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Original Article

Frequency of Thyroid Malignancy & Its Type in Patients Undergoing Thyroidectomy for Multinodular Goitre

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ABSTRACT

Objective: To determine the frequency of thyroid malignancy & its type in patients undergoing thyroidectomy as a solution for Multinodular Goitre.

Methodology: This cross-sectional study was carried out in the Department of General Surgery at the JPMC, Karachi, between June 2024 and December 2025. A total of 238 eligible patients between the ages of 20 and 60 years, who were to undergo a thyroidectomy due to multinodular goitre, were enlisted using a non-probability consecutive mechanism of sampling. Histopathological analysis of the surgical specimens was done and the malignancies were classified as per the latest WHO criteria of the classification of malignancies. Data was analysed using SPSS version 26 and Chi-square tests were used with 5% level of significance.

Results: Among 238 patients (mean age 43.47 ± 11.87 years; 76.1% females), thyroid malignancy was identified in 13.4%. Papillary carcinoma was the predominant subtype (71.9%), followed by follicular (15.6%) and Hurtle cell carcinoma (9.4%). Malignancy showed significant associations with older age (p = 0.0001) and larger goitre size (p = 0.006), while gender differences were not statistically significant.

Conclusion: Thyroid malignancy was identified in a considerable proportion in individuals diagnosed with multinodular goitre, with papillary carcinoma documented as the predominant histopathological variant. Increasing age and greater goitre dimensions were found to have a significant association with malignancy, whereas sex exhibited no statistically significant association. These findings underscore the necessity for an exhaustive preoperative assessment and systematic histopathological evaluation in all instances of multinodular goitre.

Keywords: Histopathological classification, multinodular goitre, thyroid malignancy, thyroidectomy

INTRODUCTION

The most prevalent endocrine cancer in the rest of the world is thyroid carcinoma, which is a relatively rare tumour relative to the rest of the endocrine tumours, and its prevalence has increased substantially over the past decades[1,3]. This can also be attributed to the fact that some diagnostic modalities such as high-resolution ultrasonography and fine-needle aspiration cytology have increased the detection of small and subclinical tumours[2,3]. The most prevalent one is the differentiated thyroid carcinoma which consists of papillary and follicular types, whereas the rest are medullary and anaplastic thyroid carcinomas and has a relatively low prevalence but a relatively high clinical aggression and proportionate contribution to thyroid cancer mortality[4,5].

In multinodular goitre (MNG), a common thyroid disease, multiple nodules may be associated with areas of malignant change[6]. Malignancy prevalence in MNG is assessed based on the literature as between 3% to 35% depending on the study design, diagnostic criterion, and even geographic variation[7,9]. According to some meta-analytical studies, the incidence of thyroid carcinoma in multi-nodular goitre (MNG) can be slightly lower than in solitary nodules (odds ratio around 0.7-0.8), but there are also other studies that suggest similar rates of risk that emphasize the importance of population-specific data[8,9].

In South Asia, and particularly in Pakistan, the frequency and histological spectrum of thyroid carcinoma in MNG remain insufficiently documented. Local studies have reported malignancy rates ranging between 7% and 14%, with papillary carcinoma being the most common subtype, followed by follicular carcinoma[10,13]. Many patients in Pakistan and neighbouring countries present late, often with large multinodular glands and compressive symptoms, reflecting limited access to early diagnostic evaluation[11,12]. The Middle East and Asian international studies have reported similar trends with papillary thyroid carcinoma being the histological predominant type among MNG patients who underwent thyroidectomy[14,17]. With such differences, it is necessary to identify the rate and histologic patterns of thyroid malignancy in patients with multinodular goitre that undergo thyroidectomy. The study is proposed to fill this gap by assessing the ultimate histopathological outcomes in these patients, and, therefore, serving the evidence-based surgical care and advancing the comprehension of the disease burden in the region.

METHODOLOGY

This cross-sectional study was carried out in the Department of General Surgery at the JPMC, Karachi, between June 2024 and December 2025. The study population included patients of either gender aged between 20 to 60 years, who were undergoing thyroidectomy due to multinodular goitre; that is, clinically or radiologically evident multiple nodules in one or both lobes of the thyroid. The main finding was histopathologically proven thyroid malignancy that was identified as cellular imbalances in form of calcification, haemorrhage or necrosis. Patients who had solitary nodules, Graves disease, toxic multinodular goitre; neck irradiation previously; proved malignancy preoperative; metastatic or recurrent; and insufficient Fine Needle Aspiration Cytology

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were excluded. Using the WHO sample size calculator with a prevalence rate of (13.9%)[13] for thyroid malignancy in patients with multinodular goitre, a 5% margin of error, and a 95% confidence level, the final sample size was calculated as 238. The sampling was done through non-probability consecutive method. All the eligible patients were well informed about the goals of the study, the surgical operation, the risks, and the use of anonymized data in research. Every patient was subjected to a full clinical assessment, such as thyroid function test, ultrasonography, and cytology with a fine needle (FNAC) where necessary.

Thyroidectomy was performed under general anaesthesia, and specimens were processed in 10% buffered formalin, embedded in paraffin, and examined using haematoxylin and eosin staining. Additional immunohistochemical techniques were used where necessary. Histopathological classification and typing of thyroid malignancies (papillary, follicular, medullary, anaplastic, and variants) were performed according to institutional standards following the WHO Classification of Endocrine and Neuroendocrine Tumours, 5th Edition (2022) criteria[19]. Data were collected using a structured proforma. For data analysis, SPSS version 26 was used; descriptive statistics were calculated, including frequency distributions of each thyroid cancer type. Categorical variables such as gender and malignancy presence were compared using Chi-square test, with a 5% significance level.

RESULTS

The mean age was noted as 43.47 ± 11.87 years (95% CI: 41.96----44.99). The mean goitre size was 4.03 ± 1.21 cm (95% CI: 3.87–4.18). Out of 238 sample 181 (76.1%) were female, and 57 (23.9%) were male, which indicated a significant prevalence of females. The demographic and clinical data of the study subjects are summarized in Table I. Out of all the subjects, 32 patients (13.4%) were diagnosed with thyroid malignancy and 206 patients (86.6%), with benign thyroid pathology. The most common histological subtype was papillary carcinoma, 23 cases (71.9%), followed by follicular carcinoma, 5 cases (15.6%), Hurtle cell carcinoma, 3 cases (9.4%) and medullary carcinoma, 1 case (3.1%).

The incidence of thyroid malignancy was observed to be on the rise with aging as seen in **Figure 1** that depicted the highest percentage of malignancy cases among patients above the age of 45 years.

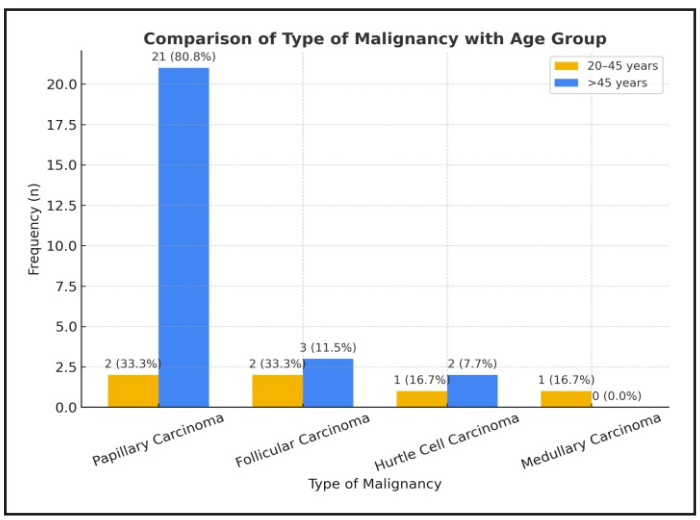
When examined in relation to gender, the incidence of thyroid malignancy was observed to be higher in males (31.3%) in comparison to females (22.8%); however, this disparity did not reach statistical significance (p=0.298). The gender-specific distribution of neoplasia is illustrated in **Figure 2**.

The average age of patients with malignant and benign findings were (51.94±8.56 & 42.16±11.78) years respectively with (p=0.0001). Similarly, the mean size of the goitre was significantly higher in the patients with (4.58±1.28 cm) as compared to the patients without (3.94 ±1.18 cm; p=0.006) **(Table II)**.

Table I: Demographic and Clinical Characteristics of Study Participants (n=238)

Mean ± Standard Deviation		**95% Confidence Interval**
Age in years = **43.47 ± 11.87**		41.96----44.99
Size of Goitre in cm = **4.03 ± 1.21**		3.87----4.18
Frequency (%)		
Gender	Male	57 (23.9)
	Female	181 (76.1)
Type of Malignancy	Papillary Carcinoma	23 (71.9)
	Follicular Carcinoma	5 (15.6)
	Hurtle Cell Carcinoma	3 (9.4)
	Medullary Carcinoma	1 (3.1)

Applying Independent Sample t-test & Chi-Square test



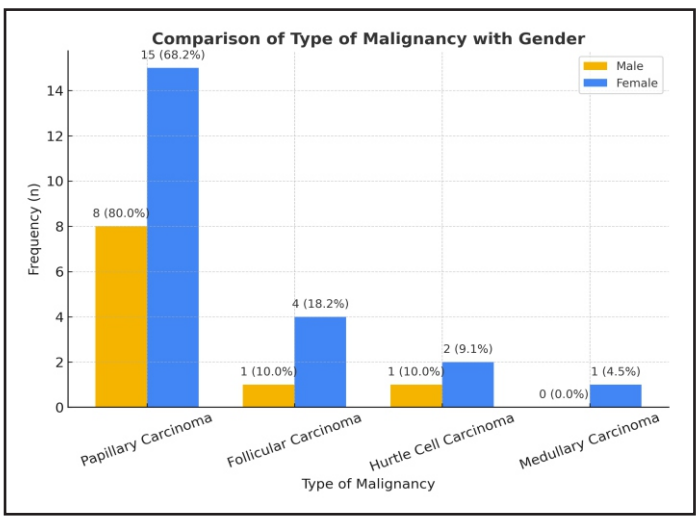


Table II: Comparison of Patient Characteristics with Malignancy (n=238)					
Patient Characteristics		**Malignancy**		**95% Confidence Interval**	**P-Value**
		Yes (n=32)	**No (n=206)**		
Age in years		51.94 ± 8.56	42.16 ± 11.78	5.504-----14.051	0.0001*
Size of Goitre in cm		4.58 ± 1.28	3.94 ± 1.18	0.187-----1.084	0.006*
Gender	Male	10 (31.3)	47 (22.8)	0.680-----3.475	0.298
	Female	22 (68.8)	159 (77.2)		

DISCUSSION

The study has assessed the frequency and histopathological range of thyroid malignancy in patients that had thyroidectomy due to multinodular goitre (MNG) and its relation to age, sex, and goitre size. The cumulative mortality of the malignancy in this cohort was 13.4% and the papillary carcinoma being the most common subtype (71.9%). Age and size of goitre were found to be significantly correlated with malignancy and gender not significantly associated.

The incidence of malignancy in the current study is within the scope of the incidence levels reported in the literature whereby rates of thyroid cancer in MNG range between 3 and 35 percent based on study group, ways of diagnosis and geographical variations[7,9]. Similar prevalence was reported by Apostolou et al. 15.1% in patients with MNG and a slightly lower rate of 12.6% in a regional Pakistani cohort was reported by Nadeem et al[10].These findings are similar, which confirms the fact that MNG, although seemingly not dangerous, has a significant chance of having an occult malignancy, which underlines the importance of close histopathological observation after thyroidectomy.

The findings of current study reported that papillary carcinoma was the most commonly occurring histological type which is in agreement with local and international research that has repeatedly demonstrated its pre-eminence among differentiated thyroid malignancy[12,14,18]. The epidemiology of papillary carcinoma is explained by its slow proliferation, correlation with exposure to radiology, and greater identification by the use of better imaging and FNAC[3,18]. In follicular and Hurtle cell carcinoma, the numbers were lower in this study but their identification demonstrates the need to do a detailed histopathological analysis since these forms of the malignancy can pose more serious clinical progressions when untreated.

This linear relationship between thyroid malignancy and aging has been found to be consistent with other literature in which advanced age has been associated with both high risk of cancer and poor prognosis[8,17]. This can be an indication of cumulative impact of chronic stimulation, long-term nodular hyperplasia, or late onset in FNAC. The same report was given by Lin et al., who indicated that the prevalence of malignancy was much higher among the patients older than 45 years[17]. These results highlight the clinical significance of age as a risk factor of malignancy, which should be more strictly examined in preoperative assessment of elderly patients with MNG.

The current research has also established that there is a strong association between the size of a goitre and malignancy, and this was also in agreement with previous cases[10,16]. An increase in gland size may reflect a prolonged disease duration, which in turn could elevate the risk of clonal transformation. Therefore, goitre size emerges as a clinically significant variable that should be considered in risk stratification and surgical decision-making in patients with MNG.

Although a higher proportion of malignancy was observed among males (31.3%) compared with females (22.8%), the difference was not statistically significant. Similar findings have been reported by Waheed A, Mehar GS, et al[16], who also found no gender-based difference in malignancy risk among MNG patients. This suggests that gender alone is not a reliable predictor of thyroid cancer in multinodular disease, even though males are sometimes reported to have more aggressive tumour behaviour once malignancy occurs.

The findings of this study have significant clinical implications. Since more than one in every ten MNG patients had a malignancy, detailed preoperative examination, such as ultrasound and FNAC of suspect nodules is justified. Additionally, histopathological examination should be done in detail in all the resected thyroid specimens to achieve early detection of incidence malignancies. The identified relationship between malignancy and age and goitre size can also help the surgeons and endocrinologists to find out more information about high-risk patients who might receive a total thyroidectomy or undergo a more intensive postoperative observation.

Limitations of the study are that it is a single-centre, and it was not conducted using a non-probability sampling, which can also influence generalisability. Also, the nodule number, ultrasonic characteristics, or cytology were not evaluated. Future multicentre, prospective studies that include these parameters would give a more effective risk model in prediction of malignancy in MNG.

Overall, current study shows that a significant percentage of patients with multinodular goitre contain thyroid malignancy, which is mostly papillary carcinoma. The predictors of greater importance were advancing age and larger goitre size, and the gender did show the significant association. The results highlight the importance of a thorough preoperative assessment and consistent histopathological testing to enhance the outcome of early diagnosis and treatment of MNG.

CONCLUSION

Thyroid malignancy was identified in a considerable proportion in individuals diagnosed with multinodular goitre, with papillary carcinoma documented as the predominant histopathological variant. Increasing age and greater goitre dimensions were found to have a significant association with malignancy, whereas sex exhibited no statistically significant association. These findings underscore the necessity for an exhaustive preoperative assessment and systematic histopathological evaluation in all instances of multinodular goitre.

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