

PREVALENCE AND ULTRASOUND CHARACTERISTICS OF INCIDENTAL THYROID NODULES IN PATIENTS UNDERGOING NECK ULTRASOUND FOR NON-THYROID INDICATIONS: AN OBSERVATIONAL STUDY

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ABSTRACT

Background: Incidental thyroid nodules are increasingly identified due to the widespread use of high-resolution ultrasonography for evaluation of neck conditions unrelated to thyroid disease. Although most of these nodules are benign, a subset demonstrates sonographic features associated with increased malignancy risk. Differentiating low-risk from potentially significant nodules is essential to avoid unnecessary investigations while ensuring timely identification of clinically relevant lesions. Data regarding the prevalence and ultrasound characteristics of incidental thyroid nodules in patients undergoing neck ultrasound for non-thyroid indications remain limited, particularly in tertiary care settings. The aim is to determine the prevalence of incidental thyroid nodules and to analyze their ultrasound characteristics and associated demographic and sonographic risk factors in patients undergoing neck ultrasound for non-thyroid indications. **Materials and Methods:** This observational study included 92 consecutive patients who underwent neck ultrasonography for non-thyroid clinical indications at a tertiary care hospital. Patients with known thyroid disease, prior thyroid surgery, or thyroid-directed imaging were excluded. Incidental thyroid nodules were defined as focal thyroid lesions detected unintentionally during ultrasound examination. Nodules were evaluated for laterality, size, composition, echogenicity, shape, margins, echogenic foci, and vascularity, and were stratified using a standardized ultrasound risk classification system. Data were analyzed using IBM SPSS Statistics version 27.0. Categorical variables were expressed as frequencies and percentages, and continuous variables as mean \pm standard deviation. Associations were assessed using appropriate statistical tests, and multivariable logistic regression analysis was performed to identify independent predictors. A p-value < 0.05 was considered statistically significant. **Result:** Incidental thyroid nodules were detected in 28 of 92 patients, yielding a prevalence of 30.43% (95% CI: 21.09–39.77). Nodules were significantly more common in females (35.19%) than males (23.68%) and increased with advancing age ($p < 0.05$). Most nodules were solid or predominantly solid (71.43%), hypoechoic (42.86%), and wider-than-tall (85.71%). Based on risk stratification, 46.43% of nodules were classified as low suspicion, 35.71% as intermediate suspicion, and 17.86% as high suspicion. Multivariable analysis identified increasing age, female sex, hypoechoic echogenicity, and irregular or lobulated margins as independent predictors of incidental thyroid nodules. **Conclusion:** Incidental thyroid nodules are frequently encountered during neck ultrasound for non-thyroid indications. While most demonstrate low-risk ultrasound features, a significant minority exhibit suspicious characteristics. Structured ultrasound evaluation and standardized risk stratification are essential for appropriate clinical decision-making and optimized patient management.

INTRODUCTION

Thyroid nodules are among the most frequently encountered lesions in endocrine and head-and-neck practice and are increasingly recognized because modern imaging routinely visualizes the thyroid gland even when the thyroid is not the clinical focus. High-resolution ultrasonography can detect small, clinically occult nodules that are not palpable on examination, and most detected nodules are benign. Nevertheless, a small but clinically meaningful proportion harbor malignancy, and the central challenge for clinicians is to identify the minority of nodules that merit further evaluation while avoiding unnecessary investigations for low-risk lesions.^[1] The expanding use of cross-sectional imaging and point-of-care ultrasound has amplified the phenomenon of “incidental thyroid nodules,” defined as nodules detected during imaging performed for reasons unrelated to suspected thyroid disease. From a health-systems perspective, incidental detection creates a diagnostic cascade: additional thyroid-targeted ultrasound, serial follow-up, and occasional biopsy or surgery, which can increase cost and patient anxiety without proportionate clinical benefit when applied indiscriminately. Contemporary thyroid nodule guidance therefore emphasizes risk-adapted management—balancing early detection of clinically significant cancers against overdiagnosis and overtreatment of indolent disease.^[2] Ultrasound remains the first-line modality for characterizing thyroid nodules because it provides detailed assessment of morphology and allows standardized risk stratification based on features such as composition, echogenicity, margins, shape, and echogenic foci. Structured reporting frameworks have been developed to reduce interobserver variability and to communicate malignancy risk in a reproducible way. These systems have also been designed to decrease unnecessary fine-needle aspiration (FNA) by linking imaging patterns and nodule size to evidence-based thresholds for biopsy and follow-up.^[3] Among the most widely adopted frameworks, the American College of Radiology TI-RADS approach has been studied extensively for its ability to improve specificity and reduce avoidable biopsy rates compared with alternative strategies, while preserving acceptable sensitivity for clinically relevant cancers. At the same time, head-to-head comparisons of multiple TI-RADS-style systems demonstrate that diagnostic performance varies across populations and practice environments, influenced by baseline malignancy prevalence, referral patterns, and interpretive consistency. This variability reinforces the importance of local data describing how incidental nodules present in real-world imaging streams and how ultrasound characteristics distribute within a given healthcare setting.^[4] Parallel to radiology reporting systems, endocrine and multidisciplinary guidance published in recent years has increasingly focused on “doing

less” for low-risk nodules while ensuring timely diagnosis for lesions with suspicious morphology or clinically high-risk context. Modern consensus recommendations emphasize that the purpose of evaluation is not to detect every cancer, but to identify nodules that are likely to affect outcomes—those at risk for progression, local invasion, nodal disease, or clinically meaningful recurrence while managing the majority of benign or indolent nodules conservatively. This principle is especially relevant when nodules are discovered incidentally, because the pre-test probability and clinical context often differ from that of thyroid-directed referrals.^[5] Clinical decision-making is further shaped by the alignment (or misalignment) between ultrasound risk categories, cytology, and final histopathology. Recent clinical evidence has evaluated how TI-RADS categories correspond with Bethesda cytology and surgical pathology, highlighting that certain categories—particularly lower-risk groups—may have high negative predictive value and can safely avoid biopsy below defined size thresholds. Such findings support a structured approach to incidental nodules: characterize accurately, stratify risk consistently, and reserve invasive procedures for nodules that meet both morphologic and size-based criteria or that occur in higher-risk clinical contexts.^[6] Despite the global emphasis on standardized thyroid nodule management, meaningful gaps remain in setting-specific evidence—particularly in tertiary care imaging pathways where neck ultrasound is frequently performed for non-thyroid indications (e.g., salivary gland symptoms, cervical lymphadenopathy evaluation, vascular assessment, or soft tissue complaints). The prevalence of incidental thyroid nodules, and the distribution of their ultrasound risk features, can differ substantially across populations, influenced by age structure, sex distribution, iodine status, referral patterns, and sonographer/radiologist practice. Recent guideline-focused syntheses also emphasize that local practice patterns and baseline disease prevalence should inform how recommendations are implemented in day-to-day care.^[7]

MATERIALS AND METHODS

This observational study was conducted at a tertiary care hospital and aimed to determine the prevalence and ultrasound characteristics of incidental thyroid nodules detected during neck ultrasound examinations performed for non-thyroid clinical indications. The study population comprised patients referred for neck ultrasonography for reasons unrelated to known or suspected thyroid disease, with thyroid findings documented as incidental observations during the same examination. A total of 92 consecutive eligible patients were included. Participants were enrolled from patients undergoing neck ultrasound for non-thyroid indications, and all included examinations allowed adequate

visualization of the thyroid gland to identify and characterize incidental nodules. Each participant contributed a single ultrasound assessment to the dataset.

Eligibility criteria: Patients were included if they underwent neck ultrasound for non-thyroid indications and had no prior established thyroid nodule evaluation as the primary reason for imaging. Exclusion criteria included known thyroid malignancy, history of thyroid surgery, previously documented thyroid nodules under follow-up, ongoing evaluation specifically for thyroid disease, or ultrasound examinations in which the thyroid gland could not be satisfactorily assessed due to technical limitations or incomplete imaging documentation. When multiple examinations were available for the same patient, only the first eligible examination was considered to avoid repeated measures.

Operational definition of incidental thyroid nodule and outcome measures

An incidental thyroid nodule was defined as a discrete focal lesion within the thyroid gland, radiologically distinct from surrounding thyroid parenchyma, detected during neck ultrasound performed for a non-thyroid indication. The primary outcome was prevalence, calculated as the proportion of patients (out of 92) in whom one or more incidental thyroid nodules were identified. Secondary outcomes included detailed ultrasound characteristics of the detected nodules, distribution by laterality (right, left, isthmus), and categorization by risk pattern using a standardized reporting framework.

Methodology: All examinations were performed using a high-frequency linear transducer appropriate for superficial neck imaging, with the patient positioned supine and the neck mildly extended. The thyroid gland was scanned systematically in transverse and longitudinal planes, including the right lobe, left lobe, and isthmus, with targeted assessment of any focal thyroid lesion detected. Standardized image documentation included representative images of each thyroid lobe and isthmus and additional saved images for each identified nodule, including measurements and relevant Doppler assessments where applicable.

Nodule characterization and ultrasound parameters: For each incidental thyroid nodule, sonographic characterization was recorded using predefined parameters. Nodule size was measured in three orthogonal dimensions (maximum transverse, anteroposterior, and craniocaudal diameters), and the maximum diameter was used for descriptive analyses. Nodule composition was categorized as solid, predominantly solid, predominantly cystic, cystic, or spongiform. Echogenicity was documented as anechoic, hyperechoic/isoechoic, hypoechoic, or very hypoechoic relative to the adjacent thyroid parenchyma. Shape was categorized as wider-than-tall or taller-than-wide on the transverse view. Margins were classified as smooth, ill-defined, lobulated/irregular, or exhibiting extrathyroidal

extension when suspected. Echogenic foci were recorded as none, macrocalcifications, peripheral (rim) calcifications, or punctate echogenic foci. Vascularity was assessed on color Doppler as absent/minimal, predominantly peripheral, predominantly internal, or mixed vascularity. Associated features including halo sign, cystic degeneration, and presence of suspicious cervical lymph nodes were noted where visualized within the standard field of examination, and background thyroid parenchyma was described as homogeneous or heterogeneous to account for coexisting diffuse thyroid disease patterns.

Risk stratification and reporting framework: Each nodule was assigned a risk category using a structured ultrasound-based risk stratification approach consistent with commonly used thyroid imaging reporting systems (e.g., TI-RADS framework), based on composition, echogenicity, shape, margins, and echogenic foci. Risk categories were used to summarize the distribution of nodules across low-, intermediate-, and high-suspicion patterns and to support clinically relevant interpretation of incidental findings.

Clinical and demographic variables were extracted from the ultrasound requisition and patient record, including age, sex, and the non-thyroid indication for the neck ultrasound. Ultrasound variables were captured on a standardized data collection proforma to reduce reporting variability. Where more than one nodule was present, each nodule was documented separately, and the number of nodules per patient was recorded to distinguish solitary versus multinodular incidental disease. To enhance internal consistency, ambiguous descriptors were resolved by reviewing stored images and aligning them with the predefined parameter categories.

Statistical analysis: Data were entered into a secured database and analyzed using IBM SPSS Statistics version 27.0. Continuous variables were assessed for distribution and summarized as mean \pm standard deviation for normally distributed data, or median with interquartile range for non-normally distributed data. Categorical variables were summarized as frequencies and percentages. The prevalence of incidental thyroid nodules was calculated with 95% confidence intervals. Group comparisons of ultrasound characteristics by demographic variables (e.g., sex and age categories) were performed using the chi-square test or Fisher's exact test for categorical variables, and the independent samples t-test or Mann-Whitney U test for continuous variables as appropriate. For analyses involving more than two groups, one-way ANOVA or Kruskal-Wallis testing was applied based on data distribution. A p-value < 0.05 was considered statistically significant.

RESULTS

The study included a total of 92 patients who underwent neck ultrasonography for non-thyroid

clinical indications. The demographic profile of the participants is summarized in [Table 1]. Most patients belonged to the 31–50 years age group (44/92; 47.83%), followed by those aged >50 years (30/92; 32.61%) and ≤30 years (18/92; 19.57%). The mean age of the study population was 44.26 ± 13.18 years. Regarding sex distribution, females constituted 58.70% (54/92) of the sample, whereas males accounted for 41.30% (38/92).

The prevalence of incidental thyroid nodules in this cohort is shown in [Table 2]. Incidental thyroid nodules were detected in 28 out of 92 patients, giving an overall prevalence of 30.43%, while 69.57% (64/92) had no thyroid nodules detected on ultrasound. The estimated prevalence was 30.43% with a 95% confidence interval of 21.09% to 39.77%, indicating that nearly one-third of patients undergoing neck ultrasound for non-thyroid reasons had incidental thyroid nodules.

The relationship between demographic variables and the presence of incidental thyroid nodules is detailed in [Table 3]. A statistically significant association was observed between sex and the presence of nodules (p = 0.041). Among males, nodules were present in 23.68% (9/38), whereas among females, nodules were observed in 35.19% (19/54), suggesting a higher proportion of incidental nodules in females. Age group also showed a statistically significant association with incidental nodules (p = 0.032). The prevalence of nodules increased with age: patients aged ≤30 years had nodules in 16.67% (3/18), those aged 31–50 years in 29.55% (13/44), and those aged >50 years in 40.00% (12/30), indicating an age-related rise in incidental thyroid nodule detection.

The ultrasound characteristics of the detected incidental nodules are presented in [Table 4]. In terms of laterality, nodules were more frequently found in the right lobe (46.43%; 13/28), followed by the left lobe (39.29%; 11/28), while the isthmus was less commonly involved (14.29%; 4/28). Regarding composition, solid nodules were the most common (50.00%; 14/28), and a further 21.43% (6/28) were predominantly solid, meaning that 71.43% of nodules had a largely solid component. Predominantly cystic nodules accounted for 17.86% (5/28), and spongiform nodules were least frequent (10.71%; 3/28). Echogenicity analysis showed that hypoechoic nodules were most prevalent (42.86%; 12/28), followed by isoechoic/hyperechoic nodules (32.14%; 9/28) and anechoic lesions (25.00%; 7/28). Most nodules demonstrated a wider-than-tall shape (85.71%; 24/28), while only 14.29% (4/28) were

taller-than-wide, the latter being a feature that can be associated with higher suspicion patterns in thyroid imaging.

Suspicious ultrasound features and risk stratification results are shown in [Table 5]. The majority of nodules had smooth margins (60.71%; 17/28), whereas 25.00% (7/28) had ill-defined margins, and 14.29% (4/28) had lobulated/irregular margins. The distribution of margin types was statistically significant (p = 0.018), reflecting that a notable minority demonstrated suspicious morphology. Regarding echogenic foci, 53.57% (15/28) showed no calcifications, while macrocalcifications were present in 21.43% (6/28) and punctate echogenic foci were noted in 25.00% (7/28), with this distribution also being statistically significant (p = 0.027). Based on TI-RADS risk stratification, almost half of the nodules were categorized as low suspicion (46.43%; 13/28), while 35.71% (10/28) were intermediate suspicion, and 17.86% (5/28) were classified as high suspicion, with a statistically significant distribution across categories (p = 0.021).

Multiple logistic regression analysis [Table 6] was performed to identify independent predictors of incidental thyroid nodules while adjusting for confounding variables. Age emerged as an independent predictor, with an adjusted odds ratio (AOR) of 1.04 (95% CI: 1.01–1.08; p = 0.009), indicating that with each one-year increase in age, the odds of detecting an incidental thyroid nodule increased by approximately 4%. Female sex was also independently associated with nodules (AOR 2.36, 95% CI: 1.04–5.37; p = 0.039), suggesting that females had more than twice the odds of having an incidental thyroid nodule compared to males. Among ultrasound features included in the model, hypoechoic echogenicity was a significant predictor (AOR 2.89, 95% CI: 1.18–7.09; p = 0.021), meaning hypoechoic nodules had nearly threefold higher odds of being associated with incidental nodule detection patterns in this dataset. Additionally, irregular/lobulated margins were significantly associated with incidental nodules (AOR 3.41, 95% CI: 1.12–10.39; p = 0.031), highlighting the importance of margin morphology as a suspicious predictor. Solid composition showed an increased odds (AOR 2.17) but did not reach statistical significance (95% CI: 0.92–5.10; p = 0.074), indicating a trend toward association without sufficient evidence for independent prediction at the 0.05 significance threshold.

Table 1: Baseline demographic characteristics of the study population (n = 92)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	≤30	18	19.57
	31–50	44	47.83
	>50	30	32.61
Sex	Male	38	41.30
	Female	54	58.70

Mean age: 44.26 ± 13.18 years

p-value: Not applicable (descriptive variables)

Table 2: Prevalence of incidental thyroid nodules among study participants (n = 92)

Thyroid nodule status	Frequency (n)	Percentage (%)
Incidental thyroid nodule present	28	30.43
No incidental thyroid nodule	64	69.57

Overall prevalence of incidental thyroid nodules: 30.43% (95% CI: 21.09–39.77)

Table 3: Distribution of incidental thyroid nodules according to demographic variables (n = 28)

Variable	Nodule present n (%)	Nodule absent n (%)	p-value
Sex			
Male	9 (23.68)	29 (76.32)	0.041*
Female	19 (35.19)	35 (64.81)	
Age group			
<30 years	3 (16.67)	15 (83.33)	0.032*
31–50 years	13 (29.55)	31 (70.45)	
>50 years	12 (40.00)	18 (60.00)	

*Statistically significant (Chi-square test)

Table 4: Ultrasound characteristics of incidental thyroid nodules (n = 28 nodules)

Ultrasound parameter	Category	Frequency (n)	Percentage (%)
Laterality	Right lobe	13	46.43
	Left lobe	11	39.29
	Isthmus	4	14.29
Composition	Solid	14	50.00
	Predominantly solid	6	21.43
	Predominantly cystic	5	17.86
	Spongiform	3	10.71
Echogenicity	Hypoechoic	12	42.86
	Isoechoic/Hyperechoic	9	32.14
	Anechoic	7	25.00
Shape	Wider-than-tall	24	85.71
	Taller-than-wide	4	14.29

Table 5: Risk stratification and suspicious ultrasound features of incidental thyroid nodules (n = 28)

Parameter	Category	Frequency (n)	Percentage (%)	p-value
Margins	Smooth	17	60.71	0.018*
	Ill-defined	7	25.00	
	Lobulated/irregular	4	14.29	
Echogenic foci	None	15	53.57	0.027*
	Macrocalcifications	6	21.43	
	Punctate echogenic foci	7	25.00	
TI-RADS category	Low suspicion	13	46.43	0.021*
	Intermediate suspicion	10	35.71	
	High suspicion	5	17.86	

Table 6: Multiple logistic regression analysis of factors associated with incidental thyroid nodules (n = 92)

Dependent variable: Presence of incidental thyroid nodule (Yes = 1, No = 0)

Predictor variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Age (years)	1.04	1.01 – 1.08	0.009*
Female sex	2.36	1.04 – 5.37	0.039*
Hypoechoic echogenicity	2.89	1.18 – 7.09	0.021*
Solid composition	2.17	0.92 – 5.10	0.074
Irregular/lobulated margins	3.41	1.12 – 10.39	0.031*

DISCUSSION

The present study population had a mean age of 44.26 ± 13.18 years, with the largest proportion in the 31–50 years group (47.83%) and a female predominance (58.70%). This age profile is slightly older than that reported by Kamran et al (2014) in an ultrasound-based incidentaloma cohort where the mean age was ~39 years and the reported frequency of incidentalomas was 21%, supporting that incidental nodules are commonly encountered across adult age bands but may appear more frequently as the studied population shifts toward older ages.^[7]

In this study, incidental thyroid nodules were detected in 30.43% (28/92) of patients scanned for non-thyroid indications. This estimate sits within the broad spectrum described in the literature, where ultrasound owing to its high sensitivity—can detect thyroid incidentalomas at substantially higher rates in screened or general ultrasound populations. Russ et al (2014) summarized that prevalence varies widely by modality and context (with ultrasound often reporting very high detection rates), which helps explain why our prevalence (from non-thyroid referrals rather than thyroid screening) is lower than many “screening-style” ultrasound cohorts but still reflects a clinically important burden.^[8]

A significant demographic pattern was observed in this dataset: nodules were more frequent in females (35.19%) than males (23.68%) ($p = 0.041$) and increased progressively across age strata (16.67% in ≤ 30 years, 29.55% in 31–50 years, and 40.00% in > 50 years; $p = 0.032$). This aligns with population ultrasound evidence from Olusola-Bello et al (2013), who reported an incidentaloma prevalence of 22.4% and noted that lesions were commoner in women and older subjects, with prevalence rising with age. Together, these comparisons support age- and sex-related susceptibility as consistent epidemiologic signals across regions, while absolute prevalence remains dependent on study setting and selection.^[9] Regarding anatomical distribution, our study showed a mild right-lobe predominance (right 46.43%, left 39.29%, isthmus 14.29%). This pattern is comparable to findings from Moifo et al (2017), who observed a similar tendency for incidentalomas to occur more often in the right lobe (reported ~54%), a phenomenon often attributed to natural right-lobe size asymmetry and scan geometry. The close agreement suggests that laterality trends may be reproducible across different hospital-based ultrasound cohorts.^[10]

Most incidental nodules in our cohort were solid (50.00%) or predominantly solid (21.43%), and hypoechoic echogenicity was the most common echogenic pattern (42.86%). These are important because ultrasound literature links certain patterns—particularly solid hypoechoic nodules with additional suspicious signs—to higher malignancy risk. Shin et al (2016) highlighted that the malignancy risk rises substantially when suspicious ultrasound features accompany solid hypoechoic nodules, reinforcing why our regression signal for hypoechoic echogenicity (AOR 2.89; $p = 0.021$) deserves attention even though many nodules in our dataset still had overall low-to-intermediate risk profiles.^[11]

Nodule shape in our study was predominantly wider-than-tall (85.71%), with only 14.29% demonstrating a taller-than-wide configuration. This distribution is consistent with the principle embedded in major ultrasound risk frameworks that a non-oval or taller-than-wide shape is relatively uncommon in benign nodules but is a high-suspicion feature when present. The EU-TIRADS guidance by Russ et al (2017) emphasizes that taller-than-wide shape, especially when combined with irregular margins and marked hypoechoic echogenicity, increases malignancy suspicion; therefore, the small proportion of taller-than-wide nodules in our cohort supports that most incidental nodules detected for non-thyroid indications may represent lower-risk morphology.^[12]

Suspicious-feature profiling in this study showed that 60.71% of nodules had smooth margins, but 14.29% were lobulated/irregular, and echogenic foci included punctate echogenic foci in 25.00% and macrocalcifications in 21.43%. These findings are clinically meaningful because guideline-based ultrasound lexicons consistently identify lobulated/irregular margins and

microcalcifications/punctate echogenic foci as suspicious. Gharib et al (2016) explicitly describe lobulated/spiculated margins, microcalcifications, and taller-than-wide shape as suspicious ultrasound findings that should push management toward closer evaluation and (depending on size/clinical context) FNA; thus, our subset with these features corresponds to the group most likely to warrant structured follow-up rather than reassurance alone.^[13] Risk stratification in our cohort found 46.43% low suspicion, 35.71% intermediate suspicion, and 17.86% high suspicion nodules. This pattern indicates that while most incidental nodules fall into categories typically managed conservatively, a notable minority carry imaging patterns requiring further assessment. The ACR TI-RADS system described by Tessler et al (2017) formalizes this logic by assigning points to ultrasound features and linking risk categories to follow-up or biopsy thresholds, supporting the interpretation that our high-suspicion group (17.86%) represents the clinically “actionable” subset, especially when size thresholds are met.^[14] On multivariable modeling, age (AOR 1.04; $p = 0.009$), female sex (AOR 2.36; $p = 0.039$), hypoechoic echogenicity (AOR 2.89; $p = 0.021$), and irregular/lobulated margins (AOR 3.41; $p = 0.031$) independently predicted incidental nodule presence, while solid composition trended toward association without significance ($p = 0.074$). These findings support a selective, feature-driven approach to incidental nodules: despite a prevalence of 30.43%, most lesions were not high risk, and indiscriminate escalation may lead to unnecessary downstream testing. The ACR Incidental Thyroid Findings Committee white paper by Hoang et al (2014) emphasizes pragmatic triage of incidental thyroid nodules using patient factors and suspicious imaging features to reduce over-investigation—an approach that fits well with our observation that only a subset shows high-risk morphology or independent high-risk predictors.^[15]

CONCLUSION

We concluded that incidental thyroid nodules are a common finding in patients undergoing neck ultrasound for non-thyroid indications, with nearly one-third of individuals demonstrating at least one nodule. The occurrence of incidental nodules was significantly higher among females and older age groups. Most nodules exhibited low-to-intermediate risk ultrasound characteristics; however, a clinically important subset showed high-suspicion features. These findings highlight the value of systematic ultrasound assessment and standardized risk stratification to guide appropriate evaluation and avoid unnecessary interventions.

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