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A Study on Clinicopathological Corelation and Management of Solitary Thyroid Nodule

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Abstract **Original Research Article**

Background*:** A solitary nodule is a goiter which, on clinical examination appears to be a single nodule in one lobe of the thyroid with no palpable abnormality elsewhere in the gland. The incidence of solitary nodule in general population in South India is 9%. This study aims to assess the presence of malignancy in patients presenting with solitary thyroid nodule and to evaluate and compare results of various investigative modalities used to diagnose a solitary thyroid nodule and the outcome of management modalities in solitary thyroid nodule. ***Methods: The present study on clinicopathological correlation and management of solitary thyroid nodule has been conducted on cases admitted and managed in the Department of Surgery at KIMS medical college, Hubli. Prospective analysis of 50 cases of solitary nodule thyroid in the specified period was done. These cases were selected by random sampling method and studied in detail clinically and recorded as per the proforma. Routine investigations and specific investigations including FNAC of the nodule, Thyroid profile, IDL, Plain X-ray neck, USG neck were done in all cases. Special investigations like radio-isotope scanning were not performed as the facilities were not available. All the patients were managed by surgery and diagnosis was confirmed by histo- pathological examination. The patients were grouped according to different variables like age, sex, size of the nodule, site of the nodule, functional thyroid status, FNAC reports and histo-pathological examination reports, then analyzed and compared with the previous similar studies conducted elsewhere. ***Results*:** Total of 50 cases of solitary nodule of thyroid studied. The mean age of presentation is 38.5 years. Cases in 3rd to 5th decades constitutes 72% of the cases studied. Out of 50 cases studied 46 were females and 4 were males, and the ratio comes to M:F = 1 : 11.5. Out of 50 cases along with swelling in front of the neck, 3 cases had pain, 3 cases had discomfort and another 2 had dysphagia. Duration of onset symptoms varied from 15 days to 8 years. Out of 50 cases studied, 26 cases presented with nodule in right lobe of the thyroid gland and the remainder in the left lobe of thyroid. On clinical examination size of the nodule, in its largest dimension, varies from 2cm to 12cm. Out of 50 cases, two presented with features of thyrotoxicosis, one with hypothyroidism and rest all were in euthyroid state. In the study, out of 7 carcinomas, 5 were papillary and 2 follicular. ***Conclusions:*** Based on the data and results obtained in the present study, Solitary nodule of thyroid is more common in females. Solitary nodule of thyroid is more common the age group of 20-50years. Most of the patients with solitary nodule of thyroid present with swelling, in euthyroid state. FNAC is the investigation of choice in the evaluation of solitary nodule of thyroid. Papillary carcinoma is the most common malignancy of thyroid.

Keywords: solitary nodule, Clinicopathological Corelation, Thyroid profile.

INTRODUCTION

A solitary nodule is a goiter which, on clinical examination appears to be a single nodule in one lobe of the thyroid with no palpable abnormality elsewhere in the gland [1]. The solitary thyroid nodule is a topic of interest for surgeons and clinicians was studied by Warren H Cole in 1949. This study found that incidence of malignancy is higher when compared with multinodular goitre [2].

Thyroid nodules are very common entities, though varying in incidence in different geographical regions. The incidence of solitary nodule in general population in South India is 9% [3]. Thyroid nodules are very common with estimated prevalence that ranges from 4% [4] bypalpation to 67% [5] by ultrasonography. Autopsy studies reveal that 50% [6] of adults had nodules, the majority of which are impalpable. Thyroid nodules are 4 times more common

in females than in men [7].

Overall incidence of malignancy in solitary thyroid nodule ranges from 10-30%. A single nodule in the thyroid is a definite clinical entity with important pathological significance. It is necessary to consider the status of opposite lobe when considering the nodule as solitary.

Another factor that influences the ultimate histopathological outcome of solitary nodule of solitary nodule thyroid is whether the definition of a solitary nodule is entirely clinical or proved by investigations like ultrasound, radio iodine scan etc. in general a solitary nodule is defined as "*a palpable single clinically detected nodule in the thyroid gland that is otherwise normal*." Visibility or palpability of opposite thyroid lobe precludes inclusion of such cases in this group. The usual presentation of a thyroid nodule is an asymptomatic swelling that is discovered by either the patient or the clinician. Nodules of at least 0.5cm to 1cm can be usually be detected by palpation, although estimates of nodule size vary from physician to physician. It can be difficult to palpate any nodule in patient with a thick, short neck.

The thyroid nodule has been subject of controversy with divergent opinions expressed by those who had wide experience in this field. The optimal management of thyroid nodule continues to be a source of controversy and the operative intervention recommended by most of surgeons is not always accepted by some physicians advocating either observation or suppression.

A solitary nodule is a clinical diagnosis and not a pathological diagnosis. Almost all conditions of the thyroid may present clinically as a solitary nodule. Diagnostic possibilities in case of solitary nodules are adenoma, carcinoma, thyroid cyst and palpable nodule in an evolving multinodular colloid goiter. Other rare causes of solitary nodules include inflammatory thyroid lesions and developmental abnormalities such as dermoid cyst, teratoma etc. Because of possibility of malignancy, some clinicians especially those in surgical subspecialties recommend that all nodules have to be removed. The solitary nodule in the thyroid gland may have a malignant potential and possibility of toxicity in the nodule and also complications like pressure effects and hemorrhage. Thyroid cancer has a much lower incidence compared to that of solitary thyroid nodule. Therefore, it is of utmost importance to determine which patients with solitary thyroid nodule would benefit from surgery.

As the clinical diagnosis may not correlate with the diagnosis during the time of management, this study is undertaken as it generates curiosity among the operating surgeons.

METHODS

The present study on clinicopathological correlation and management of solitary thyroid nodule has been conducted on cases admitted and managed in the Department of Surgery at KIMS medical college, Hubli.

Prospective analysis of 50 cases of solitary nodule thyroid in the specified period was done. These cases were selected by random sampling method and studied in detail clinically and recorded as per the proforma. Routine investigations and specific investigations including FNAC of the nodule, Thyroid profile, IDL, Plain X-ray neck, USG neck were done in all cases. Special investigations like radio-isotope scanning was not performed as the facilities were not available. All the patients were managed by surgery and diagnosis was confirmed by histo-pathological examination.

The patients were grouped according to different variables like age, sex, size of the nodule, site of the nodule, functional thyroid status, FNAC reports and histo-pathological examination reports, then analyzed and compared with the previous similar studies conducted elsewhere. Finally, conclusions were drawn accordingly.

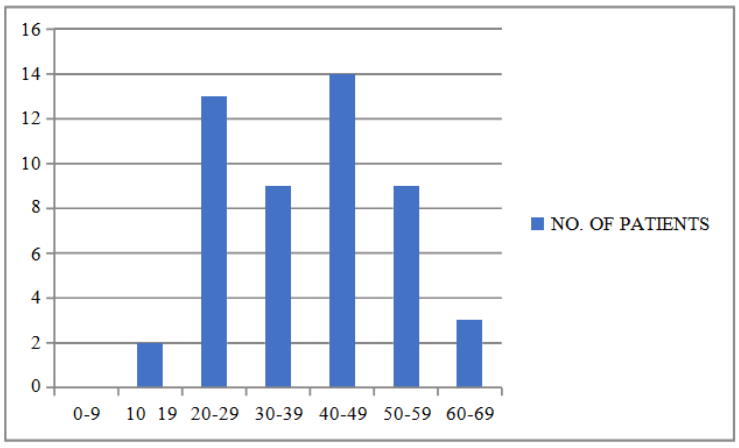
RESULTS

Total of 50 cases of solitary nodule of thyroid studied and following conclusions were drawn:

Age Incidence:

The age of the patients ranges from 18 years to 66 years, with peaks being in 3rd to 5th decades. The mean age of presentation is 38.5 years. Cases in 3rd to 5th decades constitutes 72% of the cases studied.

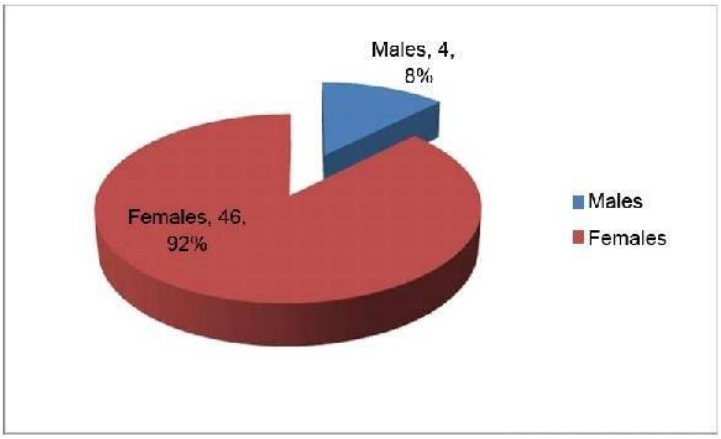
Age in Years	No. of Patients
0-9	0
10-19	2
20-29	13
30-39	9
40-49	14
50-59	9
60-69	3
TOTAL	50



Sex Incidence:

Solitary nodule of thyroid are much more common in females. Out of 50 cases studied 46 were females and 4 were males, and the ratio comes to M : F = 1 : 11.5 . Also the malignant nodules are common in females. Out of 7 cases of malignancy in the study, 6 were females.

Sex	no. of patients
Males	4
Females	46
Total	50



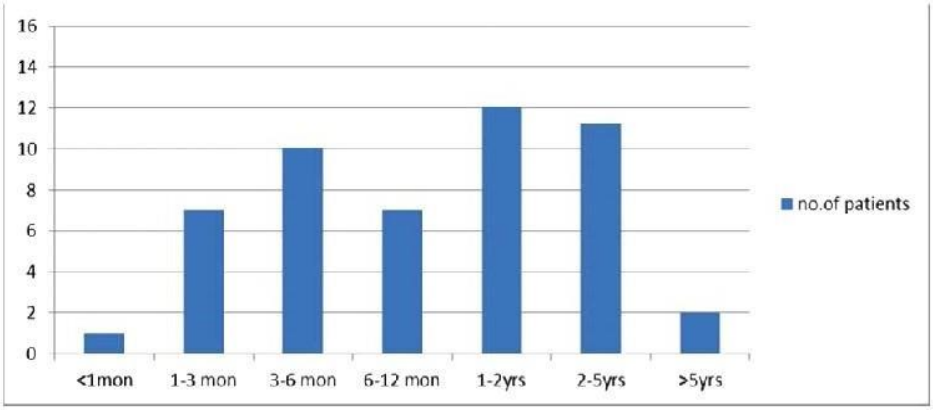
Clinical Features:

All the cases in the present study presented complaint of swelling in the region of the thyroid. Only few patients presented with pain, discomfort and dysphagia. All the mentioned additional symptoms were of mild degree. Out of 50 cases, 3 cases had pain, 3 cases had discomfort and another 2 had dysphagia. Also none of the patient had lymphadenopathy which was confirmed by ultrasonographic examination. Two patients had symptoms of thyrotoxicosis, and one had features of hypothyroidism. The latter patients' thyroid profile confirmed the functional status.

Duration of symptoms:

In our study, duration of onset symptoms varied from 15 days to 8 years. Also, duration of malignant nodules extend from 1 month to 4 years.

Duration of Symptoms	No. of patients
<1mon	1
1-3 mon	7
3-6 mon	10
6-12 mon	7
1-2yrs	12
2-5yrs	11
>5yrs	2



Site of the nodule:

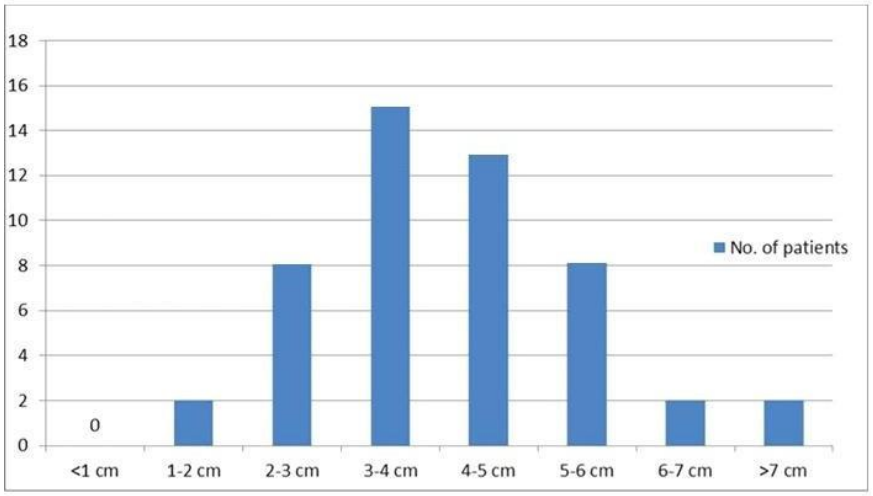
Out of 50 cases studied, 26 cases presented with nodule in right lobe of the thyroid gland and the remainder in the left lobe of thyroid. One patient among left sided solitary nodule had undergone right lobectomy 30 years back and presented with recurrent nodule in the rest of the lobe.

Site of the nodule	no. of patients
Right	28
Left	22
Total	50

Size of the nodule:

In the present study, on clinical examination size of the nodule, in its largest dimension, varies from 2cm to 12cm. Most of the patients presented with the size of about 3 to 5 cm. in the study, as such there is no correlation between the size of the nodule and the occurrence malignant nodule.

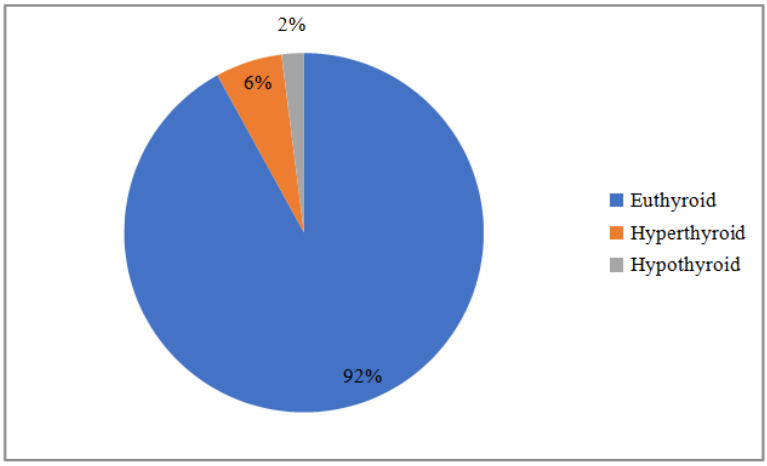
Size of the Nodule	No. of patients
<1 cm	0
1-2 cm	2
2-3 cm	8
3-4 cm	15
4-5 cm	13



Thyroid functional status:

Out of 50 cases, two presented with features of thyrotoxicosis, one with hypothyroidism and rest all were in euthyroid state. Patients with thyrotoxicosis were made euthyroid using antithyroid drugs and operated and both cases turned out to be toxic follicular adenoma. Patient with hypothyroidism was treated with thyroxine, USG neck revealed multiple nodules and managed by subtotal thyroidectomy, histopathological examination confirmed the diagnosis of multi-nodular goiter.

Thyroid functional status	No. of patients
Euthyroid	46
Hyperthyroid	3
Hypothyroid	1
Total	50

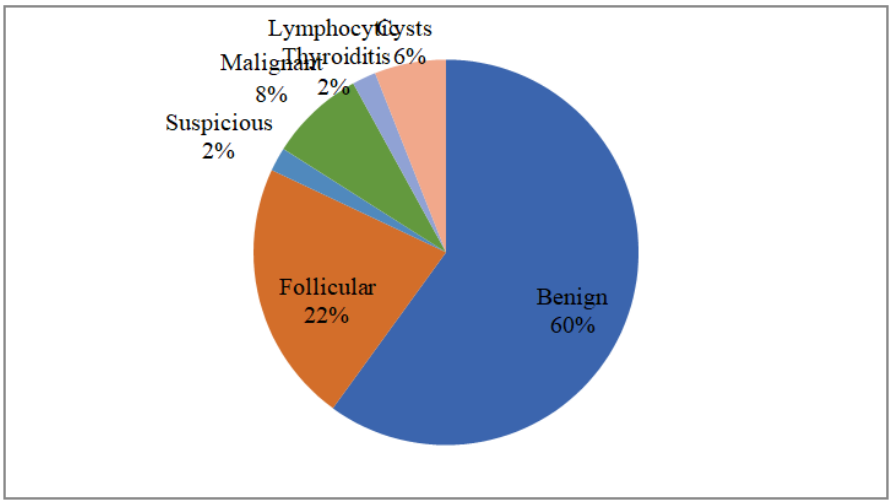


FNAC Reports:

Fine Needle Aspiration Cytology is the important investigation in the evaluation of solitary nodule of thyroid. All 50 cases were subjected to FNAC during the course of evaluation. FNAC reports are mainly categorized into 6 entities- Benign, follicular neoplasm, suspicious (of malignancy), malignant, lymphocytic thyroiditis, cysts. In our study, out of 11 follicular neoplasms, two turned out to be follicular carcinoma. One suspicious (of papillary carcinoma) case confirmed papillary carcinoma on histopathological examination. Four cases of papillary carcinoma were diagnosed pre- operatively by FNAC alone.

Three cases diagnosed as cysts by FNAC confirmed to be simple cysts on histopathological examination.

FNAC reports	No. of patients
Benign	30
Follicular Neoplasm	11
Suspicious	1
Malignant	4
Lymphocytic Thyroiditis	1
Cysts	3



Aetiological incidence of solitary nodule of thyroid:

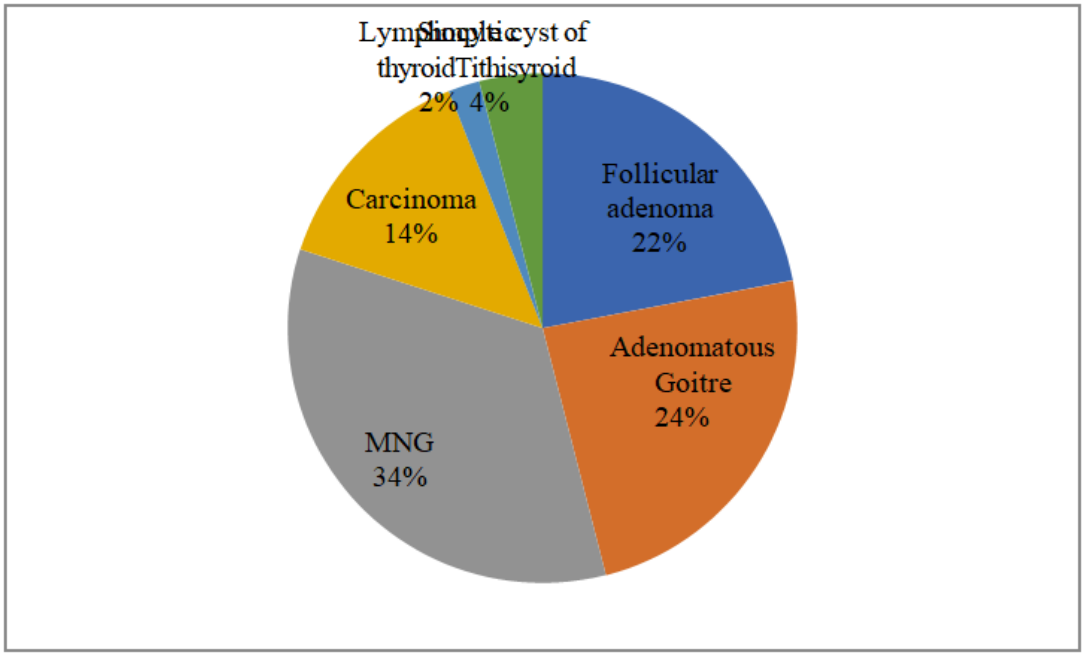
Out of 50 cases studied, common causes of solitary nodule are MNG, follicular adenoma and adenomatous goiter; the most common being MNG which constitutes about 34% of cases. Follicular adenomas have 22% and adenomatous goiters have 24% incidences.

Out of 50 cases, seven were malignant – 5 papillary carcinoma and 2 follicular carcinomas. Ultrasonography detected suspicious findings in three cases among seven malignant cases –2 papillary and 1 follicular.

Three cases of papillary carcinoma were diagnosed with certainty by FNAC, one case was suspicious which turned out to be papillary CA on histopathological examination.

Two cases of follicular carcinoma were diagnosed follicular neoplasm, one of them showed suspicious features on ultrasonographic examination.

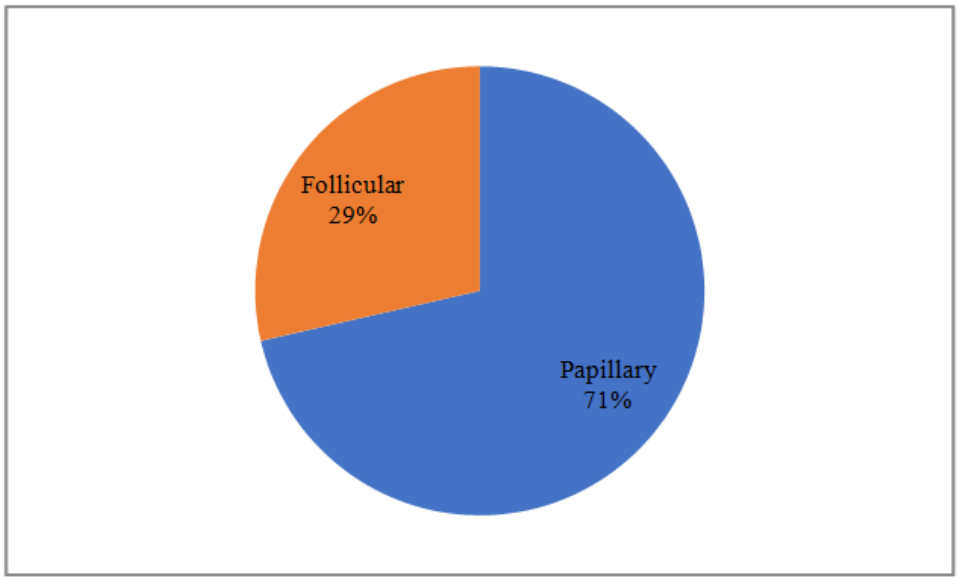
HPE Reports	No. of patients
Follicular adenoma	11
Adenomatous Goitre	12
MNG	17
Carcinoma	7
Lymphocytic thyroiditis	1
Simple cyst of Thyroid	2
Total	50



Type of carcinoma:

From the study, out of 7 carcinomas, 5 were papillary and 2 follicular: no case of medullary or anaplastic or lymphoma was detected. Papillary carcinoma accounts to 71% and follicular carcinoma accounts to 29%.

Carcinoma	No of cases	Percentage
Papillary	5	71
Follicular	2	29
medullary	0	0
anaplastic	0	0
lymphoma	0	0
Total	6	100



Surgery / operative procedure done:

Depending upon the clinical diagnosis and FNAC features, all the 50 patients undergone surgery. Among them, 25 patients had undergone hemithyroidectomy, 12 cases undergone sub-total thyroidectomy and 13 cases undergone total thyroidectomy.

Post-operatively, suppressive dose of thyroxine was started for patients who had undergone total thyroidectomy. Three cases out of 13 cases of total thyroidectomy showed features of hypocalcemia on 2-4 post-operative day, hence, they are supplemented with oral calcium and vitamin D3.

All the cases were followed up for 6 months, two cases had husky voice without any change in vocal cord movements.

DISCUSSION

The observations and results of the present study were compared with the available previous similar studies.

MEAN AGE AT PRESENTATION:

Authors	**Mean Age In Years**
Das DK (1999) [31]	35
Talepoor M (2005) [32]	38.6
Quari F. (2005) [33]	36.7
Rehman A.U. (2009) [34]	34.7
Khurshid Anwar (2012) [35]	37
Present study	**38.5**

In the study done by Quari F and Talepoor M separately in 2005, reported the mean age at presentation as 36.7years and 38.6years respectively. Khurshid Anwar reported, in 2012, the mean age of presentation as 37years. From the present study, the mean age at presentation found to be 37.27years, correlates with the previous studies.

Most of the earlier series reported peak incidence of solitary nodule thyroid in the 3rd and 4th decades. Bhansali S. K (1982) [36], in his similar study, reported the peak incidence in 4th and 5th decade. In the present study, the peak incidence found to be 3rd to 5th decades, which constitutes about 70% of the cases studied.

Sex Distribution:

Authours	**Sex Incidence (M: F)**
Dorairajan (1996) [26]	1:9
Das DK (1999) [31]	1:5.39
Gupta C (2001) [37]	1:5
Present study	**1:11.5**

In the study done by Dorairajan (1996) and Das DK (1999) reported ratio of sex incidence as 1:9 and 1:5.39 respectively. In the present study, it's found to be 1:11.5, which correlates with previous studies.

Because of periods of fluctuations in the demands of the hormonal requirement in female in their life cycle (puberty, menstrual cycles, pregnancy, menopause), the chances of thyroid nodule formation are very high as compared with male counterparts.

Distribution of non-neoplastic and neoplastic lesions diagnosed by FNAC:

Authours	Non- Neoplastic	Neoplastic	Ratio
Sarda AK (1997) [39]	487	59	8.25:1
Das DK (1999) [31]	346	85	4.07:1
Gupta C (2001) [37]	470	30	15.66
Talepoor M (2005) [32]	325	70	4.33:1
Hurtado Lopez M (2005) [38]	80	50	1.6:1
Nagada (2006)	51	18	2.83:1
Chao CT (2007)	276	264	1.04:1
Present study	**34**	**16**	**2.12:1**

In the present study, neoplastic conditions include adenomas and all malignant lesions. From the study, the ratio of non-neoplastic to neoplastic cases is about 2.12:1, which is comparable to the studies done earlier like Karur (2002), Hurtado Lopez M (2005), Nagada (2006), Chao CT (2007).

Distribution of malignancies by FNAC:

Authours	Percentage
Sarda A. K *et al*., (1997)	10.8
Karur K *et al*., (2002)	18
Mundsad B *et al*., (2006) [40]	4.16
Present study	**8**

In the present study, among 5 cases of papillary CA, 4 were diagnosed with certainty by FNAC and the rest one was suspicious of malignancy. But both the follicular CA were initially reported as follicular neoplasm. From the study, distribution of malignancy is about 8, which is comparable with the earlier studies.

Aetiological incidence (in percentage):

Series	MNG	Adenoma Follicular	Carcinoma	Others	Total No. of cases
Zaman & Bhagbati (1971)	83	9	8	-	2221
Ananth Krishnan (1983)	12	47	2	2	104
Bhansali (1982)	71	20	9	-	449
Fenn (1980)	22	55	12	11	342
Kapur (1982)	28	50	11	11	221
Present series	**34**	**22**	**14**	**30**	**50**

From the present study, commonest cause of solitary nodule is MNG, which is comparable with the studies done by Fenn (1980), Kapur (1982), Bhansali (1982). The common causes are follicular adenoma and adenomatous goiter.

Incidence of carcinoma:

Study	Year	Percen tage
C.Leigh *et al*., [41]	1969	20.9%
A S Fenn *et al*., [42]	1980	12.0%
Bhansali S K	1982	9.0%
Kapur *et al*.,	1982	11.0%
A K Sarda *et al*., [39].	1997	10.8%
Mazafferi *et al*., [43]	1998	11-12%
Wagana *et al*.,	2002	16%
G.A Khairy *et al*., [44]	2004	13.9%
Talepoor *et al*., [32]	2005	15.8%
CatrherineIhre Lundgreen [45]	2007	20.9%

Study	Year	Percen tage
Judy Jin *et al*., [46]	2009	15%
Rehman A U [34]	2009	11.4%
Salim Ahmed *et al*., [47]	2011	12.3%
Md. Abul Hossain *et al*., [48]	2014	28%
Rameshbabu *et al*., [49]	2015	10.83%.
Fernando *et al*., [50]	2015	12%
Present study	**2018**	**14.0%**

From the literature, the incidence of malignancy in thyroid nodule ranges from 5% to 30%. From the present study, the incidence found to be 14%, which is comparable with the previous studies.

CONCLUSIONS

The present study is a prospective analysis of 50 cases of solitary nodule of thyroid, admitted in KIMS medical college. Though a large number of patients are required to come to better conclusions, based on the data and results obtained in the present study, the following conclusions can be drawn:

- Solitary nodule of thyroid is more common in females.
- Solitary nodule of thyroid is more common the age group of 20-50years.
- Most of the patients with solitary nodule of thyroid present with swelling alone.
- Most of the patients with solitary nodule of thyroid are in euthyroid state and only few present with toxicity and hypothyroidism.
- Incidence of malignancy in male patients presenting with solitary nodule thyroid is more when compared to female patients presenting with the same.
- Commonest cause of solitary nodule of thyroid is multi-nodular goitre.
- USG can be used to detect multi-nodular goitre in patients presenting with solitary nodule thyroid.
- FNAC is the investigation of choice in the evaluation of solitary nodule of thyroid. It has few pitfalls. In such situations, only histopathology can confirm the exact pathology. It detects papillary carcinoma in a solitary nodule with high sensitivity and specificity.
- Papillary carcinoma is the most common malignancy of thyroid, followed by follicular carcinoma.

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