

## Study of Thyroid Abnormalities using Scintigraphy

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### ABSTRACT

Radionuclide imaging is an integral part of functional evaluation of thyroid diseases. This study aimed to study thyroid abnormalities using scintigraphy, The study population consisted of 173(149 female and 24 male) patients with thyroid abnormalities, and referred to Nuclear Medicine, Fujairah hospital for thyroid scintigraphy during the period from Jan 10, 2016 to June 30, 2018. All patients Thyroid function test were done before coming to radiology department. The mean age of patients was 38 years.

The results of this study revealed that thyroid nuclear medicine scan findings as normal in 6.4 % (16 patients) and abnormal in 91% (157 patients) , Autonomous Nodule 2 (1.1),nodular goiter- NTG , TNG 30 (17.3%),Goiter11(6.4%),Grave disease13(7.5%), Multinodular goiter 43(24.8%), Thyroiditis 20 (11), Thyroid nodule 2 (1.1), Toxic multinodular goiter 21 ,Toxic goiter 15 (8.7%), Normal 16 (9.2%).

This study concluded that radionuclide methods are complementary and provide information that can help in the appropriate management of various thyroid diseases.

**Key words:** Scintigraphy, goitre, Graves' disease, thyroid nodule

### 1 Introduction

The thyroid gland is located in the neck, superior to the trachea and between the thyroid cartilage and sternal notch. The gland is relatively small, consisting of 2 lobes, each of which is approximately 2–3 cm wide by 5 cm high. <sup>[1]</sup>.

Thyroid gland has the unique ability to take up iodine — an essential component of its hormones. The phenomenon of accumulation of iodine in the thyroid gland allowed for the use of iodine isotopes in the diagnosis of thyroid disease as early as about 70 years ago, although the mechanism of iodine uptake at the molecular level has been carefully examined until the late twentieth century. In 1939, a group of scientists from the University of Berkeley documented the uptake of radioactive iodine in human thyroid for the first time. This gave rise to first therapeutic radioiodine applications in patients with hyperthyroidism and thyroid cancer <sup>[2, 3]</sup>. Nowadays, we know that the uptake of iodine in the thyroid gland is attributed to the sodium-iodide symporter (NIS), described in 1993 by Kaminsky et al <sup>[4]</sup>. The uptake of iodine by the thyroid cells is still widely used in the evaluation of thyroid function by means of

radioiodine uptake test and thyroid scintigraphy [5]. This study aimed to study thyroid abnormalities using scintigraphy

## 2 Materials and methods

A total of 173 patients were seen by surgeons and medical doctors as having thyroid issues, and referred to Nuclear Medicine and Radiology Department, Fujairah hospital for thyroid scintigraphy and neck ultrasound during the period from Jan. 10, 2016 to June. 30, 2018.

The thyroid scintigraphy obtained 10-20 minutes after intravenous injection of 37-111MBq of sodium pertechnetate Tc-99m using a LEHR (low energy high resolution collimator-equipped gamma-scintillation camera. All thyroid scintigraphies were interpreted by one Nuclear Medicine Physician. For ultrasound, all patients were scanned supine with their necks hyperextended using a 7.5-10-MHz transducer. All patients underwent neck ultrasound by one expert radiologist. The data analyzed using the SPSS program.

## 3 Nuclear medicine examination

Technetium 99m pertechnetate ( $^{99m}\text{TcO}_4^-$ ) is a used radioactive label for thyroid scanning. Injection Technique a fine Butterfly needle (gauge 23-25 according to patient's age) is recommended. Technetium-99m when used as a radioactive tracer can be detected in the body by medical equipment (gamma cameras). It is well suited to the role because it emits readily detectable 140 keV gamma rays (these are about the same wavelength as emitted by conventional X-ray diagnostic equipment), and its half-life for gamma emission is 6.0058 hours (meaning 93.7% of it decays to  $^{99}\text{Tc}$  in 24 hours). The "short" physical half-life of the isotope and its biological half-life of 1 day (in terms of human activity and metabolism) allows for scanning procedures which collect data rapidly, but keep total patient radiation exposure low. The same characteristics make the isotope suitable only for diagnostic but never therapeutic use.

## 4 Data Collection and Analysis

Data will be collected in tabulated database sheet and will be analyzed by SPSS. The data included the age, gender, US finding and Nuclear medicine scintigraphy findings

## 5 Results

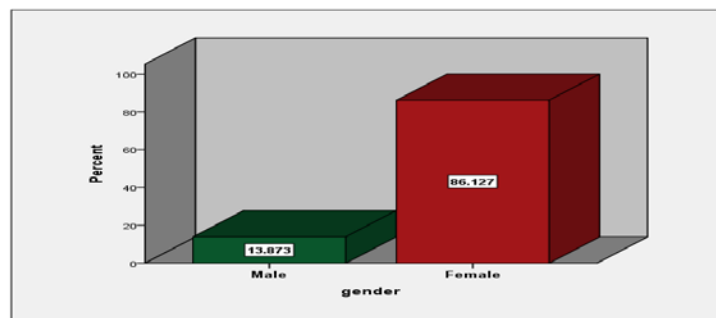


Figure 1 shows gender of the patients

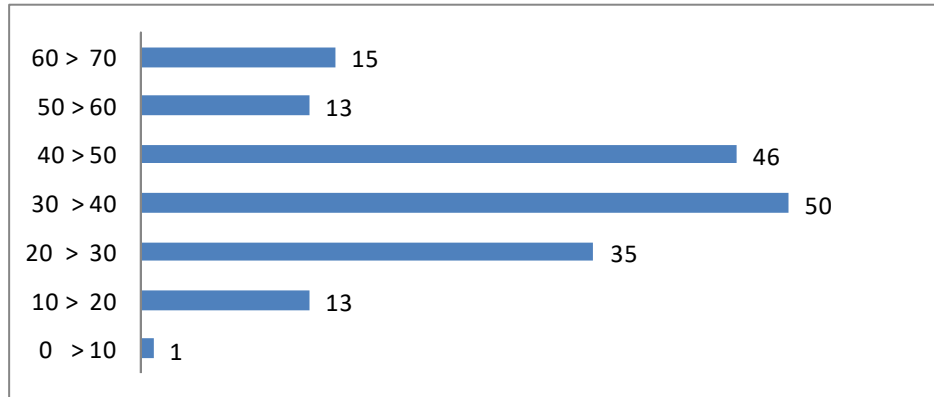


Figure 2 shows patient's ages

Table 1 shows NM findings

Thyroid disorders	Frequency
Autonomous Nodule	2 (1.1)
nodular goiter- NTG , TNG	30 (17.3%)
Goiter	11(6.4%)
Grave disease	13(7.5%)
Multinodular goiter	43(24.8%)
Thyroiditis	20 (11)
Thyroid nodule	2 (1.1)
Toxic multinodular goiter	21
Toxic goiter	15 (8.7%)
Normal	16 (9.2%)
total	173

Table 2 shows Nodules sites

Nodule site	Frequency
Lt lobe	63
Rt lobe	80
isthmus	19
Total	162

Table 3 shows Thyroid size

size	Frequency
Normal	49 (28%)
Enlarge	124 (72%)
Total	173 (100%)

## 6 Discussion

Nuclear scintigraphy is commonly used for evaluation of physiologic thyroid function and for identification of metabolically active and inactive nodules.

Nuclear medicine thyroid scan was performed by an Bright View gamma camera. Nuclear medicine classification based on distribution of the radioisotopes through the thyroid. Features were performed by one experienced nuclear medicine technologist. Size was measured as the whole diameter. The features included, homogeneity, uptake, count per pixel, and area.

The study population consisted of 173 patients were seen by surgeons and medical doctors as having thyroid issues, and referred to Nuclear Medicine and Radiology Department, Fujairah hospital for thyroid scintigraphy and neck ultrasound during the period from Jan. 10, 2016 to June. 30, 2018. All patients Thyroid function test were done before coming to radiology department. So all results were comparing with the TFT results.

nuclear medicine thyroid scintigraphy and demographic data are presented in Tables and figures for this study revealed that, among this 173 patients 86% were female (149) and 14% were male (24), fig(1). The mean age of patients was 38 years, thyroid nuclear medicine scan were reported as normal in 6.4% (16 patients) and abnormal in 91% (157 patients).

In this study table (1) shows that nuclear medicine is able to detect multi nodules in 43 patients. and if multi nodules are toxic, nuclear medicine is better in detecting it (21 patients) In diagnosis of Autonomous nodule nuclear scan was able to detect it In graves' disease nuclear medicine (13 patients) 7.5% in detecting it. For thyroiditis nuclear medicine, (25 patients) 14.4% to (20 patients) 11%. However in diagnosis of toxic goiter nuclear medicine thyroid scan was better than ultrasound, (15 patients) 8.7%

Table (2) shows the nodule sites in the Rt lobe, Lt lobe and isthmus, 80, 63, 19 in the thyroid nuclear medicine scan.

Table (3) shows that the thyroid gland size if its enlarge or not. In nuclear medicine thyroid scan it was enlarge in (124 patients) 72% of patients and normal in (49 patients) 28% of all cases.

In spite of some limitations of this, ultrasound examination plays an important role for patients in diagnosis of thyroid abnormalities, especially in thyroid nodules.

## 7 Conclusion

This study concluded that radionuclide methods can be able to provide information that can help in the appropriate management of various thyroid diseases.

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