Brief Report

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Iranian Journal of Diabetes and Obesity (IJDO)

The Effect of Oral Selenium on the Size of Thyroid Nodules in Patients with Benign Thyroid nodules: A Brief Study

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Abstract

Objective: The thyroid gland is susceptible to the formation of nodules. Therefore, due to the critical role of selenium in the function of the thyroid gland, the impact of this element on the size and volume of this organ and its nodules were examined.

Materials and Methods: During three months, two groups consisting of 30 patients with benign thyroid nodules who were referred to Baghaeipour Endocrinology Clinic were given daily doses of 100 and 200 micrograms of selenium, and a control group of 30 people without selenium consumption were assessed.

Results: The results of intergroup analysis detected that the mean (±SD) of nodules length in the 100 µg selenium consumer group was 17.13 (±7.9) and 14.93 (±6.01) before and after intervention respectively (P= 0.008). About the nodules height in the 200 µg selenium consumer group, the mean (±SD) was 9.3 (±2.8) and 8.93 (±2.71) before and after intervention in that order (P= 0.001).

Conclusion: Our findings suggest that selenium has been effective in the size and volume of the nodule and thyroid gland, as well as the TSH hormone, and further studies are needed to determine its therapeutic approach and efficacy.

Keywords: Selenium, Thyroid gland, Nodule

QR Code

Citation: Moradi S, Mohammadi S M, Namiranian N, Afkhami-Ardekani M, Afkhami-Ardakani O. The Effect of Oral Selenium on the Size of Thyroid Nodules in Patients with Benign Thyroid nodules: A Brief Study. IJDO 2022; 14 (4) :219-222

URL: http://ijdo.ssu.ac.ir/article-1-747-en.html

10.18502/ijdo.v14i4.11229

Article info:

Received: 24 June 2022

Accepted: 05 October 2022

Published in November 2022

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[DOI: 10.18502/ijdo.v14i4.11229]

Introduction

Nevertheless, the mechanism of the effect of selenium, as well as the relationship between selenium deficiency and thyroid cancer are still unclear. In this following study, we assessed the effect of oral selenium on thyroid size and thyroid nodule volumes in patients with the benign thyroid nodule. The aim of this trial was the evaluation of the effect of oral selenium supplement in two different doses of 100 and 200 micrograms daily for three months on the size and volume of nodules, thyroid gland, and serum thyroid stimulating hormone (TSH) level.

Materials and Methods

Patients aged 25 to 50 years who were referred to Baghaeipour Endocrinology Clinic of Shahid Sadoughi Hospital in Yazd, Iran were recruited for this study. They were diagnosed with benign thyroid nodules by ultrasound. The patients with benign thyroid nodules were included, the nodules volume and number were determined by ultrasound. Inclusion criteria were as follows: no history of hyperthyroidism and thyroid malignancy; and do not take selenium supplements for the last 3 months. Moreover, subjects with severe anemia (HB<10), pregnancy and lactation (due to the prohibition of selenium consumption), and hypothyroid patients requiring changes in the drug dose were excluded from the study.

Among the patients referred to the endocrinology clinic who contained the criteria to enter the study, three 30 people groups were randomly formed (without any homogenization in terms of age, gender, or weight):

A. The treated group with oral selenium at a daily dose of 100 micrograms.
B. The treated group with oral selenium at a daily dose of 200 micrograms.
C. The control group did not receive any treatment.

The complete blood count (CBC) and serum levels of TSH were measured before and after the intervention, and an ultrasound was performed to determine the size and volume of the thyroid gland as well as nodules. Intensive examination of thyroid malignancy evidence like micro-calcification and irregular margins was performed. In cases where the patient was multi-nodular, the size of the largest nodule was measured and recorded. The examination identified that there was no side effect during the intervention with selenium consumption in 100 and 200 µg doses.

All data were analyzed using the SPSS standard software (Version 21.0, IBM, Armonk, NY, USA) and $P< 0.05$ were considered statistically significant for all of them. Because of the normality of investigated variables according to the Kolmogorov - Smirnov test, the One Way ANOVA test was used to compare the variables in the groups, and the T-test was used to compare the variables before and after the intervention. The present study was approved by the Human Ethics Research Committee of the Shahid Sadoughi University of Medical Sciences, Yazd, Iran. All participants in the study were taken informed consent. Patients did not incur any costs and the highest-quality equipment was used in sampling.

Results

The mean of length, width, height and volume of thyroid nodules in all three groups showed significant differences before and after three months of the intervention (Table 1).

Determination and comparison of Serum level of TSH before and after three months following

As shown in Table 2, before the intervention, the mean serum levels of TSH indicated a statistically significant difference between all three groups ($P= 0.0001$). On the other hand, this decreased significantly in these groups after the intervention ($P= 0.0001$).

[DOI: 10.18502/ijdo.v14i4.11229]

Table 1. Comparing the size and volume of thyroid nodule between the studied groups before and after the intervention

Variables			Before	After	*P*
Thyroid nodules	Length	Control	15.03 (± 5.30)	14.93 (±5.08)	0.415
		100 µg	17.13 (± 7.90)	14.93 (± 6.01)	0.008
		200 µg	13.43 (± 5.91)	13.03 (± 5.02)	0.259
		P	0.091	0.294	-
	Width	Control	11.10 (± 3.38)	11.13 (± 2.97)	0.851
		100 µg	10.06 (± 2.53)	9.93 (± 2.34)	0.354
		200 µg	9.63 (± 2.90)	9.50 (± 2.88)	0.423
		P	0.064	0.679	-
	Height	Control	9.90 (± 3.38)	10.0 (± 3.17)	0.415
		100 µg	9.40 (± 2.22)	9.33 (± 2.20)	0.489
		200 µg	9.30 (± 2.80)	8.93 (± 2.71)	0.001
		P	0.315	0.229	-
	Volume	Control	1.11 (± 0.73)	1.11 (± 0.71)	0.805
		100 µg	1.05 (± 0.70)	1.05 (± 0.71)	0.921
		200 µg	0.82 (± 0.61)	0.78 (± 0.59)	0.029
		P	0.229	0.139	-

- Values are reported as mean (± SD)

Table 2. Comparison of serum levels of TSH between the study groups before and after the intervention

Variable		Before	After	*P*
TSH	Control	2.57 (± 0.59)	2.48 (±0.59)	0.018
	100 µg	1.76 (± 0.53)	1.54 (± 0.41)	0.010
	200 µg	2.09 (± 0.63)	1.83 (± 0.52)	0.002
	P	0.0001	0.0001	-

- Values are reported as mean (± SD).
- Abbreviation: TSH: Thyroid Stimulating Hormone

Discussion

Elements iodine and selenium carry out vital roles in thyroid gland function. Iodine is one of the most important fragments of T3 and T4 hormones (1).

Selenium, as selenocysteine, is incorporated into a large number of antioxidant selenoproteins and has a protective activity against the abundance of hydrogen peroxide produced during the biosynthesis of thyroid hormones. Furthermore, selenium is an essential component of the enzyme iodothyronine deiodinases (DIOs), which catalyzes the thyroid hormones activity (2).

In the Rasmussen study, the relationship between thyroid volume and selenium status in women has been proven (3). The thyroid gland is prone to be nodular and thyroid nodules represent an ordinary clinical problem. Epidemiological studies show that the prevalence of palpable thyroid nodules is about 5% in women and 1% in men (4).

The cause of nodules is unknown, but selenium deficiency is one of the proposed ones. In the present study, it was manifested that the mean length of nodules in the A group and the mean height and volume in the B group decreased significantly compared to the control one. Moreover, examination of serum levels of TSH in patients displayed that the mean serum levels of TSH in the three groups before and after the intervention had a significant reduction.

Acknowledgments

We want to thank all of participated patients

Funding

this study was supported by Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Conflict of Interest

The authors declare that they have no conflict of interest.

[DOI: 10.18502/ijdo.v14i4.11229]

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[DOI: 10.18502/ijdo.v14i4.11229]