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Study of the Ideal Delay Period of Carbimazole for Hyperthyroidism Patients Using Thyroid Function Test

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Abstract

➢ ***Introduction***

The aim of this study was to submit the ideal delay period of Carbimazole for hyperthyroidism patients using thyroid function test. It may be possible to perform thyroid scan with a minimum delay period of carbimazole, this can be time saving and decrease the adverse effects of discontinuing carbimazole.

➢ ***Patients and Methods***

Among all the patients with hyperthyroidism who referred to nuclear medicine department of Khartoum Oncology Hospital, during the period between December 2018 and December 2019, 51 patients who were on Carbimazole were selected. A Thyroid Function Test (TFT) was obtained while they ware on medication for all these patients and then they were divided into three groups upon TFT results each with different Carbimazole delay period (A,B,C). We asked each group; to discontinue the usage Carbimazole for 3, 5 and 7 days respectively and then a second TFT was obtained. After that thyroid scan was performed for these patients. Revealed data was analyzed under supervision of statistical specialist with descriptive methods on SPSS.

➢ ***Results***

11 patients were males and the other 40 were females. Mean age of group A, B and C were 37 , 47 , 47 respectively. The mean of the first TFT (T3, T4 and TSH) for group A was: (5.2, 225.59, 0.17), group B: (5.28, 231.86, 0.13) and group C: (5.34, 246.19, 0.06). While the mean of the second TFT (T3, T4, TSH) was for group A: (6.33, 246.38, 0.03), group B: (9.18, 318.55, 0.05) and group C: (9.96, 381.72, 0.04). The mean of thyroid uptake for group A, B and C was (21.35, 18.82 and 23.31) respectively. By comparing thyroid uptake average from all the groups, the result showed that thyroid uptake was not affected by the delay period. While the second TFT results showed that there is a direct linear association between T3 and T4 level and the delay period; as the delay period increase T3 and T4 level increase, and TSH level decrease as the delay period increases.

➢ ***Discussion***

In conclusion, we demonstrated that Carbimazole 3-days delay period does not interfere with reabsorbing of Technetium-99m in thyroid gland and peripheral tissues. A possible limitation of this study is the number of patients in the sample. Therefore, it seems that it may be possible to perform thyroid scan with a delay period of 3 days rather than 5 or 7 days, this can be time saving and decrease the adverse effects of discontinuing Carbimazole.

Keyword:- *Hyperthyroidism, Carbimazole, Thyroid Scan, TFT.*

I. INTRODUCTION

Several diseases may affect thyroid gland. Hyperthyroidism occurs when the gland produces excessive amounts of thyroid hormones, the most common cause being Graves' disease, an autoimmune disorder. Thyroid storm is a condition that occurs due to excessive thyroid hormone of any cause and therefore includes hyperthyroidism.

Treatment depends partly on the cause and severity of disease. There are three main treatment options: radioiodine therapy, medications, and thyroid surgery. Medications such as beta-blockers may control the symptoms, and anti-thyroid medications such as Carbimazole can help people temporarily or permanently depending on the severity of their condition.

The diagnosis of hyperthyroidism is confirmed by blood tests, which show a decreased thyroidstimulating hormone (TSH) level and elevated T4 and T3 levels. TSH is a hormone made by the pituitary gland in the brain that tells the thyroid gland how much hormone to make. When there is too much thyroid hormone, the TSH will be low. Also a nuclear thyroid scan can confirm the diagnosis by showing the uptake of technetium-99m(99mTc) in thyroid gland. If the uptake was higher than 4%, it indicates hyperthyroidism disease.

Although the delivery of optimal patient care is the ultimate goal, cost-efficient utilization of limited resources is a growing concern. The goal of avoiding unnecessary use of expensive invasive procedures has focused more attention on the use of noninvasive or less invasive

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diagnostic and therapeutic modalities, including nuclear imaging. Ultimately, it is the treating physician responsibility to rationalize the utilization of resources for optimal patient care at reasonable cost.

II. PATIENTS AND METHODS

Among all the patients with hyperthyroidism who referred to nuclear medicine department of Khartoum Oncology Hospital during the period between December 2018 and December 2019, Sudanese male and female patients from all ages with hyperthyroidism diseases who are using antithyroid medication (Carbimazole) who are following up in Khartoum Oncology Hospital. The sample of this study were consisted of 51 patients with different hyperthyroid diseases referred to Khartoum Oncology Hospital from different hospitals and private clinics in Sudan.

At the first episode of the study we obtained a TFT to all patients and upon this TFT result they were divided to three groups: (A,B and C). We asked each group to discontinue using Carbimazole for a specific period; group A for 3 days, group B for 5 days and group C for 7 days. After each group delay period; a second TFT was obtained before thyroid scan was performed. after that thyroid scan was performed for these patients.

No preparation was necessary for obtaining a standard TFT test. A healthcare professional drawn blood from a vein allowing blood to flow into the connecting tube and vial. After labeling the blood sample, we sent it to a laboratory for testing. Hormones levels were compared between the first and the second results of TFT which showed a direct linear association between the delay period and the hormone level elevation. Thyroid scan was performed from thyroid and peripheral tissues after 15 min of 5 mc Technetium99m injection to the patients.

III. RESULTS

11 patients were males and the other 40 were females. Mean age of group A, B and C were 37, 47 and 47 respectively. The mean of the first TFT (T3, T4 and TSH) for group A was: (5.2, 225.59, 0.17), group B: (5.28, 231.86, 0.13) and group C: (5.34, 246.19, 0.06). while the mean of the second TFT (T3, T4, TSH) was for group A: (6.33, 246.38, 0.03), group B: (9.18, 318.55, 0.05). The mean of thyroid uptake for group A, B and C was (21.35, 18.82 and 23.31) respectively. By comparing thyroid uptake average from all the groups, the result showed that thyroid uptake was not affected by the delay period. While the second TFT results showed that there is a direct linear association between T3 and T4 level and the delay period; as the delay period increase T3 and T4 level increase, and TSH level decrease as the delay period increases.

Variables	3 days delay	5 days delay	7 days delay
Age	± 37.29	± 47.82	± 47.71
First T3	± 5.2	± 5.28	± 5.34
First T4	± 225.59	± 231.86	± 246.19
First TSH	± 0.17	± 0.13	± 0.06
Second T3	± 6.33	± 9.18	±.96
Second T4	± 246.38	± 318.55	± 381.72
Second TSH	± 0.03	± 0.05	± 0.04
Thyroid uptake	± 21.35	± 18.82	± 23.31

Table 1:- The Average Values for Body Characteristics and TFT Levels

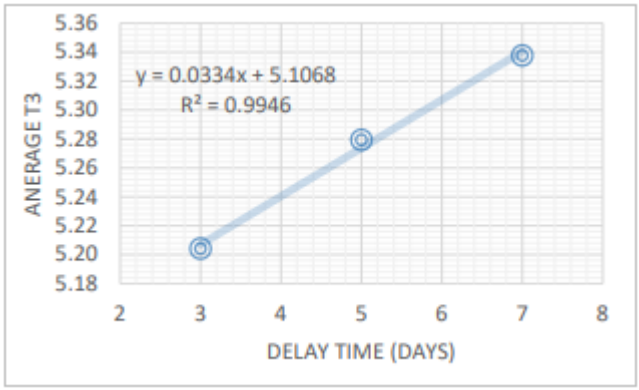

Fig 1:- Scatter Plot Show a Direct Linear Association of Average T3 Level with Delay Time.

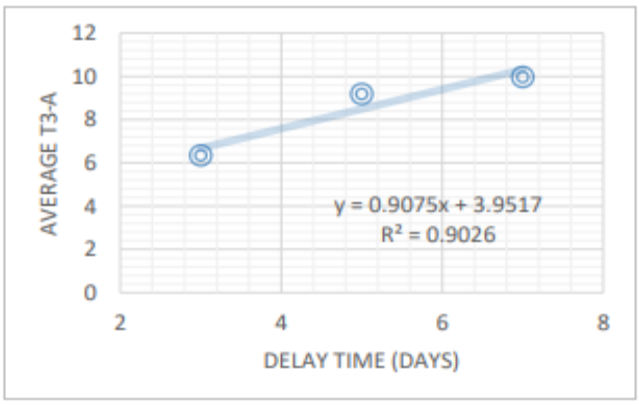

Fig 2:- Scatter Plot Show a Direct Linear Association of Average T3-A Level with Delay Time

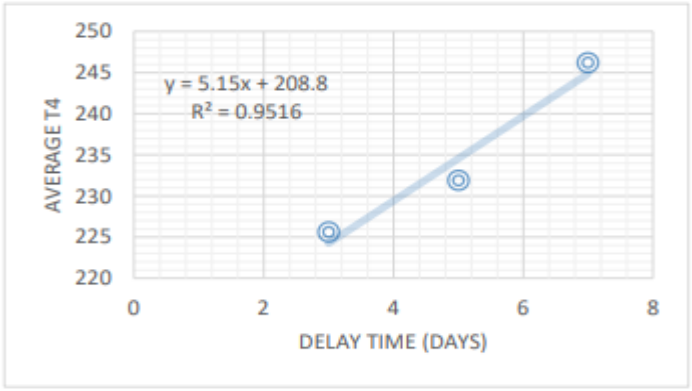

Fig 3:- Scatter Plot Show a Direct Linear Association of Average T4 Level with Delay Time.

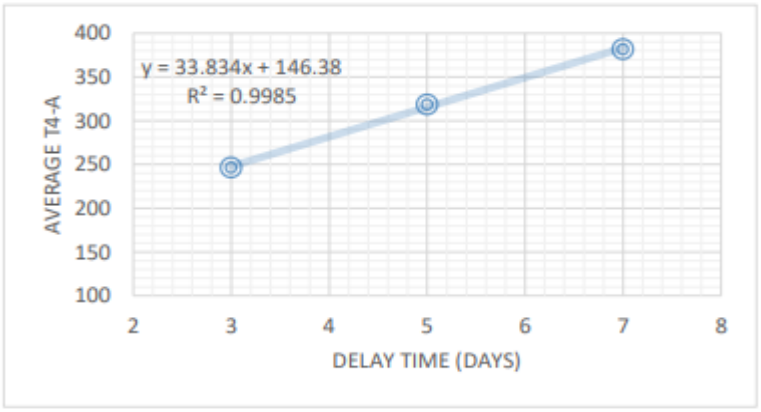

Fig 4:- Scatter Plot Show a Direct Linear Association of Average T4-A Level with Delay Time.

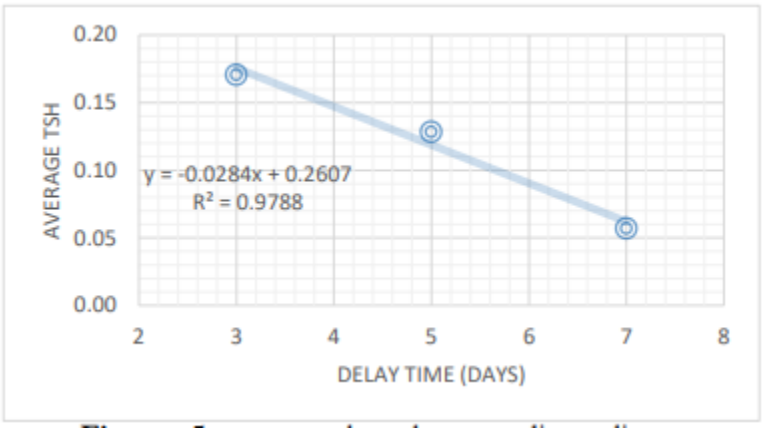

Fig 5:- Scatter Plot Show a Direct Linear Association of Average TSH Level with Delay Time.

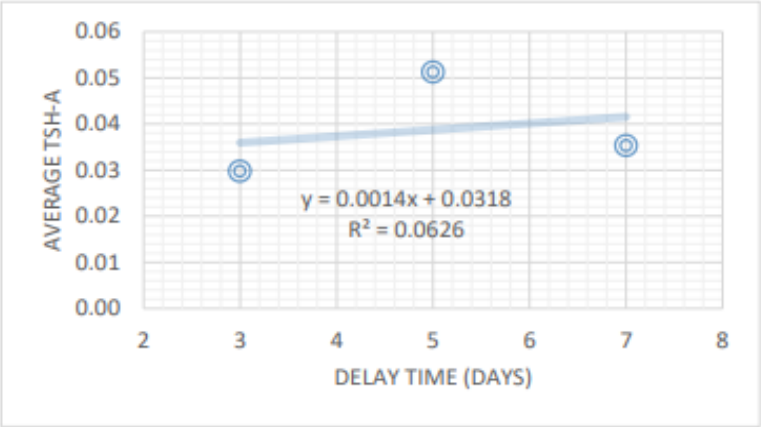

Fig 6:- Scatter Plot Shows the Relation between TSH-A Level Average with Delay Time.

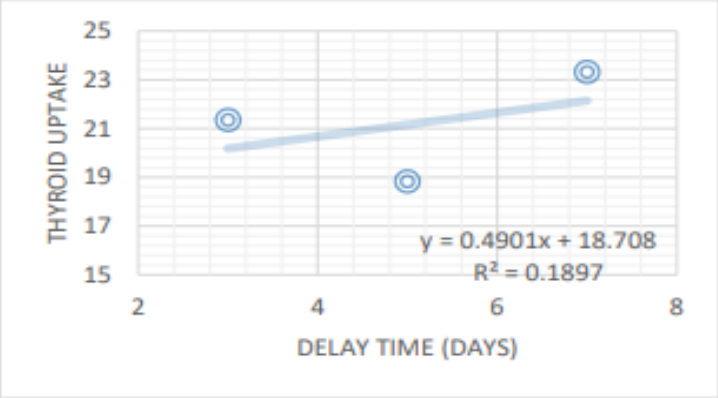

Fig 7:- Scatter Plot Shows the Relation between Thyroid uptake Average with Delay Time.

IV. DISCUSSION

The data of this study was collected from 51 hyperthyroid patients (from both genders and different ages, MBI, medication doses and period of using medication) who were using Carbimazole. Initially a TFT has been collected from all patients while they were using Carbimazole. These patients were divided according to the first TFT results into three groups; each group had a different delay period of Carbimazole for thyroid uptake scan. After delay period, a second TFT was collected from all patients to check hormones status:

The results showed that there is a direct linear association between T3 level and the delay period; as the delay period increase the T3 level increases as shown in Figures 1 and 2.

There was also a direct linear association between T4 level and the delay period; as the delay period increase the T4 level increases as shown in Figures 3 and 4.

The results showed that the TSH level decrease as the delay period increases as shown in Figures 5 and 6.
After comparing thyroid uptake average from all the groups, the result showed that thyroid uptake was not affected by the delay period as shown in Figure 7.

V. CONCLUSION

The main objective of this study was to study the ideal delay period of carbimazole for hyperthyroidism patients using thyroid function test.

A number of thyroid uptake scans and TFT were conducted to estimate the ideal delay period of Carbimazole that can save patients from severe elevation of thyroid hormones and TSH level and serve thyroid uptake scan by ultimate advantage with the least risk on patients.

The results showed that thyroid uptake do not change by the increase of the delay time.

In the other hand, as the delay period increased, thyroid hormones increased and TSH decreased leading to a severe elevation of hormones that may lead to thyroid storm.

In summary, this study showed that thyroid uptake scan can be done after a delay period of 3 days and still have the same thyroid uptake as 5 or 7 days but with the least risks on patients.

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