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Nabeel B Kadum
Student. Department Internal and Preventive Medicine, College of Veterinary Medicine, University of Baghdad, Iraq

Oday K Luaibi
Assist. Prof. PhD. Department Internal and Preventive Medicine, College of Veterinary Medicine, University of Baghdad, Iraq

Correspondence
Nabeel B Kadum
Student. Department Internal and Preventive Medicine, College of Veterinary Medicine, University of Baghdad, Iraq

Clinical study hypothyroidism in goats and treatment by iodine compounds

Nabeel B Kadum and Oday K Luaibi

Abstract
The objective of the experiment were determined the clinical, hormonal and histological changes in hypothyroidism local breed goats. The plans of experiment was carried out by using 15 goats aged between (1-2yeares) and 20-25kg of body weight (B.W.).The goats has separated of three collections randomly. The control groups (C) was showed healthy, while the induction groups (T1 and T2) were induced hypothyroidism by giving thiourea 50mg/kg body weight daily for one week without treated, however the induction group (T2) was treated iodine compounded,(potassium iodide 0.005mg/kg of body weight by oral daily and tincture iodine application skin weekly for 8week). The results of clinical examination of induction groups showed became dullness, lose appetite, lethargy, weakness, anemic, leg edema, constipation and alopecia, beside decrease significant in the respiratory, heart rate and body temperature, also the hormonal analysis Triiodothyronine (T3), thyroxine (T4) hormones levels showed significantly decrease while increased Thyroid stimulating hormone (TSH) level whereas the T2 group after treated with iodine compounds recovered in the second week and the hormonal analysis were showed return to normal range in 3-4 week after treatment. Whereas the histopathological changes were presented in T1 group hyperplasia and hypertrophy endothelial follicles, which projected in lumen, and congested blood vessels, but the T2 groups were showed decrease size of endothelial cell (flatted), with increase of the colloid and collagen fibroses with lymphocyte filtration in interstitial tissue. The conclusion of the study could be iodine compounds to the therapeutic iodine deficiency.

Keywords: Goats, hypothyroidism, thiourea and iodine compounded

1. Introduction
Hypothyroidism was one of the common thyroid disorders in humans and animals, the etiology decreased of production thyroid hormones below the normal level, were occurred as a congenital or an acquire defect. Hypothyroidism could outcome after thyroid defect and damage in the machine regulator creation of thyroid hormones or might rise by way of a consequence of difficulty throughout therapy of hyperthyroidism. Beside hypothyroid formal was an impediment during treatment of hyperthyroidism, also the hypothyroid was compound hormonal dysfunction rather than single hormonal defect, however it obvious largely by slowing rescindable down of all body function. Through it was part from general metabolic disturbance; destruction of thyroid hormone production causes serious intellectual and behavioral stress and depression. Hypothyroid was lead to increase stages of total cholesterol, lowdensity lipoproteins and Apo lipoprotein B. it had previously shown that thyroid hormones increased the synthesis of mobilization of triglyceraldehydes stored in adipose tissue and lipoprotein-lipase activity [1-3]. The array of thyroid were disorders focuses on the outliers along the continuum of thyroid function (hypothyroidism and hyperthyroidism) based upon the production of T3 (triiodothyronine) and T4 (thyroxine) [4].Thyroid gland function was essential to normal growth and development so rapid advances have been made in understanding thyroid gland in human and animals [5-7]. The recent research was assume to explain clinically and hormonal alterations though the hypothyroidism of the goats.

2. Materials and methods
Fifteen local goats were used age between 1-2 years old and 20-25kg of B.W. The animals were kept in animal house of College of Veterinary Mdicine / University of Bagdad; The animals were classified equally to three groups, which was including control group (C) and the induction groups (T1&T2) were induced hypothyroidism by giving thiourea 50mg/kg of B.W. orally daily for one week [8, 9] and left T1 group without treatment, while T2 group were

treated with potassium iodide 0.005mg/kg of body weight daily and tincture iodine application for skin weekly for 8week [10, 11]. The animals were monitor daily observation to record of notices clinical changes for respiratory, heart rate and body temperatures. The blood collection was obtained by jugular vein and kept by tubes without anticoagulant and sediment by centrifuge 5000/5mint and serum aspiration with pastor pit and tubes further than stored in the -20C' freezing weekly before and after treated 8 weeks. Blood specimens was examined the hormonal analysis Triiodo-thyronine (T3), thyroxin (T4) and Thyroid stimulating hormone (TSH) was depended on radioimmunoassay in maglin (clia) users special commercial kites according [12]. The histopathological examinations were take thyroid gland and permanent in 10% neutral protected formalin, and the routine histological technique according to [13]. The statistical analyses of the results were expressed as mean ±SE difference of data between groups which were assessed by depending method analysis (One-way), trailed through least statistical variance test stayed via determine variances among averages of investigated groups, equal of statistical significant remained set at (P<0.05) [14]

3. Results

3.1Clinical examination

After one week of administration of thiourea orally, the animals in groups T1 and T2 were showed hypothyroidism signs including dullness, lose appetite, lethargy, leg edema, alopecia, pail mucosal membranes, head pressing, Horsens of sound and constipation. It shows in the figures. These signs disappeared gradually in treated group (T2) after week days of administration potassium iodide and tincture iodide therapy. Whereas the induction group (T1) without treatment was signs continuous during time this study. The control group was very active and healthy. The respiratory, pulse rate and temperature showed decline significant P<0.05 in induction group T1. While the control groups were within normal range, furthermore in the treated group (T2) were showed return to normal range in second week after treatment and non- significant P<0.05 with control group until to end study (tables 1, 2, 3).

Table 1: The respiratory rate (R.R.) / min. control (C), induction (thiourea) (T1) and induction with treated potassium iodide and tincture iodide (T2) groups

Weeks	Groups		
	Control	T1	T2
W.0	28.33±1.37a	28±2.35a	27.33±0.78ab
W.IND	28.33±1.37a	20.66±0.78e	20.66±0.19e
W.1	27.33±0.78ab	20.33±0.21e	20.66±0.78e
W.2	28±2.35a	20.66±0.21e	25.33±0.78bc
W.3	28.33±1.37a	20.33±0.21e	25.33±0.78bc
W.4	25±0.58bc	20.33±0.21e	26.66±0.77ac
W.5	24.66±0.75cd	20.66±0.21e	26.66±0.76ac
W.6	26±2.35ac	20.66±0.22e	27±0.58ac
W.7	24.66±0.75cd	20.33±0.22e	28±2.35a
W.8	28±2035a	20.66±0.23e	28±2.35a

- Means ± SE, WIND (week induction)
- The lettering is similar represent non statistically at the altitudes of (P<0.05)
- The lettering is variable represent statistically at the altitudes of (P<0.05)

Table 2: The pulse rate /min. Control (C), induction (thiourea) (T1) and induction with treated with potassium iodide and tincture iodide (T2) groups

Weeks	Groups		
	Control	T1	T2
W.0	65±4.71a	64.33±2.52ab	65±2.35a
W.IND	65±2.35a	50.66±0.78eg	52.33±3.73ef
W.1	65±4.71a	50.66±0.78eg	52.66±0.78e
W.2	64.33±2.52ab	48±2.35gi	56.66±3.13d
W.3	63.33±3.72ac	50±2.35eg	60±2.35cd
W.4	61.66±1.35ac	48.66±0.75fh	60±2.35cd
W.5	61±0.58ac	46±2.35hi	60±2.34cd
W.6	62±2.35ac	46±2.34hi	62.33±3.72ac
W.7	60.66±0.75bc	44.66±0.78i	62±2.35ac
W.8	64.66±5.47ab	44.66±0.78i	62.33±3.72ac

- Means ± SE, WIND(week induction)
- The lettering is similar represent non statistically at the altitudes of (P<0.05)
- The lettering is variable represent statistically at the altitudes of (P<0.05)

Table 3: the temperature (C°) Control (C), induction (thiourea) (T1) and induction with treated with potassium iodide and tincture iodide (T2) groups

Weeks	Groups		
	Control	T1	T2
W.0	38.93±0.02af	39.43±0.01a	39.10±0.07ad
W. IND	39.43±0.01a	38.46±0.01fh	38.40±0.14fh
W 1	38.86±0.05be	38.23±0.01gi	38.56±0.09dg
W 2	39.10±0.07ad	38.10±0.01gk	38.93±0.02ad
W 3	39.13±0.02ac	38.26±0.05gi	39±0.04ae
W 4	38.93±0.02af	38.06±0.05hk	39.26±0.03ab
W 5	38.63±0.05cg	37.90±0.05ik	39±0.02ae
W 6	39.13±0.05ac	38.16±0.02gj	39.06±0.01ad
W 7	38.63±0.05cg	37.70±0.04jk	39.03±0.01ad
W 8	39.36±0.01ab	37.60±0.07k	39.40±0.07ab

- Means ± SE, WIND(week induction)
- The lettering is similar represent non statistically at the altitudes of (P<0.05)
- The lettering is variable represent statistically at the altitudes of (P<0.05)

3.2 Hormonal analysis

The level of T3, T4 and TSH in control group was presented normal range (1.7-2.3ng/ml), (42-80ng/ml) and (0.01-0.02mlu/ml) respectively incidence, but induction groups were presented decrease significant P<0.05 T3, T4 and increase TSH levels, comparative with control group, beside that in T1 treated group were showed recovered to normal level T3, T4 and TSH hormones in 3-4 weeks, nonsignificant P<0.05 with control groups but different important P<0.05 with T1 induction groups (tables 4, 5, 6)

Table 4: Level of T3 (ng/ml) Control (C), induction (thiourea) (T1) and induction with treated with potassium iodide and tincture iodide (T2) groups.

Weeks	Groups		
	Control	T1	T2
W.0	1.73±0.18dg	1.86±0.02cg	1.83±0.01cg
W.IND	1.73±0.18dg	0.50±0.01kl	0.60±0.02jk
W.1	2.16±0.03ac	1.20±0.01hi	1.56±0.02fh
W.2	1.86±0.02cg	1.62±0.01eg	1.66±0.01eg
W.3	2.36±0.05a	0.20±0.05l	1.53±0.01fh
W.4	1.86±0.03cg	0.90±0.05ij	1.50±0.01gh
W.5	2.03±0.01ae	1.39±0.05fh	1.73±0.01dg
W.6	1.96±0.02be	0.19±0.02l	1.93±0.02bf
W.7	2.06±0.01ad	0.20±0.04l	2.13±0.02ac
W.8	1.83±0.01cg	1.43±0.07fh	2.30±0.02ab

- Means ± SE, WIND(week induction)
- The lettering is similar represent non statistically at the altitudes of (P<0.05)
- The lettering is variable represent statistically at the altitudes of (P<0.05)

Table 5: Level of T4 (ng/ml) Control (C), induction (thiourea) (T1) and induction with treated with potassium iodide and tincture iodide (T2) groups.

Weeks	Groups		
	Control	T1	T2
W.0	62±10.23d	65±16.3d	61±5.3d
W.IND	62±10.23d	21.66±1.37l	22±2.35l
W 1	65±16.4d	30.66±2.45jk	25±0.58kl
W 2	80±9.23bc	33±0.21jk	32.66±8.41hk
W 3	45.66±14.81e	13±1.37m	40±4.11ei
W 4	43.66±17.82ef	18.33±7.25im	40.33±2.54ei
W 5	42±0.58eh	31.66±7.25ik	42±2.35eh
W 6	61±5.29d	10.66±2.35m	73.33±10.17c
W 7	44.33±9.52ef	35±5.25fj	85±9.41a
W 8	42.33±1.35eg	33.66±1.37gk	87±11.21ab

- Means ± SE, WIND(week induction)
- The lettering is similar represent non statistically at the altitudes of (P<0.05)
- The lettering is variable represent statistically at the altitudes of (P<0.05).

Table 6: Level of TSH (mlu/ml) Control (C), induction (thiourea) (T1) and induction with treated with potassium iodide and tincture iodide (T2) groups

Weeks	Groups		
	Control	T1	T2
W.0	0.01±0.001**c**	0.02±0.009**c**	0.01±0.007**c**
W.IND	0.01±0.001**c**	0.30±0.001**a**	0.27±0.001**a**
W.1	0.02±0.009**c**	0.20±0.001**a**	0.20±0.001**a**
W.2	0.02 ± 0.001 **c**	0.11 ± 0.001 **b**	0.12 ± 0.001 **b**
W.3	0.02±0.005**c**	0.10±0.002**b**	0.11±0.003**b**
W.4	0.01±0.007**c**	0.21±0.002**a**	0.01±0.005**c**
W.5	0.02±0.009**c**	0.10±0.001**b**	0.01±0.003**c**
W.6	0.02±0.003**c**	0.20±0.001**a**	0.02±0.001**c**
W.7	0.02±0.003**c**	0.13±0.002**b**	0.01±0.001**c**
W.8	0.02±0.001**c**	0.10±0.001**b**	0.01±0.003**c**

- Means ± SE, WIND(week induction)
- The lettering is similar represent non statistically at the levels of (P<0.05)
- The lettering is variable represent statistically at the altitudes of (P<0.05).

3.3 Histopathological changes

Control groups (C)were showed histological findings of thyroid, normal thyroid follicles with variable size contain a homogenous pink colloid material; thyroid has a fibrous capsule with fine collagenous septa (Insert for figure 1)Thyroid follicles lined by simple cuboidal cells, when active smaller follicles, while a larger follicle is less active lining by flatted epithelial cells.

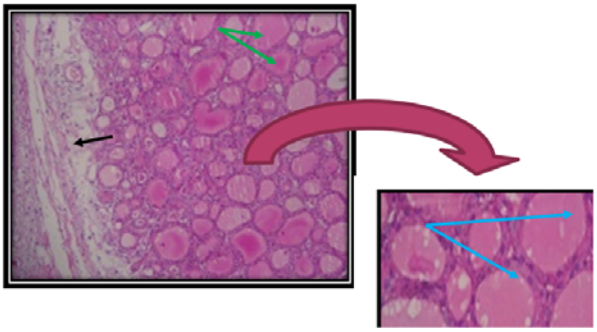

Fig 1: Showed microscopically in control goats Multiple size of follicles depended to activity when small size is very activity (green arrow) Capsules out line of gland contended of connective tissue (black arrow) cuboid ales and flat cell in epithelium internal lumen with collide (blue arrow).

Induction group T1 were showed microscopic examination Thyroid architecture was destroyed &replaced by irregular follicles. The lining epithelium of many follicles is disrupted &disorganized-most of the follicles lack of colloid (figure2) their epithelium tends to be vacuolated with evidence of necrosis seen in the lumen of some follicles the storm showed vascular congestion and dilation with evidence of atrophied follicles While other follicles lined by atrophic epithelium & cluster of necrotic epithelial cells seen in the lumen that contain little amount of pale secretion (figure2)

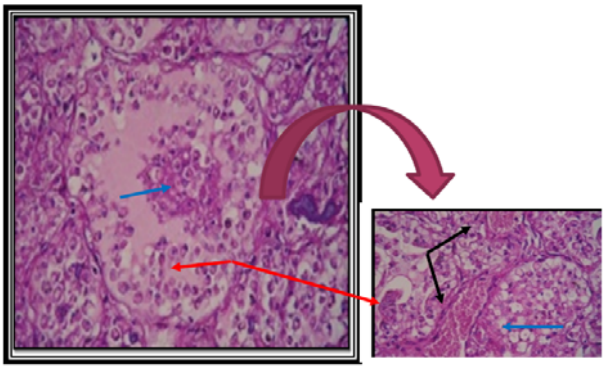

Fig 2: Microscopically section in thyroid gland of goat induced hypothyroid without treated showed Necrotic epithelium cell with sever vacuolation in follicles (blue arrow), blood vessels congestion and dilatation (black arrow), hyper atrophy of epithelial cell, projected in lumen (Read arrow).

Treated group was showed microscopic examination Most of thyroid section in this group showed colloid –filled follicles with variable sized. The colloid is vacuolated mainly at the edges; some of follicles form papillary process, while other follicles lining with hyperplasia epithelia and the lumen contain strands of colloid (figure3) some of epithelial cells have hyper chromatic nuclei. Also the collagenous fibrous storm showed cellular infiltration consist mainly of lymphocytes (figure3)While other section revealed newly formed small follicles seen in the fibrous storm with simple cuboidal epithelia.

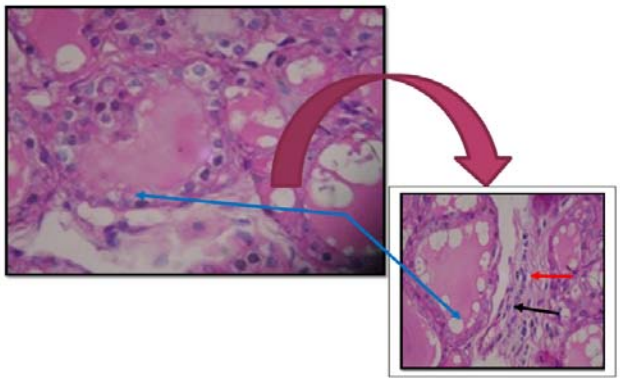

Fig 3: Microscopically section in thyroid gland of goat when induction of hypothyroidism by thiourea with treated by iodine compound showed, Lymphocytes infiltration in capsules (black arrow) collagenous fibrous storm (red arrow), Flatted epithelium cells (blue arrow)

4. Discussion

4.1Clinical examination

The results of clinical signs for induction groups (T1&T2) showed dullness and lose appetites for resulting serum T3 levels reduction in answer to neuron impulse depression then limit to reduce the upkeep vigor supplies and protein squalor. Limb edema and head pressing of a wall because increase in plasma protein and binding with protein subcutaneous lead to leg, face edema and cerebral edema the results was sported with [15-18]. Also alopecia and pail mucosal eye membranes because decrease blood flow to hair follicles and anemic animal lower RBC numbers cause thyroxin affected life Spain and frigidity sported with [19]. However it showed constipation because hypothyroidism resulting from decreased gut motility sported with the [20]. Beside lethargy because throughout hypothyroidism, nearby remains a shortened ingestion of oxygen and poorer heat creation sported with [21]. Additional of hoarsens of sound because inflammation effect to voice cord, sported with [22], furthermore all the clinical signs appearance in induction groups (T1) agreement with [23-26] The control goats were stabilized to respiratory rate between (24-28/mint) but the induction groups were decreased the R.R to (20/mint) because in hypothyroidisms animals were utilized oxygen from all tissue body and basil metabolic rate were decreased lead to neediest O_2 was fuelled, by hypothyroid-stimulated neuropathy and myopathy foremost toward diaphragmatical defect the same results recorded with [27] hypothyroid individuals may present with dyspnea on exertion and decreased exercise tolerance, and whereas [28] were recorded symptoms include hypothermia, bradycardia,, hypotension, and eventual respiratory failure from hypoventilation and carbon dioxide retention, the results was agreement with [26]. The treated group was recovered to normal R.R range when second and third week in treated group. The control groups were showed variable pulse rate range between (60-65 p/min) was the normal range but the induction goats were showed lower normal range because hypothyroidisms when the H.R (44-50 p/min) therefore effected heart muscles contraction (Na+ /K+ pump depression) and depression catecholamine receptors sensate lead to cardiac output decreased sported with [21]. The results agreement with [28, 29] Beside that the treated groups were showed recovered to normal range when third weeks and stabilized to end study. however control group were showed the body temperature stabilized normal range between (38.5-39.5C°), temperature was appearance subnormal in the induction groups from study time (37.5-38.4C°) therefore for reasoning decrease heat production, basic metabolic rate and inactivation of skeletal muscles abridged ingesting of oxygen and lesser heat creation sported with [21]. The result agreement with [26, 30].The treated groups were showed in the second week recovered to normal temperatures range slowly for study period.

4.2 Hormonal analysis

The control groups were showed T3&T4 level range between (1.73-2.3ng/ml) (42-80ng/ml) respectively, but when induction goats were recorded lower level of T3&T4 because it was decreased T3&T4 production in the thyroid gland effected thiourea decrease iodine intake, iodide peroxidation,DIO;MIO copulation and iodination of T4 in peripheral body systems, these was sported with [8, 31, 32]. The results were an extremely statistical decline in standards of T3 and T4 of experimental animals. Treated groups were increased T3 and T4 level gradually when in the 4week recorded normal range agreement with [10, 33],increase significantly T3 and T4 when the iodine supplemented groups beside control groups were presented the TSH level range between (0.01-0.02mlu/ml) but when the induction groups were showed increased TSH level to (0.1-0.2mlu/ml) because hypothalamus effected positive feeding to pituitary gland by (thyrotrophic releasing hormones TRH) lead to increased TSH level in blood in hypothyroid dogs,sported with the [34]. Hypothyroidism affected by iodine inadequacy go to greater creation of thyroid-stimulating hormone, these results agreement with [25, 26]. The treated group T2 were recorded decrease TSH level gradually in the normal level appearance in the four weeks treated and remaining to last time of the study,this results was agreement with [33,35].

4.3 Histopathological

Control group was showed histological findings of thyroid, normal thyroid follicles with variable size contain a homogenous pink colloid material; thyroid has a fibrous capsule with fine collagenous septa, Thyroid follicles lined by simple cuboidal cells, when active smaller follicles, while a larger follicle is less active lining by flatted epithelial cells, this results sported by the [36]. The induction groups T1 were showed thyroid architecture and destroyed, which replaced by irregular follicles because high level TSH lead to increase blood flow to gland and growth, developed follicles lead to hypertrophy and hyperplasia, to cells, these results sported by the [8, 24, 37, 38-40]. The Treated group T2 was showed microscopic examination colloid –filled follicles with variable sized because increase T3 and T4 level lead to decrease TSH effected to gland (negative feedback) and collagenous fibrous storm showed cellular infiltration consist mainly of lymphocytes, and lower epithelium cell, these result sported with [35, 41-45]

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