

# Estimation of the relationship between Thyroid uptake and thyroid volume by using Tc <sup>99m</sup> Radiotracer among of the Sudanese patient

<sup>1,2,5</sup> Kamal Youssif ,  
<sup>1,3</sup> Mohamed Yousef,  
<sup>1,5</sup> Mohammed Alfadil,  
<sup>1,4</sup> Gihad hamid ,

<sup>1</sup>College of Medical Radiological Science, Sudan University of science and Technology, Sudan Khartoum

<sup>2</sup>Nuclear Medicine Department, Radiation Isotopes Center of Khartoum

<sup>3</sup>College of Batterjee Science College, Radiological Science, Jeddah, Saudi Arabia

<sup>4</sup>Nuclear Medicine Department, King Abdulla Medical City KSA

<sup>5</sup>Ribat University Medical Radiology And Nuclear Medicine Department

**Abstract:-** The main objective of this study was to evaluate the normal range of thyroid uptake and determine the thyroid volume in patients who has normal thyroid function test (T.F.T) & homogenous distribution of the radiotracer in Sudanese especially in Radiation & Isotope Center Khartoum (RICK) & Elnelain Medical Diagnostic Center. This study includes 400 patients (85% female, 15% male) in different age, sex, center of origin and type of food and drink intake, for nine months From May 2017 to Feb 2020. The most frequency of ages distribute as (22-26)15%, (26-30)15% the thyroid uptake value in the gamma camera (mediso) & (simens), the result of this study showed that, the normal range of thyroid uptake is in the range between (0.4% —4.5%) & the thyroid volume is in the range of (20cm<sup>2</sup> to 40cm<sup>2</sup>) there was a direct relationship between thyroid uptake and the thyroid volume that when the volume increase the uptake increase that shown in the following equation:  $y = 0.59x + 2.7$  where x refers to thyroid volume and y refers to uptake in percent.

## I. INTRODUCTION

Scientific research is ever developing day after day especially that concerning with organ and glands in human bodies and there function to get diagnostic procedure tools as well as therapeutic if any disease affects them.

Thyroid gland is one of the important glands in human bodies that by playing great role in hormone function by producing thyroxin and tri iodothyronine (T3 & T4).

The suboptimum level of thyroid dysfunction could lead to some diseases or other pathological states in the human bodies such as (hyperthyroidism, hypothyroidism, thyrotoxicosis, thyroiditis ... etc) (Bracer, 2013).

The main objective of this study was to evaluate the normal range of thyroid uptake and determine the thyroid volume in patients who has normal thyroid function test (T.F.T) & homogenous distribution of the radiotracer in

Sudanese especially in Radiation & Isotope Center Khartoum (RICK) & Elnelain Medical Diagnostic Center.

## II. MATERIALS AND METHOD

The instruments used to collect the data were categorized into, nuclear medicine a instrument which is dual head SPECT and whole body gamma camera, NUC1EFE TM, manufactured by MEDISO company. Meager at 2006 and gamma camera SPECT sigle head, manufactured by SIMENS Company. German at 2008 .

The sample of this study were consisted of 100 patients (85 female and 15 male) with thyroid problem referred to IJCK (radiation and isotopes center of Khartoum) & Elnelain Medical Diagnostic Center (KHARTOUM) from different hospitals and private clinics in Sudan. The sample includes different tribes and ethnic groups because RICK is the biggest central hospital in Sudan. All the investigations was done in radiation and isotopes center of Khartoum (RICK) including TFT (thyroid function test) and thyroid uptake in the period from September 2009 to April 2010.

## III. STUDY PROTOCOLS METHODS (TECHNIQUES)

Before the injection of the radioactive dose it must be measure accurately in the dose calibrator, and take a 60 seconds image of the full syringe in the gamma camera. Then inject the dose of 4.0 mCi of <sup>99m</sup>TcO<sub>4</sub> — for adult patient. The dose can be minimizing in case of children or low weight patient using different calculation methods. (It is also can be used to maximize the dose in case of high weight patients).

After the injection, 60 seconds image for the empty syringe was taken. The patient waits for 15 minutes, for maximum concentration of sodium pertechnetate. Firstly 300 K. counts image AP was taken in supine position with pillow under the shoulder and chin hyper extended for good visualizations of thyroid gland; this image is used in calculation of thyroid uptake.

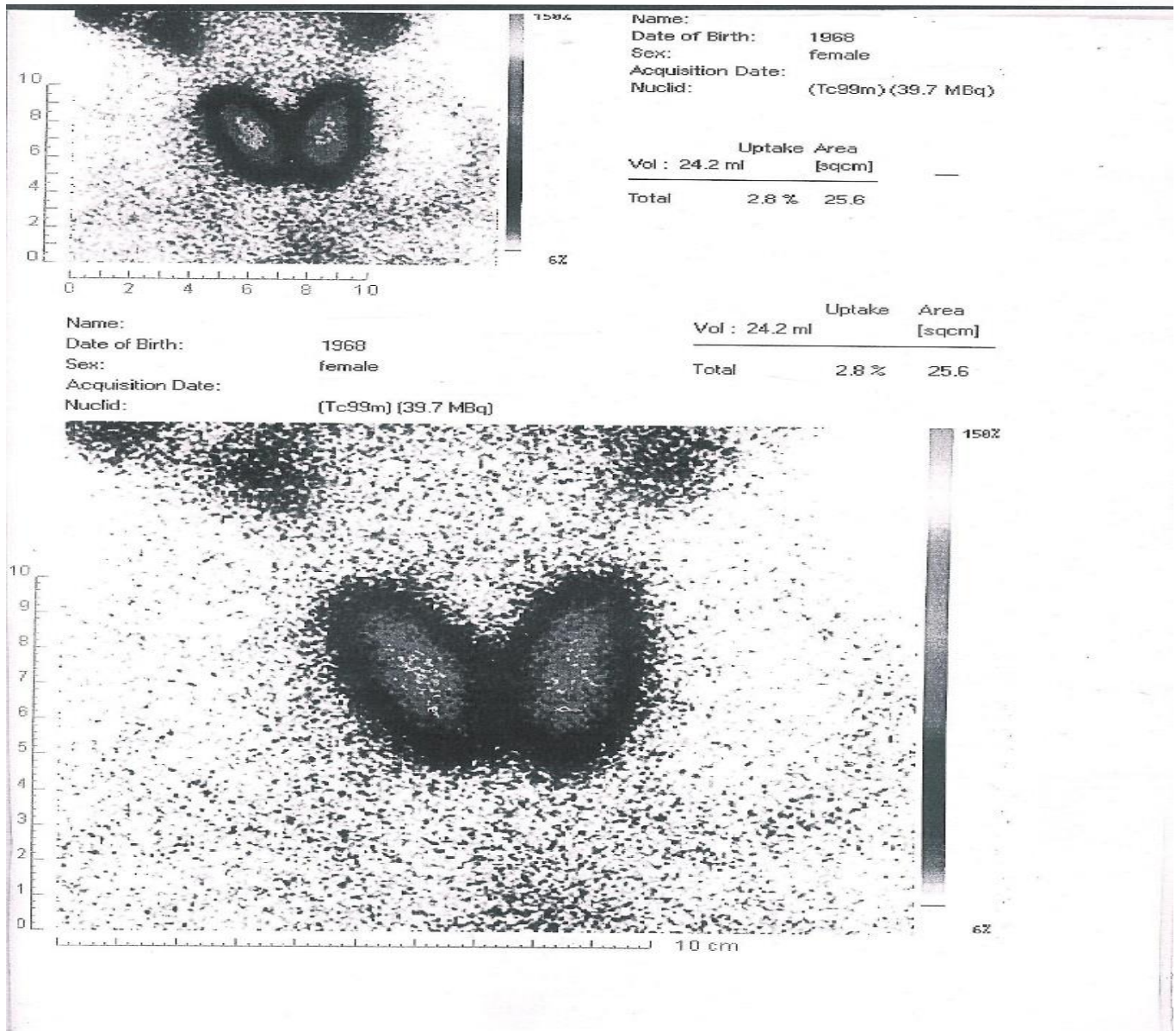


Fig 1:- Thyroid uptake by TC99M

**IV. PATIENT PREPARATIONS**

The patient was prepared according to the following points: Patient should stop thyroid medication for will before the investigation, Should prevent from any iodinated contrast media, Patient also should stop taking any food contain iodine. If the patient is female, will be inspected if she is pregnancy, the patient will return to there physicians. In case of breast feeding, the patient will be asked to stop feeding for awhile until the radioactive substance been excreted from the body. The history of the patient should be taking into account, and the clinical condition should be noted. The related study must be available, which is help full in diagnosis (Becker D, et al 1996).

**V. RESULT**

Shows the relationship between the thyroid uptake and the thyroid volume. The study reveals that the thyroid uptake increases with increasing of thyroid size, because the enlargement of thyroid area, which means a lot off trapping of iodine ion in human, body (Berman, 2014). The correlation could be fitted in the following equation:  $y = 0.59x + 2.7$

where x refers to thyroid volume and y refers to uptake in percent.

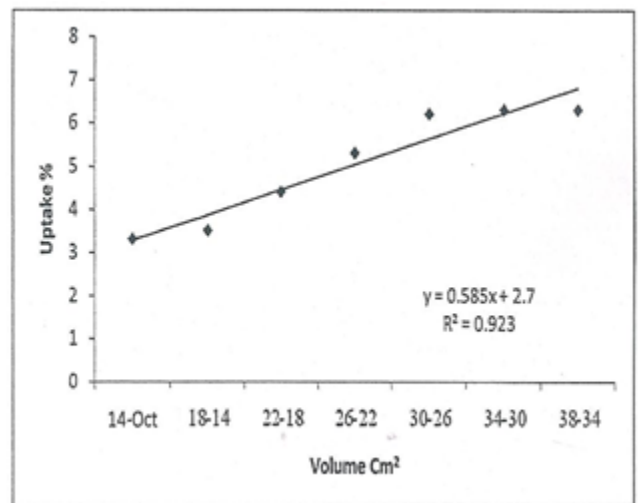


Fig 2:- shows the relationship between the thyroid uptake and thyroidvolume

**VI. CONCLUSION**

The result of this study showed that the uptake of thyroid gland for patient with normal thyroid function test (T.F.T) and homogeneous distribution of the radiotracer is in the range of 0.4% to 4.5%.

By measuring the thyroid volume in this study for patients that with homogenous distribution of the radiotracer & normal thyroid function test (T.F.T) (mean of normal range of these patients T3 0.8-3.0 n mole/L, T4 60-160 n mole/L & TSH 0.7-5.0 mu/L) in Radiation and Isotope Center Khartoum (RICK) and Elnilien Medical Center is in range of ( 20Cm² - 24Cm²).

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