient was a child of one month age.
2. Majority of the patients with reactive lymph nodes (9 cases, 41%) were in the age group of 3 – 6 years. Majority of the patients with tubercular lymph nodes (5 cases, 45.4%) were in the age group of 12 – 14 years.. Majority of the patients with thyroid swellings (3 cases, 37.5%) were in the age group of 9 – 12 years.
3. The Male : female ratio in the present study was 55 : 45.
4. The Male : female ratio of patients with reactive lymph nodes was 68 : 32. The Male: female ratio of patients with tubercular lymph nodes was 36 : 64. The Male : female ratio of patients with thyroid swellings was 25 : 75.. The Male : female ratio of patients with chronic sialadenitis was 80 : 20. The Male : female ratio of patients with lymphangiomas was 67 : 33.
5. Majority of the head and neck masses (63.3%) were situated in the anterior triangle. Others were , in the posterior triangle (16.6%), in both the triangles (8.3%) and in neither of these triangles (11.67%).
6. The Inflammatory masses were predominant forming 40 / 60 cases (66.6%) followed by congenital forming 11 / 60 (18.3%), benign neoplasms forming 7 / 60(11.7%), malignant neoplasms forming 1 / 60 (1.7%) and Non Inflammatory benign lesion (1.7%).
7. Out of 40 Inflammatory lesions, 22 (55%) were reactive lymph nodes, 11 (27.5%) were tubercular lymph nodes, 5 (12.5%) were chronic sialadenitis and 2 (5%) were chronic lymphocytic thyroiditis.. Out of 11 congenital lesions , 3 (27.3%) are lymphangiomas, 3 (27.3%) are dermoids, 2 (18.2%) are thyroglossal cysts and one case of branchial cyst (9%). Out of 7 benign neoplasms , 6 cases (85.7%) were colloid goiter and one case was Aneurysmal bone cyst (14.3%).

Malignant neoplasm comprised only one case of Rhabdomyosarcoma (1.7%) . Non Inflammatory benign lesion also comprised only one case i.e, sternocleidomastoid tumour (1.7%).

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