

# Radioiodine therapy for hyperthyroidism



**ASSIGN  
BUSTER**

## RESULTS AND DISCUSSION

Radioiodine therapy is now a day increasingly used for treatment for hyperthyroidism. The response to this treatment is unpredictable and the factors postulated to predict outcome have not generally proven clinically useful or is not widely accepted in clinical practice. So this retrospective study was carried out to determine whether the demographic, clinical and laboratory characteristics at presentation had any influence on the recurrence and the success of the radioiodine therapy. This study was carried out in the Nuclear Medicine Department of Kovai Medical Center And Hospital during the inclusive period of Jan 2014 to July 2014. At the beginning of the study 70 patients were included, but only 62 completed follow up.

In this study, the records of 70 hyperthyroid patients were reviewed. Among those 70 patients, 23 (32.9%) males and 47 (67.1%) females were enrolled. The female to male ratio was 2.1:1, showing a higher incidence of hyperthyroidism in females than in males. Even though females are more prone to hyperthyroidism, this had no influence on the outcome of therapy ( $p=0.2330$ ). Similar studies conducted by Antony Lewis *et al* also could not find any association between gender and outcome of therapy. (Table: 1 & Graph: 1)

As hyperthyroidism is relatively more common in adult population, for convenient analysis patients were categorized based on the age limit into 2 groups i. e. less than 35 years and above 35 years. The mean age of study patients was found to be  $42.56 \pm 13.44$  years (range 15 to 72 years). 21

patients came under the category of less than 35 years with females and males with mean age of  $27.42 \pm 5.81$  and  $26.57 \pm 7.45$  years respectively. The remaining 49 patients comes under the age limit of above 35 years, the mean age of male patients was  $49.06 \pm 9.05$  and  $49.21 \pm 10.21$  years in females. This indicated a higher incidence of hyperthyroid conditions in subjects above 35 years. According to this study, there was no significant tendency for proportion cured to change with age ( $p= 0.899$ ). Studies done by Robert A. Nordyke *et al* also could not find any association with age and cure rate and also the mean age of the study population was also similar.

(Table: 2, 3 & Graph 2, 3)

The patients in this study received a fixed dose of 10 mCi for Graves' disease and relatively higher doses for toxic multinodular goiters based on the size of thyroid gland determined by physical examination and thyroid uptake scan. Of the total of 70 patients who received radioactive iodine 52 (74.3%) patients were treated with an average dose of 5 mCi, range (0-10 mCi) and 18 patients received an average dose of 15 mCi, range (11-20 mCi) of radioactive iodine. The optimal method for determining the appropriate iodine-131 treatment dose remains controversial. Techniques vary from fixed dose to more elaborate calculations based on the gland size and iodine uptake. In calculated dose method, a dose of RAI is administered which is proportional to the size of the gland, this theoretically increases the chances of cure. But studies done by satzal-Mazer *et al* and Y. Khalid *et al* have failed to demonstrate any improvement in cure rate with calculated dose compared to fixed dose regimen. In this study, a good result was seen in 90.9% of patient who received a dose of RAI in the range of 0-10 mCi and 83.

3% of patients receiving a dose of 11-20 mCi, but this correlation was not significant. ( $p = 0.403$ ) (Table: 4 & Figure: 4)

Studies done by Funda Utsun *et al* revealed that majority of the patients was treated for Graves' disease followed by toxic multinodular goiter. In this study also among the patients who received radioactive iodine, the largest group was diagnosed with Graves' disease (54 patients, 77.2%), followed by toxic multinodular goiter (11 patients, 15.7%). The relatively smaller groups include those with thyrotoxicosis (4 patients, 5.7%) and solitary thyroid nodule (1 patient, 1.4%). (Table: 5 & Figure: 5)

Clinical Graves' ophthalmopathy was noted in 8 patients (11.4%) in which except one all others were female. 62 patients (88.6%) were free from ophthalmopathy. Of the 8 patients who had ophthalmopathy, 5 patients was treated successfully and hence there was no significant correlation between ophthalmopathy and outcome of the treatment in this study ( $p = 1.00$ ).

Studies done by Wisam. K. Ghadban *et al* found out that there was no significant worsening or new development of ophthalmopathy post RAI treatment. In contrast, a systematic review done by Shamasunder H. Acharya *et al* concluded that radioiodine therapy is associated with increased risk of progression of ophthalmopathy compared with antithyroid drugs and hence pretreatment with steroids is necessary. (Table: 6 & Figure: 6)

Presence of goiter was assessed clinically by endocrinologists and was documented as either present or absent at the time of radioiodine administration. About 58 patients (82.9%) showed the presence of goiter and in 12 patients (17.1%) the signs of goiter were not present. No

significant association was seen in this study on goiter and treatment success. ( $p= 0. 326$ ). In contrast, previous studies done by Anthony Lewis *et al*/ revealed that patients with small or no goiter were more likely to be successfully treated by a single dose.(Table: 7& Figure: 7)

Prior use of antithyroid medication occurred in 63 patients (90%). Of these, 68. 57% (48 patients) received treatment for more than one year whereas 21. 43% (15) of patients received for a period of less than one year. 10% (7) of patients had no pre-treatment with antithyroid medication before RAI administration. Previous studies done by Joyce S Y Yau *et al*/ demonstrated that there was no significant association between anti-thyroid medication and radioiodine treatment within one year. (Table: 8& Figure: 8)

Among the study subjects who received pre-treatment, majority of the patients were treated with carbimazole (40%, 28 patients), followed by neomercazole (19 patients, 27. 2%) and methimazole (15 patients, 21. 4%). Only 1 patient among the 63 patients was treated with propylthiouracil (1. 4%). All were advised to stop the drugs 7 days before radioiodine administration. A significant correlation was not observed between pretreatment with antithyroid drugs and treatment success (1. 00). In a prior study done by Edward Prinat *et al* , treatment success was obtained in patients with no pre-treatment and those who have stopped ATD seven days before  $^{131}\text{I}$  admnistration, while in the group of patients who received MMI until  $^{131}\text{I}$  application, success was significantly lower.(Table: 9 & Figure: 9)

The primary objective of radioactive iodine therapy is to eliminate hyperthyroidism, but what is important to patients is the quickness of

therapeutic effect. Graph 10 shows change in mean concentrations of TSH and T<sub>4</sub> before and after I<sup>131</sup> administration. The result revealed an increase in TSH concentration after the RAI treatment whereas the T<sub>4</sub> levels showed a decrease in the concentration which indicates that therapeutic effect is achieved in the hyperthyroid patients. Piotr Szumowski *et al* came up with a study which showed similar results. (Table: 10& Graph: 10).

Thyroid hormone concentrations before and after administration of radioiodine was analysed. A significant difference was found in the concentration of TSH and T<sub>4</sub> before and after radioiodine therapy in patients who are on thyroxine replacement therapy after RAI administration (p= 0.000& p= 0.003 resp.). Whereas on comparing the concentration of TSH and T<sub>4</sub> prior and post therapy on who were not on drugs, there was no significant difference (p= 0.533 & 0.057) (Table: 14).

As the time after radioiodine administration elapses, the percentage of hypothyroid patients increases. The incidence of hypothyroidism was 38.5 % (27) in first trimester, 12.8 % (9) in second trimester and 2.8 % (2) in the third trimester. A prior study done by Ajith S Shinto *et al* also similar incidence of hypothyroidism after therapy. (Table: 12 & Graph: 12)

The assessment of overall efficacy of treatment at one year after I<sup>131</sup> administration showed that a euthyroid status was achieved in 24.3% (17) of patients, hypothyroidism was observed in 54.3% (38 patients), while persistence or recurrence of hyperthyroidism was seen in 10% of patients, which revealed that a second dose of radioiodine is required in these patients. This outcome meant that 75.7% of patients require further

treatment. In that 38 patients requires further hormone replacement therapy and 7 patients requires a second dose of radioactive iodine. The achievement of euthyroid and hypothyroid status is considered as good result. Studies done by Mosako Tsuruta *et al* and Sirianong Namwongprom *et al* also showed similar results.(Table: 11 & Graph 11)