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Outcome of Hyperthyroidism Treatment by Radioactive Iodine

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Abstract: **To assess the outcome and safety of Radioactive iodine (RAI) in hyperthyroid patients at Dr Solieman Fageeh Hospital.**

Methodology: It is a retrospective study of all patients of hyperthyroidism treated by Radioactive Iodine (RAI) seen in endocrinology clinic at DR Solieman Fageeh Hospital in Jeddah, Saudia Arabia. More than 800 patients diagnosed to have hyperthyroid been treated by RAI. They proved to have hyperthyroidism by thyroid function test (TSH, FT4 and T3) and isotopes scanning of the thyroid gland. All received 20 mci of RAI and were then followed up after one month and every two months thereafter for at least one year. The efficacy of the therapy was assessed by the improvement of the clinical features and by the thyroid function tests and any side effect been noted.

Results: A total of 837 patients were treated by RAI at Dr Solieman fgeeh hospital in the last five years from 2010-2015. There mean age was 36.5±10.64 years. Five hundred fifty three were female and two hundred eighty four were male. Graves disease was the underlying cause in 517 patients [61.7%], toxic multinodular goiter in 213 patients [25.4%] and toxic adenoma in 107 patients [12.7%]. The symptoms improved after one month only in 33 patients but others required antithyroid treatment for two months. Only 21 patients remained hyperthyroid after six months of treatment (2.5%).

Conclusion: Radioactive iodine is very effective in treatment of hyperthyroidism with minor side effects such as weight gain, fatigability and hypothyroidism.

Keywords: **Hyperthyroidism Treatment, Radioactive iodine.**

1. INTRODUCTION

Hyperthyroidism is a popular endocrine disease all over the world, which is defined by the overproduction of thyroid hormone, and the increase in excretion of thyroid hormone from the thyroid gland, but thyrotoxicosis is related to a clinical state of surplus thyroid hormones, regardless of the origin [1]. Previous studies have shown that every two out of a thousand are affected by hyperthyroidism, especially who are living in iodine sufficient region [2]. Hyperthyroidism is considered a common disorder; moreover, the percentage of females affected by hyperthyroidism is 2% worldwide and the percentage of affected males is 0.2% [3].

There are many pathological conditions and diseases that lead to thyrotoxicosis, such as toxic multinodular goiter, postpartum thyroiditis, solitary hyperfunction nodule, drug-induced thyroid dysfunction, and thyrotropin releasing tumors; however, the most common cause is Grave's disease [4]. The symptoms of thyrotoxicosis manifest as heat intolerance, palpitations, anxiety, fatigue, weight loss, muscle weakness, and irregular menses [5]. Also, Clinical findings may include tremor, tachycardia, lid lag, and warm moist skin [3].

There are three methods that have been used to treat hyperthyroidism, which are radioactive iodine, anti-thyroid drugs, and surgery [2]. However, most patients who are affected by hyperthyroidism, prefer to be treated by radioactive iodine because it characterized by high efficacy, low cost, and safety [5].

On the other hand, radioactive iodine may show a number of contraindications and complications. RAI is contraindicated during pregnancy, breast feeding, and severe thyrotoxicosis. Among the complication of RAI therapy is hypothyroidism, as well as, malignancy due to radiation, sialoadenitis, loss of taste or smell, xerostomia, and hematological abnormalities [6].

Radio- active iodine has been used to treat hyperthyroidism since 1940. The efficacy, safety and low cost of radioactive iodine has made it the definitive treatment in most patients with this disorder.

Iodine 131 is used which a radionuclide that emits beta particle. The radioactive iodine is taken up by the thyroid gland, and the beta particle damages the thyroid follicular cells. Therefore, reduces thyroid hormone formations and controls thyrotoxicosis [7].

The aim of this article is to assess the efficacy and safety of radioactive iodine in treating thyrotoxic patients at Dr. Soliman Fakeeh Hosptital, Jeddah.

2. METHODOLOGY

All patients who presented to the clinic with symptoms suggestive of thyrotoxicosis such as palpitation, decreased weight, tremor or pro- fuse sweating had their TFTs (TSH, Ft4, and Ft3) done by third generation radio immune assays. If the result showed high FT4 or FT3 with low TSH, thyroid scan was done to determine the cause of thyrotoxicosis. The patients with high uptake either focal or diffuse were advised to go for radioactive iodine therapy if there was no contraindication [pregnancy or breast feeding]. We have to follow the protocol for those patients treated by RAI. The effect and side effects of Radioactive Iodine were explained clearly to the patient while informing them about the other modalities of treatment (Surgery or Anti-thyroid drugs). The doses of radioactive iodine were given according to the assessment of size of the thyroid gland 15 MCI, or 20 MCI. Patients received radioactive iodine were advised to be away from their children for 48 hours and women advised against pregnancy for 6 months post radioactive iodine. The patients were followed after one month with TFTs and then every three months with registration of all the symptoms and examination. We looked for all expected side effect of the RAI such as sialenditis, increase weight, falling hair and fatigability.

Patients, who were still thyrotoxic six months post radioactive iodine, were given another dose of radioactive iodine. If there was no response after three doses of RAI surgical treatment was undertaken.

Relevant data such as patient's age, sex, cause of hyperthyroidism [Graves disease, toxic multinodular goiter, toxic adenoma], clinical presentation, mode of therapy (medical, radio- active iodine or surgical) and outcomes (euthyroid, hypothyroid or hyperthyroid) were recorded. Statistical analysis was performed using the SPSS 7-5 (Statistical Package for Social Science). Mean±SD was determined for quantitative data, and frequency was deter- mined for categorical variables. Chi-square was used to analyze group differences for categorical variable and a P value <0.05 was considered significant.

3. RESULTS

A total 837 patients were diagnosed in the period 2010 - 2015 and followed up for at least one year and all findings and the outcome were analyzed. The mean age was 44.5 +/- 10.64 years with female: male ratio of [598: 299] 2 : 1 (figure2). Graves' disease was the diagnosis in 517 patients [61.7%], while 213 [25.4%] patients had toxic multinodular goiter and 107 [12.7%] had toxic adenoma. As shown in Table-1, palpitation, tremor, weight loss, nervousness and cold intolerance were the most common clinical manifestation. four hundred ninety patients [51%] were below 50 years and [49%] patients above 50 years.

All those patients followed after one months and no changes in there weight , 153 experience neck pain in the first week (18%). All remained thyrotoxics after one months from treatment.

In 3 months visit 407 became euthyroid, 231 became hypothyroid and the remain still thyrotoxics (76% after 3 months became hypothyroid or euthyroid). Their weight increased more than 5 kg in 83 patients and increased less than 5 kg in 101 patients.

In 6 months visit 213 patients (26%) became euthyroid, 603 patients (73%) became hypothyroid and 21 patients (2.5%) remain thyrotoxics. Weight increase more than 5 kg in 613, and less than 5 kg in 123 patients.

The patients who not responded are smoker , on medical treatment for more than 2 years and most of them male (18 male and 3 female).

With stastistical ananalysis of out come of radioactive iodine for thos who recoverd either became euthyroid or hypothyroid very significant <0.005

This makes radioactive iodine a preferred treatment in patients with hyperthyroidism. Hypocalcaemia was observed in 31 patients treated by radioactive iodine.

Table-I: Clinical feature of 837 patients with thyrotoxicosis :

Symptoms	Patient No.	Signs	Patient No.
Palpitation	791	Diffuse goiter	470
Tremors	750	Multinodular	217
Weight loss	731	Single nodule	107
Nervousness	633	Tremors	810
Heat intolerance	587	Exophthalmoses	571
Increased sweating	501	Lid lag	676
Increased appetite	433	Lid retraction	513
Dyspnea	222	Opthalmoplegia	73
Menstrual irregularities	311	Myopathy	113
Diarrhea	271		
Fatigue	181		
Dysphagia	33		

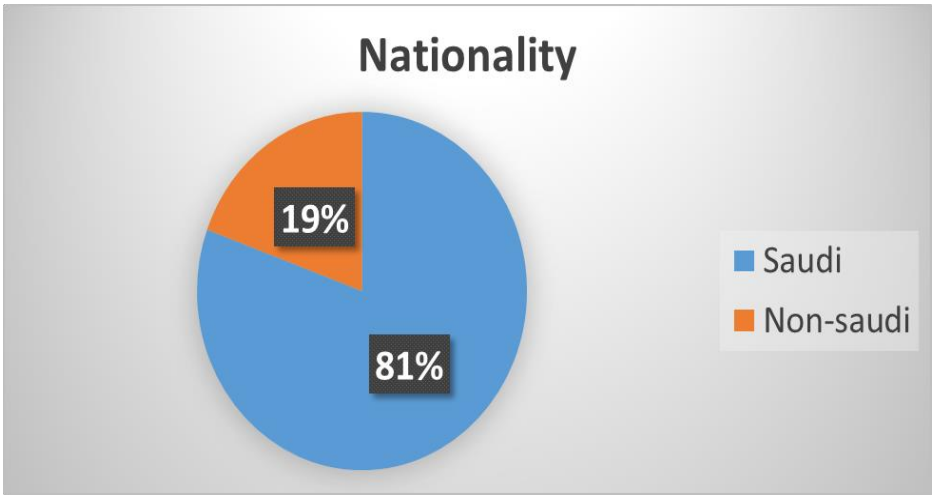

Figure: 1

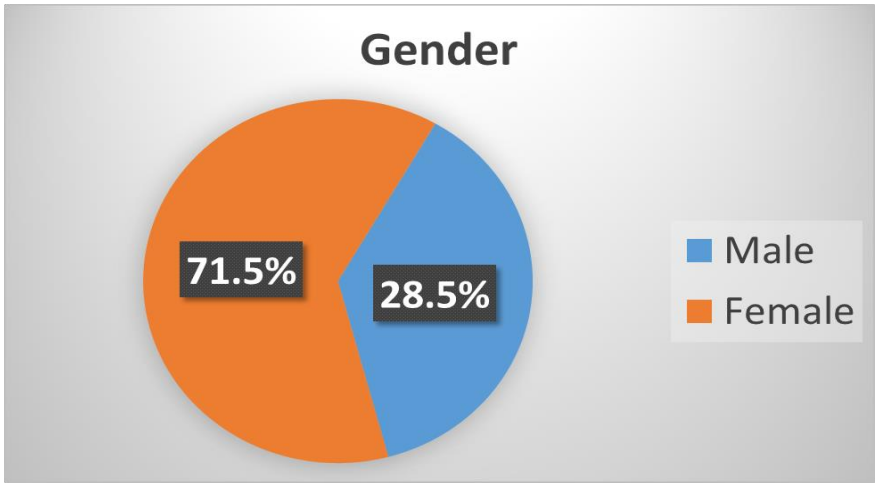

Figure: 2

4. DISCUSSION

Hyperthyroidism is a common endocrine disorder worldwide with prevalence of 2:1000 in iodine sufficient areas. [8]It is essential that the correct cause of hyperthyroidism should be identified and the severity of the symptoms should be clinically assessed as this will guide physicians in selecting treatment. [9, 10] Causes and clinical manifestations of thyrotoxicosis in our patients were comparable with those reported in the literature. Graves, disease is the commonest cause followed by toxic multinodular goiter, a finding similar to that reported by other.[14,15] Clinical manifestations due to sympathetic over activity are a common mode of presentation which is consistent with what has been reported.[14,15]

In Saudi Arabia, we noticed an increase in the female predominance of hyperthyroidism over the last 10 years from 1.7[.13]and 1.4[14]to 3.8[15] and 3.1 as noticed in our study. Radioactive Iodine (RAI) has been used to treat hyperthyroidism since 1940.16,17,18 The efficacy, safety, and low cost of this therapy have made it the preferred definitive treatment in most patients with this disorder.[18] A retrospective study in Saudi Arabia has showed efficacy of Radioactive Iodine but no prospective study which was conducted to see the efficacy and safety. Radioactive iodine is administered orally as sodium 131–I in solution or capsule. The radioiodine is rapidly incorporated into the thyroid, and its beta – emissions result in extensive local tissue damage. We chose high dose for all of our patients because the cure rate in >90% whereas low dose is more likely to result in treatment failure.[16-18] The net effect is ablation of thyroid function over a period of 2- 6 months. We recommend checking TFTs after one month of radioiodine, to start thyroxin even with low TSH, to prevent weight gain which is the most bothersome complication of radioiodine therapy. Patients who remain thyrotoxic clinically and biochemically need to take antithyriod treatment for one month to be evaluated after that. The efficacy of all different modalities of therapy are comparable with better results in radioiodine group but has increased incidence of hypothyroidism [73%].

Radioactive iodine is an absolute contraindication in pregnancy. Fetal thyroid tissue is present by 10 – 12 weeks and would be destroyed by the radioiodine, resulting in cretinism. The occurrence of menses within the 10 days before treatment makes pregnancy unlikely[19] but we prefer to exclude pregnancy definitely by either careful history or by doing pregnancy test. Resistant cases to radioactive treatment were seen in 21 patients [2.5%], who remained hyperthyroid six months after treatment. They were given another dose and 14 patients responded and 7 patients required 3rd dose. Radioactive iodine appears to be quite safe except from hypothyroidism.[20] Radioactive iodine showed the best treatment for our patients. Weight gain and fatigability are the common side effects which were related to hypothyroidism. The other side effect is radiation thyroiditis. It can cause severe thyroid pain which lasts 2 – 3 weeks, and may be associated with exacerbation of hyperthyroidism. The Cooperative Thyrotoxicosis Therapy Follow up Study Group has followed 35,593 patients from 26 centers for cancer mortality after radioiodine therapy . They reported no increase in the incidence of leukemia or cancer after mean follow up of 8.2 years.[20] A more recent analysis of data through 1990, representing a mean follow up of 21 years, also revealed no increase in overall cancer mortality[21] However, in contrast to their earlier data[22] and other report,[23] prolonged follow up demonstrated a small in- crease in thyroid cancer risk . Another analysis of 7417 patients in the United Kingdom also found a significant increase in the incidence of thyroid cancer.[24] In the earlier report from the Cooperative Study Group, adolescents given radioiodine had an increased risk of thyroid adenoma, but not cancers[.23] Whether radioio- dine therapy affects the development or progression of Graves's ophthalmopathy is controversial. Early studies noted progression or onset of ophthalmopathy during or after treatment for Graves hyperthyroidism but did not demonstrate an increased risk with radioiodine.[26,27] A subsequent retrospective uncontrolled study found that ophthalmopathy, when present, occurred coincident with hyperthyroidism most of the time and appeared equally frequently before and after hyperthyroidism in the remainder;[28] it therefore seemed unrelated to radioiodine therapy. In contrast, two prospective randomized trails of antithyroid treatment suggested a relationship be- tween radioiodine and development or worsening of ophthalmopathy .[29,30] In our patients 187 had ophthalmopathy only four patients showed worsening in exophthalmos which was insignificant. The principle used to follow the effect of treatment of hyperthyroidism is the measurement of serum T4 concentration. Measurement of serum TSH can be misleading in the early follow up period because it remains low for weeks or even months, even when the patient is clinically euthyroid and has a serum T4 value well within the normal range[.31,32] Hypothyroidism developed in 73% of our patients in first year which is close to what has been reported (67%).[33] In conclusion radioiodine is very safe for our patients with early benign complications like hypothyroidism and we recommend it for all cause of hyperthyroidism if there is no contraindication.

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