Physiological harmony of hormones related to the thyroid gland function in cretinous sheep

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Abstract:

The present study showed that cretinous rams and ewes revealed an obvious elevation of TSH values accompanied with a declined values of both T3 and T4 from the same samples. Each of these results revealed significant differences in probability values under 0.05 ($p< 0.05$) when compared with samples from normal sheep of the same species. It can be concluded that cretinous sheep had a disturbance in thyroid physiology opened the hypothesis that it is primary hypothyroidism type.

Keywords: Cretinism, Arrabi sheep, Thyroid hormones, TSH, Hypothyroidism.
Physiology Classification QP1 - 345

Introduction:

Around the world, the most common cause of congenital hypothyroidism is iodine deficiency [(4)]. Cretinism is therefore most probably due to a diet deficient in iodine. It has affected many people worldwide and continues to be a major public health problem in many countries. Iodine is an essential trace element, necessary primarily for the synthesis of thyroid hormones. Iodine deficiency is the most common preventable cause of brain damage worldwide. Although iodine is found in many foods, it is not universally present in all soils in adequate amounts. Most iodine, in iodide form, is in the oceans where the iodide ions oxidize to elemental iodine, which then enters the atmosphere and falls to earth as rain, introducing iodine to soils [(5)]. Earth deficient in iodine is most common inland

Cretinism is a sickness arising from congenital deficiency of thyroid hormones (congenital hypothyroidism) usually due to maternal hypothyroidism. Congenital hypothyroidism can be endemic, genetic, or sporadic. If untreated, it results in mild to severe impairment of both physical and mental growth and development [(1)]. Signs of cretinous animals may include shortness of stature, swelling of the skin, loss of water and hair, delayed of bone maturation, thickened skin, enlarged tongue, or a protruding abdomen, neurological impairment[(2)]. On the same line, sporadic and genetic cretinism results from abnormal development or function of the fetal thyroid gland. Thyroxine must be dosed to combat this case as it's done in many countries [(3)].

If there is a deficiency of dietary iodine, the thyroid will not be able to make thyroid hormone. The lack of thyroid hormone will lead to decreased negative feedback on the pituitary, leading to increased production of thyroid-stimulating hormone, which causes the thyroid to enlarge (the resulting medical condition is called *endemic colloid goiter*; see goiter). This has the effect of increasing the thyroid's ability to trap more iodide, compensating for the iodine deficiency and allowing it to produce adequate amounts ofthyroid hormone[12]. Both T_3 and T_4 are used to treat thyroid hormone deficiency (hypothyroidism). They are both absorbed well by the gut, so can be given orally. Levothyroxine is the pharmaceutical name (INN) of levothyroxine sodium (T_4), which is metabolized more slowly than T3 and hence usually only needs once-daily administration. Natural desiccated thyroid hormones are derived from pig thyroid glands, and are a "natural" hypothyroid treatment containing 20% T3 and traces of T_2, T_1 and calcitonin. Also available are synthetic combinations of T_3/T_4 in different ratios (such as liotrix) and pure-T3 medications (INN: liothyronine). Levothyroxine Sodium is usually the first course of treatment tried. Some patients feel they do better on desiccated thyroid hormones; however, this is based on anecdotal evidence and clinical trials have not shown any benefit over the biosynthetic forms [13,14].

So the aim of this study was focused on determining the harmony between T3, T4, and TSH in cretinousArrabi sheep in addition to record the type of hypothyroidism beating those animals.

and in mountainous areas and areas of frequent flooding, but can also occur in coastal regions owing to past glaciation, and leaching by snow, water and heavy rainfall, which removes iodine from the soil. Plants and animals grown in iodine deficient soils are correspondingly deficient. Populations living in those areas without outside food sources are most at risk of iodine deficiency diseases. Iodine deficiency results in the impairments in varying degrees of physical and mental development. It also causes gradual enlargement of the thyroid gland, referred to as a goitre. It is being combated in many countries by public health campaigns of iodine administration[6,7].

The thyronines act on nearly every cell in the body. They act to increase the basal metabolic rate, affect protein synthesis, help regulate long bone growth (synergy withgrowth hormone) and neural maturation, and increase the body's sensitivity to catecholamines (such as adrenaline) by permissiveness [8,9]. The thyroid hormones are essential to proper development and differentiation of all cells of the human body. These hormones also regulate protein, fat, and carbohydrate metabolism, affecting how body cells use energetic compounds. They also stimulate vitamin metabolism. Numerous physiological and pathological stimuli influence thyroid hormone synthesis. Thyroid hormone leads to heat generation in humans [10]. However, the thyronamines function via some unknown mechanism to inhibit neuronal activity; this plays an important role in the hibernation cycles of mammals and the moultingbehaviour of birds. One effect of administering the thyronamines is a severe drop in body temperature [11].

Materials and Methods:

normal Arrabi sheep have been examined to detect and compare the values of

Twenty rams and fifteen ewes of cretinous sickness versus the same number of

immunoradiometric assay Gamma instrument (HIDEX Co., Ltd- Finland) Gamma instrument (HIDEX Co., Ltd- Finland). It's worth mentioning that the tools used in our experiment were manufactured by Yanchenghuida medical instruments Co., Ltd- China, and the kits of immune analyses supplemented by Perkin-Elmer Co.- USA.

Statistical analysis used in our research is student-T-test where the null hypothesis is supported [15].

thyrionines.All of our animalmodels selected of the same age period of being eight month old age.Blood samples have been collected from the jugular veins, later blood serum separated by electric centrifuge (Lab line stock center- India), then kept inside the jug supplemented with ice pieces before sending it to the clinical chemistry laboratory where they assayed fortriiodothyrionine and thyroxin by radioimmunoassay Gamma instrument (HIDEX Co., Ltd- Finland), while thyrotropin releasing hormone assayed by

Results:

On the other hand, the values of thyroid stimulating hormone in cretinous sheep elevated to record a significant difference at P value < 0.05 when compared with control normal sheep (table-1).

The collected data shows that each of triiodothyrionine and thyroxine declined in their values for the cretinous sheep in comparison with normal ones (controls). This elevation appeared to be as a significant difference where the P value < 0.05.

Table-1: the T3, T4 and TSH ofcretinous and normal Arrabi sheep

Sheep casing	Sex	T_3 values (nmol/L)	T_4 values (nmol/L)	TSH values (mIU/L)
Cretinous=35	Rams=20	1.01±0.81[a]	55.11±1.21[a]	0.19±0.11[a]
	Ewes=15	1.09±0.6[a]	58.09±1.54[a]	0.2±0.019[a]
Control=35	Rams=20	1.45±0.29[b]	79.35±19.19[b]	0.125±0.015[b]
	Ewes=15	1.5±0.22[b]	81.44±2.02[b]	0.13±0.019[b]

✦ **Different letters explain a significant difference on a probability level P< 0.05.**

Discussion:

features such as typical facial appearance, hoarse slow speech, and dry skin and by low levels of thyroid hormones. Management includes treatment of the cause and administration of thyroxine [16,17].

According to the results According to the results we can interpret that all of the events recorded in this experiment and research precisely can be expressed as primary hypothyroidism that is considered a problem arose in the thyroid gland itself. Hypothyroidism is deficiency of thyroid hormone. It is diagnosed by clinical

usually results from Hashimoto thyroiditis and is often associated with a firm goiter or, later in the disease

the hormone release by the thyroid. Hypothyroidism may also occur in patients taking amiodarone or other iodine-containing drugs, and in patients taking interferon-alfa. Hypothyroidism can result from radiation therapy for cancer of the larynx or Hodgkin lymphoma (Hodgkin disease) [26]. The incidence of permanent hypothyroidism after radiation therapy is high, and thyroid function (through measurement of serum TSH) should be evaluated at 6- to 12-mo intervals [27].

It'll proved that the majority of cases of hypothyroidism occurs due to the destruction of the thyroid glands by a type IV autoimmune response, a process known as lymphocytic thyroiditis because this type of response is mediated by T cells[28]. This autoimmune response develops spontaneously in most affected animals and usually progresses through a sequence of thyroiditis to necrosis and atrophy. In some cases, the administration of sulphonamide antibiotics may induce a reversible form of lymphocytic thyroiditis. Lymphocytic thyroiditis may occur concurrently with other immune-mediated endocrine diseases such as lymphocytic parathyroiditis or Addison's disease producing autoimmune polyglandular syndromes [29,30].

From the present results, it can be recommended to assay the level of iodine in the serum to differentiate between iodine deficiency and the congenital status of the animal.

Primary hypothyroidism is due to disease in the thyroid; thyroid-stimulating hormone (TSH) is increased. The most common cause is autoimmune [18]. It process, with a shrunken fibrotic thyroid with little or no function. The 2nd most common cause is post-therapeutic hypothyroidism, especially after radioactive iodine therapy or surgery for hyperthyroidism or goiter. Hypothyroidism during overtreatment with propylthiouracil, methimazole, and iodide abates after therapy is stopped [19,20].

Several scientists and researchers found that most patients with non-Hashimoto goiters are euthyroid or have hyperthyroidism, but goitrous hypothyroidism may occur in endemic goiter. Iodine deficiency decreases thyroid hormonogenesis. In response, TSH is released, which causes the thyroid to enlarge and trap iodine avidly; thus, goiter results. If iodine deficiency is severe, the patient becomes hypothyroid, a rare occurrence in the US since the advent of iodized salt [21,22].

Some studies explained that iodine deficiency can cause congenital hypothyroidism. In severely iodine-deficient regions worldwide, congenital hypothyroidism (previously termed endemic cretinism) is a major cause of intellectual disability[23,24]. Rare inherited enzymatic defects can alter the synthesis of thyroid hormone and cause goitrous hypothyroidism [25].

Hypothyroidism according to several researches may occur in patients taking lithium perhaps because lithium inhibits

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التناغم الفيولوجي للهرمونات المتعلقة بوظيفة الغدّة الدرقيّة في الأغنام القميئة

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الخلاصة:

أظهرت هذه الدراسة أن الأكباش والنعاج القميئة أظهرت إرتفاعاً واضحاً في قيم TSH مصحوبة بقيم منخفضة لكل من هرموني T_3 و T_4 من نفس العيّنات. كل من هذه النتائج كشفت عن إختلاف كبير في القيم الإحتماليّة تحت 0.05 ($p< 0.05$) عند مقارنتها مع عيّنات من الأغنام الطبيعيّة من نفس الأنواع.

إنّ الإستنتاج الواقعي لدراستنا يبيّن أنّ الأغنام القميئة عانت إضطرابات في فسيولوجيا إفراز هرمونات الغدّة الدرقيّة ممّ يسند فرضيّة أنّ هذا النوع من العلل هو قصور الإفراز الدرقاني من النوع الإبتدائي.

كلمات مفتاحيّة: القماءة، الأغنام العرابيّة، هرمونات الدرقيّة، الهرمون المحرّض للدرقيّة، قصور الغدّة الدرقيّة.