

A study on Clinical diagnosis, hormonal profile and radiological correlation with Histopathology in MNG

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Received: 13-10-2020 / Revised: 30-11-2020 / Accepted: 12-12-2020

Abstract

Background and Objective: Nodular goiter is the most common pathology of the thyroid gland. The disease is hyperplastic in nature. Palpable thyroid nodules are found in 3-7% of adult population and are more frequent in women. The basic objective of this study is - To evaluate the accuracy of radiology, and clinical diagnosis with respect to histopathology and role of hormonal data analysis for early diagnosis and treatment. **Methodology:** The study period is from Jan 2017 to Jan 2020, carried out in Department of Pathology, Gayathri Vidya Parishad institute of healthcare and medical technology(GVPIHC&MT), on the thyroidectomy specimens for detailed analysis of diagnostic efficacy, accuracy of radiology, clinical diagnosis with histopathology in detection of nodules in thyroid and their co-existent lesions. **Results:** A total of 180 histopathological case details were collectively analyzed. Out of these, 155 cases had hormonal profile data, 56 cases had radiological data. The study showed strong female preponderance with 41-60 years being the most common age group. Out of 180 nodular goiters studied, most of them were benign with only 12.22% malignant cases. The diagnostic accuracy for radiology- 89.5%, and clinical diagnosis- 92.1% were noted. **Conclusion:** Prior examination of thyroid by clinician, hormonal profile assessment, radiology of the lesion provides additional diagnostic aid to the conventional thyroidectomy. Though, histopathology remains the gold standard for diagnosing thyroid lesions, all these together minimize the unwanted surgeries and provide greater diagnostic yield.

Keywords: Histopathology, Nodular goiter, Thyroid nodules.

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Introduction

Thyroid gland is unique among endocrine organs. Because of its superficial location, it is the only gland

that is amenable to direct physical examination. In surgical practice, thyroid lesions are common, observed in 4-7% of the population and affect women more commonly than men. Excising all the thyroid lesions is impracticable and associated with risk. [1]Nodular goitre is the most common pathology of the thyroid gland. Palpable thyroid nodules are found in 3-7% of adult population and are more frequent in women. Ultrasonography, which has been introduced in the diagnosis of thyroid gland has confirmed earlier

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autopsy reports indicating that focal lesions are found in as many as 50% of clinically normal thyroid glands.[2] The prevalence of thyroid nodules increases with advancing age and is higher in women. However, thyroid nodules are more likely to be malignant in men, patients with a history of head and neck irradiation, children, and young or older adults (<30 or >60 years of age). The evaluation of a patient with a palpable solitary nodule is generally straightforward and usually will include a fine-needle aspiration (FNA) biopsy with or without US guidance. It is important to recognize that in up to 50% of patients with a clinically palpable solitary nodule, ultrasonography will often demonstrate the presence of one or more additional nodules.[3]The evaluation and management of patients with multinodular goitres (MNGs) represents a much more difficult problem in the clinical setting. Non- palpable nodules have the same risk for malignancy as palpable nodules of a similar size[3]. Most focal lesions in the thyroid gland are of benign nature. The incidence of thyroid cancer in multinodular goitre is estimated to be approximately 5-10 %.[2]

Materials and methods

This is a hospital based observational study of various lesions associated with nodular goitre by using clinical diagnosis, radiology and by histopathology. The patients were referred by Surgery, General Medicine, ENT, Surgical & Medical Oncology, TB and Chest to our hospital. The duration of study period was from Jan 2017 – Jan 2020. This material included 180 histopathology specimens. The specimens received

Results

were fixed in 10% buffered formalin. After fixation, tissues were processed in graded alcohols, xylol and embedded in paraffin. Routine haematoxylin & eosin staining was applied to sections of paraffin blocks and studied under light microscopy for the confirmation of nodular goiter and associated other thyroid lesions. All the slides were thoroughly evaluated for histological features and the lesions were categorized into nonneoplastic and neoplastic. The clinical, radiological and histological data was analyzed and compared with peer studies

Inclusion criteria: 180 cases of histopathology reported as nodular goiters were included in the study. 155 cases had recorded hormonal profiles. 56 cases had radiological data, out of which 48 cases were taken for the correlative study with histopathology.

Exclusion criteria: Cases with inadequate clinical details, inadequate or inconclusive radiological data were excluded from the study.

Ethical clearance: Ethical clearance was obtained from the institutional ethical review committee of Gayathri Vidya Parishad institute of healthcare and medical technology (GVPIHC&MT).

Statistical analysis: After studying, histopathological sections, the data collected was analyzed statistically and tabulated. Descriptive statistics was adopted to analyze the study data using percentage, tables, graphs, bar diagrams, line diagrams and pie charts. Inferential statistics consisting of Chi-square, sensitivity, specificity and accuracy were used to analyze the diagnostic efficacy of radiology and clinical diagnosis with that of histopathology.

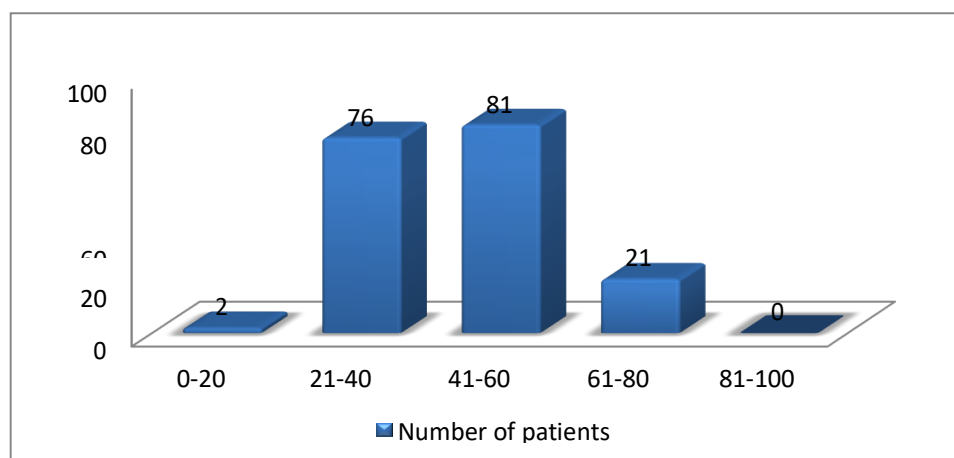


Fig 1: Age distribution of nodular thyroid lesions

Most common age group seen in the present study was 41-60 yrs. followed by 21-40 yrs. Only 2 cases were reported

0	Swelling in the neck	Pain and discomfort	Dysphagia	Dysnoea	Hoarseness of voice	Rapid growth	Cervical lymph nodes
Number	180	48	34	7	14	9	16
Percentage	100	27	19	4	9	5	9

in the 0-20yrs age group.

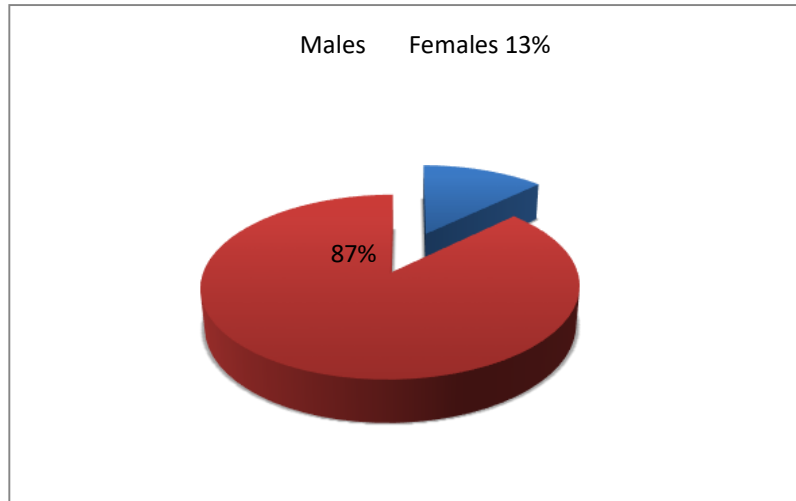


Fig 2: Sex distribution of nodular thyroid lesions

Present study showed strong female preponderance constituting 87 % i.e. 157 females and 13 % i.e. 23 males. Male to female ratio was noted to be 1: 6.8.

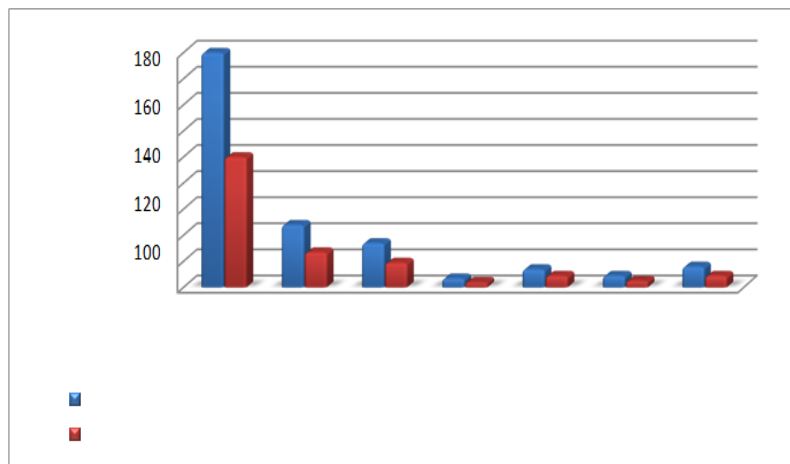


Fig 3 :Clinical presentation of nodular thyroid lesions

Present study showed various clinical symptoms with most common being swelling in the neck (100%) and only few cases presented with pressure symptoms such as dysphagia (19%), dyspnea (4%) and hoarseness of voice (9%).

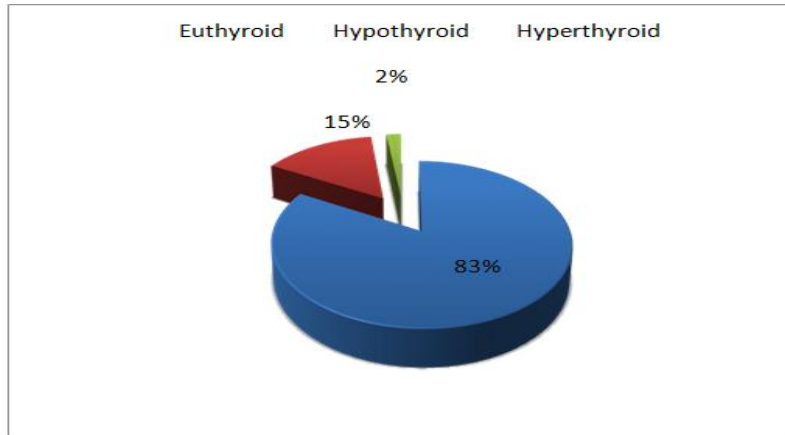


Fig 4 :Hormonal profile in nodular thyroid lesions

The total cases with recorded hormonal profile in present study were 155 cases in a total of 180. Most of them had normal thyroid profile (euthyroid) constituting 83%, followed by 15% hypothyroid and 2% hyperthyroid cases.

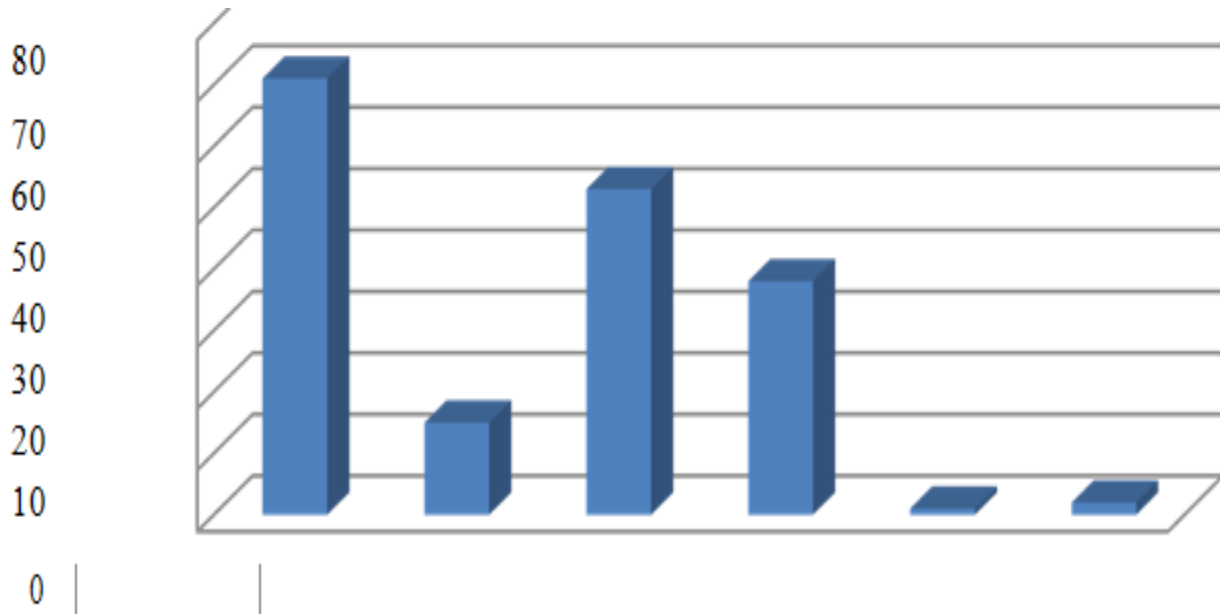


Fig 5 :Types of operative procedures used for nodular thyroid lesions

In present study, 39.44% i.e., 71 out of 180 cases underwent total thyroidectomy. Left hemithyroidectomy was more frequent operative procedure seen in this study compared with right. Subtotal thyroidectomy was done in only 15 cases. Completion thyroidectomy was done in 2 cases which previously underwent subtotal and hemithyroidectomy for reported malignancy.

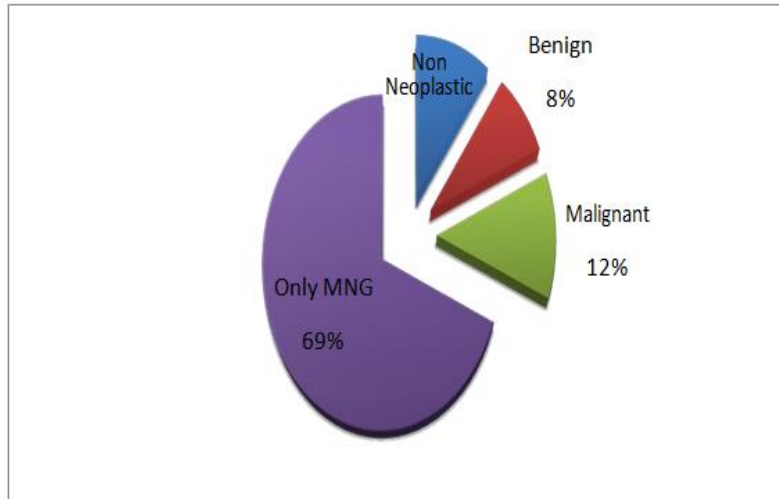


Fig 6: Nature of lesions

Associated lesions with MNG included 11% nonneoplastic lesions, 8% benign lesions and 12 % malignant lesions. Only MNG was observed in 69% of the cases

Table 1:Discrepancy rates of radiology and clinical diagnosis with respect to HPE

Diagnosis	Discrepancy Rates
Radiology	10.41%
Clinical diagnosis	7.81%

Discrepancy rates were recorded for cytology, radiology and clinical diagnosis with histopathology as standard diagnostic modality.Clinical diagnosis had 7.81% discrepancy rate constituting 10 cases out of 128 cases taken for the correlative study.Radiology showed a discrepancy rate of 10.41% with 5 cases out of 48 cases taken for the study.

Table 2: Chi-square test and level of significance for clinical diagnosis

Clinical diagnosis	HPE		
	N	Y	
N	10	0	10(7.8)%
Y	0	118	118(92.2)%
	10(7.8)%	118(92.2)%	128(100)%

Chi squared	114.492
DF	1
Sigmificance level(P)	0.000

Chi-squared test

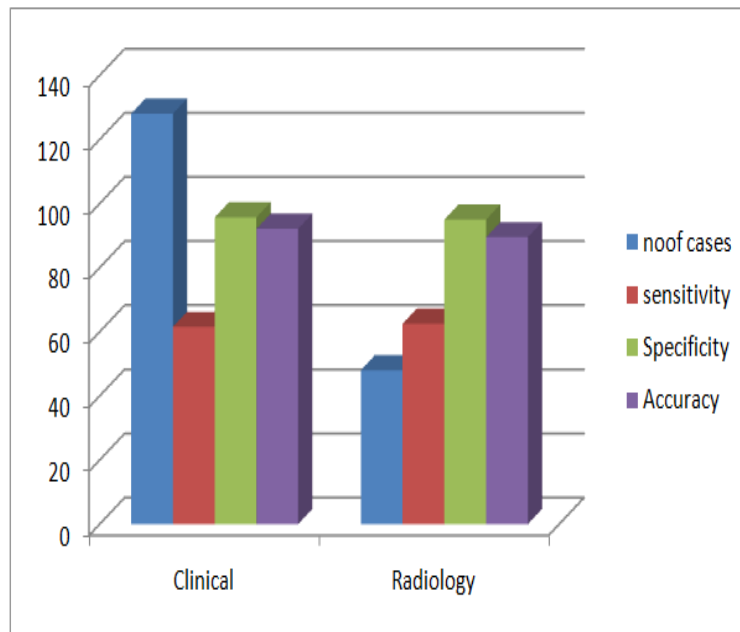
p- value below 0.001 was considered significant. Clinical diagnosis was checked for association with histopathology for 128 cases. There is significant association between clinical diagnosis and histopathology with p- value corresponding to 0.000.

Table 3:Chi-square test and level of significance for radiology Chi-squared test

Ultrasound	HPE		
	N	Y	
N	5	0	5(10.41)%
Y	0	43	43(89.6)%
	5(10.41)%	43(89.5)%	48(100)%

Chi squared	37.88
DF	1
Sigmificance level(P)	0.000

p- value below 0.001 was considered significant. Radiology was checked for association with histopathology for 48 cases. There is significant association between radiology and histopathology with p- value corresponding to 0.000.

**Fig 7: Distribution of sensitivity, specificity & accuracy with respect to HPE**

Taking Histopathology as gold standard for accurate diagnosis of thyroid lesions, sensitivity, specificity and accuracy of radiology, clinical diagnosis were noted. The available data recorded was different in each, 48 cases in radiology, 128 cases in clinical diagnosis. Sensitivity of clinical diagnosis (61.5%) and radiology (62.5%). Specificity was high for both radiology (95%) and clinical diagnosis (95%). Accuracy was more for clinical diagnosis with 92.1% compared to radiology (89.5%).

Discussion

180 Histopathology specimens of thyroidectomy received over a period of time i.e. Jan 2017 – Jan 2020 at Gayathri vidya parishad institute of healthcare and medical technology(GVPIHC&MT)and general hospital were analysed. These formed around 3.5% of the total surgical specimens received in the Pathology department of Gayathri Vidya Parishad institute of healthcare and medical technology(GVPIHC&MT) during the above mentioned period.

Table 4: Distribution of age in nodular goitre in comparison with other studies

Study group	Present study	MangeshRam Padmawar[4](2014)	Karthik Kathladka et al[5](2015)	Hanumanthappa et al[6](2012)
Age range	41-60	20-30	30-40	21-30
Percentage	45%	29.82%	59%	35%
No. of patients	180	57	100	100

The results of the data analysis in the present study showed that 4th–6th decade was the most common age group constituting 45% cases followed by 21-40 yrs. constituting 42.22% cases. Mangesh Ram Padmawar,4 Karthik Kathladka et al[5] (30-39yrs.) and Hanumanthappa et al[8] (21-30yrs.) studies showed prevalence in the younger age groups that formed the second most common age group in the present study.

Table 5: Distribution of sex in nodular goitre in comparison with other studies

Study group	Present study	MangeshRam Padmawar[4](2014)	Karthik Kathladka et al[5](2015)	Bombil et al[6](2012)	Mustaq Ahmed et al[8](2014)
Female(%)	87%	78.94%	90%	85.8%	85.7%
No. of patients	180	57	100	162	105

In the present study, males comprised 13%, females comprised 87% of the total cases with a male: female ratio-1:6.8. This is in concordance with most studies as seen in Karthik Kathladka et al[5](90%), Mushtaq Ahmed et al[8] (85.7 %) and Bombil et al[7] study (85.8%).

Table 6: Clinical presentation of nodular goitre in comparison with other studies

Study group	Present study	Hanumanthappa et al[6](2012)	Karthik Kathladka et al[5](2015)
Most common complaint	Swelling neck	Swelling neck	Swelling neck
Percentage	100%	92%	100%

Swelling in the neck was the most common clinical presentation noted in this study similar to the findings seen in Karthik Kathladka et al[5] (100%) and Hanumanthappa et al[6] (92%). Discomfort was

recorded in 27% cases in the present study, whereas in 5% of cases in Karthik Kathladka et al[5] study. The increase in the proportion of symptoms may be due to the late presentation to the hospital

Table 7: Operative procedure employed in comparison with other studies

Thyroidectomy	Present study	Karthik Kathladka et al[5](2015)	Chetan VR et al[9](2013)
Left hemi	53	5	66
Right hemi	38	5	
Total	71	20	3
Near total/ Subtotal	15	11/ 59	1

Present study included 39.4% total thyroidectomies compared to hemi- thyroidectomies. Chetan VR et al[9] study noted hemi-thyroidectomies that comprised 66% compared to just 10% of hemi-thyroidectomies in Karthik

Kathladka et al study. In a study by Mattioli FP[10] et al., subtotal thyroidectomy was shown to be an adequate surgical intervention for MNG.

Table 8: Thyroid hormonal profile in comparison with other studies

Hormonal status	Present study	Karthik Kathladka et al[5](2015)	Chetan VR et al[9](2013)	Muhammed A Altae et al[11]
Euthyroid	83%	80%	90%	73.2%
Hypothyroid	15%	1%	8%	3.4%
Hyperthyroid	2%	19%	2%	24.4%
No of cases	155	100	73	127

Most of the thyroidectomy cases had euthyroid state prior to surgery that comprised 83% of the total cases. Present study was in concordance with other studies that showed predominantly euthyroid states. However, hypothyroid and hyperthyroid states were variable in different study groups. Karthik Kathladka et al, Muhammed A Altae et al[11] study groups showed 19%, 24.4% hyperthyroid cases and 1%, 3.4% hypothyroid cases respectively. These two studies

showed that percentage of hyperthyroid states were more compared to the present study. This may be due to epidemiological variation. Diagnostic accuracy and association of clinical diagnosis with HPE. Clinical diagnosis in the present study showed a concordance of 92.2% and discordance of 7.8%. Sensitivity, specificity and accuracy were 61%, 95% and 92% respectively. Clinical diagnosis was correlated with HPE as gold standard which showed a significant association suggested by “p” value i.e. 0.000.

Table 9: Diagnostic accuracy and association of Radiology with HPE

Study group	Cases evaluated	Concordant cases	Discordant cases
Present study	48	89.6%	10.41%
N Kukar et al[12]	43	86.05%	13.05%

Conclusion

The present study highlights the various lesions associated with nodular goitre. The results of this study illustrate the complexity of thyroid nodule assessment. It also highlights the multi-disciplinary co-ordination as thyroid nodular disease is a clinical problem which cuts across several disciplines including endocrinology, radiology, surgery, general medicine and ENT in addition to pathology.

Acknowledgment: The author is thankful to Department of Pathology for providing all the facilities to carry out this work.

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Conflict of Interest: Nil

Source of support: Nil