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A Study On Water Intake And Food Consumption In Animals Treated With Thyroxine Followed By *Bauhinia Purpurea* And *Withania Somnifera* - Original Research

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Abstract

Background: There has been a tremendous range of interest in drugs obtained from medicinal plants that are believed to be safer with significant efficacy in the treatment of thyroid disorders Objective: to observe the water intake and food consumption in animals treated with Thyroxine followed by Bauhinia Purpurea and Withania Somnifera. Materials and Methods: A total of 30 adult female Albino rats of Wistar Strain weighing 150-230 grams were utilized for the present study. The animals were maintained and the protocol was approved by the Institutional Animal Ethical Committee (No.878/ac/05/CPCSEA/10/22) from Raghavendra Institute of Pharmaceutical Education & Research (RIPER), Anantapur, Andhra Pradesh. The animals were divided into 5 groups and each group consisted of 6 animals in our study Results: The mean water intake rate was significantly decreased (25.94+0.42) in the rats treated with thyroxine (0.5 mg/kg b.w) followed by Bauhinia purpurea (150mg) and Withania somnifera (1000mg) when compared control group was 29.44+0.27. The food consumption rate was significantly increased in the rats treated with Thyroxine(0.5 mg/kg b.w) 21.33+1.71 when compared to the control group in our study Conclusion: The animals treated with thyroxine alone showed increased food consumption compared with other experimental and control groups, whereas water intake was significantly higher in control animals than other experimental groups.

Keywords: Bauhinia purpurea, food consumption, water intake, Withania somnifera

Introduction

The thyroid gland is specific for the production, storage, and release of thyroid hormones thyroxine (T4) and triiodothyronine (T3). Thyroxine is a quantitative hormone released from the thyroid gland, while triiodothyronine biologically originates from peripheral deiodination of thyroxine [1]. Herbal remedies are popular for managing thyroid disorders due to their efficiency, and safety with fewer side effects [2]. Many plant species are consumed worldwide to regulate thyroid hormones, to support the thyroid function as a source of iodine, or as a thyroid suppressor [3]. Alternative thyroid treatments place more importance on improving lifestyles and nutritional diets and providing spiritual support along with natural thyroid medication. The Bauhinia Purpurea leaves possess different flavonoids such as quercetin and may be antithyroid [4]. The administration of 600 mg of ashwagandha root extract daily led to significant improvements in thyroid levels and a significant increase in triiodothyronine (T3) and thyroxin (T4) levels of 41.5% and 19.6%, respectively [5].

Materials and Methods

A total of 30 adult female Albino rats of Wistar Strain weighing 150-230 grams were utilized for the present study. The animals are maintained under controlled conditions with room temperature (23+20 C), humidity (50+5%), and 12 hr light and dark cycle. The animals were fed with a standard rat pellet diet manufactured by Champaka Pvt Ltd., Bangalore (Table 1), and provided drinking water ad libitum. The animals were maintained as per the CPCSEA guidelines and the protocol was approved by the Institutional Animal Ethical Committee from Raghavendra Institute of Pharmaceutical Education & Research, Anantapur, Andhra Pradesh (No.878/ac/05/CPCSEA/10/22). The animals were divided into 5 groups and each group consisted of 6 animals in our study (Table 2). The water intake rate was calculated on the final week of the experiment before sacrifice by subtracting the amount of water left over in each cage barrier from the measured amount of water provided on the previous day. The mean water consumption per rat was also calculated by dividing the amount of water consumed in a week by seven. The food consumption rate was calculated on the final week of the experiment before sacrifice by subtracting the amount of food left over in each cage barrier from the measured amount of food provided on the previous day. The mean food consumption per rat was also calculated by dividing the amount of food consumed in a week by seven in our study.

Results

The mean water intake rate was significantly decreased (25.94+0.42) in rats treated with thyroxine(0.5 mg/kg b.w) followed by Bauhinia purpurea (150mg) and Withania somnifera (1000mg) when comparable control group 29.44+0.27 was noted (Table 3). The rats treated with thyroxine(0.5 mg/kg b.w)followed by Bauhinia purpurea (150mg) and Withania somnifera (1000mg) showed a significant increase in the water intake when compared with other experimental groups respectively. The food consumption rate was significantly increased in the rats treated with Thyroxine(0.5 mg/kg b.w) 21.33+1.71 when compared to the control group (Table 4). The rats treated with thyroxine(0.5 mg/kg b.w) followed by Bauhinia purpurea (150mg) and Withania somnifera (1000mg) showed a significant increase (19.41+0.47) in the food consumption rate with other experimental groups in our study. We also noted a mild increase in food consumption rate in rats treated with thyroxine(0.5 mg/kg b.w) followed by Bauhinia purpurea (150mg) and Withania somnifera (1000mg) in the present study.

Discussion

The thyroid hormones have a direct impact on feed and water intake in rats injected with TRH or TSH, as TRH has been to have a direct effect on the suppression of intake of water [6-7]. The water intake was significantly higher in control animals than in other experimental groups in our study are agrees with previous literature. The hyperphagia associated with hyperthyroidism may be a result of thyroid hormones acting directly on CNS appetite circuits. Increased levels of T3 and T4 hormones are involved in leading to hyperthyroidism. The hormone tri-iodothyronine (T3) directly stimulates food intake at the level of the hypothalamus. In rodent models, peripheral and central hypothalamic administration of T3 increases food intake [8-10]. The increased energy expenditure in hyperthyroidism reduces the body weight and increases food consumption [11,12]. In our study, there was increased food intake in thyroxine(0.5 mg/kg b.w) induced animals than in control and other experimental animal groups. The Hypothalamo-Pituitary-Thyroid axis may

play a direct role in the hypothalamic regulation of appetite, independent of effects on energy expenditure. The hypothalamic thyrotropin-releasing hormone (TRH) stimulates thyroid-stimulating hormone (TSH) release from the anterior pituitary gland, which then stimulates the release of both thyroid hormones, tri-iodothyronine (T3) and thyroxine (T4). Reports suggest that these signaling molecules can directly influence food intake [13-14]. Our results agree with previous literature and suggest that the hypothalamic-pituitary-thyroid axis played a more significant role in the food consumption rate in thyroxine-alone-induced group than in other groups, whereas water intake was significantly increased in control animals than other experimental groups may be because of thyroid hormones metabolic changes.

Conclusion

The animals treated with thyroxine alone showed increased food consumption compared with other experimental and control groups, whereas water intake was significantly higher in control animals than other experimental groups.

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Conflict Interest**: NIL**

Tables/Legends

Table -1: Normal diet given as Gastric gavage

Ingredients -Standard pellet Diet	**(grams/100g)**
Cellulose	15.5
Ground nut oil	3.5
Beef tallow	0
Moisture	10
Vitamins	2.5
Minerals	3.2
Energy	292K cal
Casein 20	20
Methionine	0.3
Strach	15
Sucrose	30

Table 2: Animal Grouping

S.No	**Group**	**Number of animals**	**Dosage**
1	Group-I	6	Control(0.9% NaCl saline as Vehicle)
2	Group-II	6	Thyroxine 0.5 mg/kg b.w *
3	Group-III	6	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 75mg +WS 500mg b.w (3 Weeks)**
4	Group-IV	6	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 100 mg +WS 750mg b.w (3 Weeks)**
5	Group-V	6	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 150mg +WS 1000mg b.w (3 Weeks)**

** Orally; * i.p: intraperitoneal, b.w: body weight; BP: Bauhinia Purpurea; WS: Withania Somnifera

Table 3: The mean water intake of the animals on the final week of the experiment in control and experimental groups

S.No	**Group**	**Number of animals**	**Mean ± SD** (ml/rat/day)
1	Control	6	29.44 ± 0.27
2	Thyroxine 0.5 mg/kg b.w *	6	24.16 ± 1.02
3	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 75mg +WS 500mg b.w (3 Weeks)**	6	24.26 ± 1.41
4	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 100 mg +WS 750mg b.w (3 Weeks)**	6	25.14 ± 0.12
5	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 150mg +WS 1000mg b.w (3 Weeks)**	6	25.94 ± 0.42

** Orally; * i.p: intraperitoneal, b.w: body weight; BP: Bauhinia Purpurea; WS: Withania Somnifera

Table 4: The mean food consumption of the animals on the final week of the experiment in control and experimental groups

S.No	**Group**	**Number of animals**	**Mean ± SD** (g/rat/day)
1	Control	6	18.77 ± 1.39
2	Thyroxine 0.5 mg/kg b.w *	6	21.32 ± 1.26
3	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 75mg +WS 500mg b.w (3 Weeks)**	6	18.86 ± 1.20

4	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 100 mg +WS 750mg b.w (3 Weeks)**	6	18.48 ± 0.54
5	Thyroxine 0.5 mg/kg b.w (2Weeks)* and BP 150mg +WS 1000mg b.w (3 Weeks)**	6	19.41 ± 0.47

** Orally; * i.p: intraperitoneal, b.w: body weight; BP: Bauhinia Purpurea; WS: Withania Somnifera

Figures

Figure 1: The mean water intake of the animals on the final week of the experiment in control and experimental groups

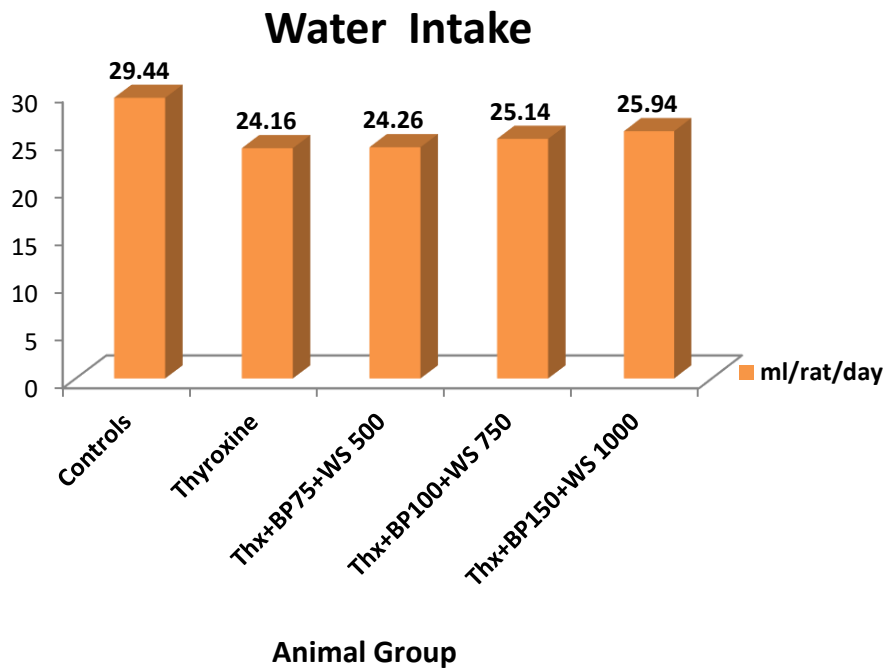

Figure 2: The mean food consumption of the animals on the final week of the experiment in control and experimental groups