Research Article

Effect of Marshmallow's Root Extract on Thyroid Hormones in Broilers

Farshid Roshangar, Mehrdad Modaresi and Majid Toghyani
Department of Animal Science, Khorasgan Branch, Islamic Azad University, Isfahan, Iran

Abstract: Marshmallow (Althaea officinalis L.) is belonging to Malvaceae family. Previous studies have shown that this plant has many physiological effects on hormone systems. The goal of this study was investigating the effect of root extract of this plant on concentrations of thyroid hormones in broilers. 240 broilers were divided into four groups with five replications and twelve members in each replication. A group was control group and other groups were fed by various doses of extract (0.25, 0.5 and 1%) for 42 days in drinking water. At last two broilers were selected randomly from each replication, blood samples were taken and concentration of T3, T4 and TSH hormones were measured using Eliza method and Monibind Kit. Obtained data were analyzed using SAS program and means were compared using Duncan multiple ranges test. Concentration of T3 hormone was decreased significantly (p<0.05) in third and fourth groups (doses 0.5 and 1%) but 0.25% of extract (group 2) increased it none significantly. Concentration of T4 hormone was not affected by treatments. There was significant differences between TSH hormone of third and fourth group with control group (p<0.05), but second group didn’t affect this hormone. On the whole the extract of marshmallows root can affect T3 and TSH hormones dose dependently and is effective in metabolism in this way.

Keywords: Broilers, marshmallows root extract, T3, T4

INTRODUCTION

Thyroid hormones affect actions of the most body tissues. These hormones control development and maturity process (Fisher et al., 1982) and action of some organs like heart, stomach, liver (Daza et al., 1982; Wiekenden et al., 1997) and neural system. Thyroid gland is the biggest and one of the most important glands of body which its hormones (T3 and T4) are very important for growth, development and metabolism. Hypothyroidism is one of the most important diseases of endocrine glands in human and animals. This disease is following generally by symptoms like fatigue, drowsiness, slow muscles, slow brain processes, slow heart beating, reduction in heart output, reduction in blood volume, increase in body's weight and dry skin (Author and Beckett, 1999). The important role of endocrine glands including thyroid in metabolic actions of body is obvious. Hyperthyroidism or hypothyroidism and fluctuations of relating hormones can affect chemical activities of body highly (Kar et al., 2002). Hypothyroidism is made by iodine deficiency, thyroid disease or autoimmune disorders (such as Hashimoto's thyroiditis) (Ott et al., 2011; Ozturk et al., 2009). Successful medication of hypothyroidism is only possible when level of thyroid hormones in peripheral tissues be in natural level which this needs to substitue hormones (Mistry et al., 2011).

Considering the ancient use of plants in medication, marshmallow plant was used in this study as a pharmaceutical plant which has probable effects on concentration of thyroid hormones.

Marshmallow (Althaea officinalis L.) is a plant from malvaceas family which is probably originated to Asia and Europe (Batooli, 2002). Using this plant for medication has been common for long time. The root of marshmallow has many properties including: skin softener and tranquilizer, treating intensive coughs, angina, bronchitis and diseases induced inflammation (Mirhidar, 2002; Sutovska et al., 2007), kidney stone, constipation and cramps (Zargari, 2004). Flavonoides from polyphenoles group (Bradley, 1992; Razavi, 2003), Polysaccharids (Sutovska et al., 2007; Kardosova and Machova, 2006) and mucins (Pakravan et al., 2007) are from important discovered compounds of marshmallow's root. Root has also chemical compounds like musillage matters, starch, cumarins (scopoletin), sugar compounds, pectin, aspargin, a little oil, flavonoides, glycosides, ethanole, 3-4 dihydroxy benzylocta decan, 5-β and 13-β dihydroxy nonacosanyl godolite, tillerozide, campherole, chlorogenic acid, caffic acid and oxalate (Zoobi and Mohd, 2011).

Scopoletin (7-hydroxy 6- metoxy cumarin) of root is used in rats for increasing thyroid activity, lipid peroxidation and increase in blood sugar. This matter seperates lipid peroxidation of liver and increase the
activity of anti oxidants, superoxide desmootase and catalase this shows that scopoletin is the reason of anti thyroid activity and increase in blood sugar without causing liver poisonity (Panda and Kar, 2006). Considering that there isn't any scientific study about the effect of roots extract on thyroid hormones, the aim of this study was probable effect of its extract on concentrations of thyroid hormones in broilers.

MATERIALS AND METHODS

The study was done in south west of Yasouj (Iran). 240 broilers from Ross 308 race and one day old were divided in four groups. Each group was divided into five replications with 12 members. Three groups were treatment groups and one group was control. Broilers were located randomly and kept in cages by one square meter area (1*1 m) for 42 days. Samples had free access to food. According to husbandry manual of Ross 308, temperature was 32°C among first week and then was decreased 1°C every day three to final temperature about 21-23°C. Gas burner provided needed temperature and light was produced by 60 watts lamps which were located at height of 2 m. Light period were adjusted for 23 h brightness and one hour darkness. Yield parameters like food consumption, weight increasing and conversion factor in three periods of 0-14 days, 14-28 days and 28-42 days. Control group was used drinking water only and didn’t recieve any extract. Second, third and fourth group were recieved 0.25, 0.5 and 1% of extract in their drinking water.

To prepare the extract, marshmallows roots were collected in late autumn of 2012 before flowering stage from Dena heights of Zagros mountains in southwest of Iran (kohgilouyeh and Boyerahmad province). Roots were dried in shade and milled by circular blade mill. 500 mg of dried powder was prepared and then 500 mL of distilled water with temperature about 70-80°C was added to powder in an erlen. Erlen mouth was coverd by foil and was placed in water bath (60°C). After 24 h solution of earln was squeezed and obtained extract was filtrated using filtration papers and Bokhner funnel. The process was replicated six times to prepare required extract (Mashhadian and Rakhshandeh, 2005).

At the end of experiment two broilers were selected randomly from each replication and blood samples were taken from vein under the wing. Samples were centrifuged for 2 min and 3000 cycles per minute to separate the serum. After that samples were kept at 20°C until hormone measuring T₃, T₄ and TSH hormones were measured using Eliza method and Monobind kits made by USA.

For determining T₃ 25 µL of sample and for T₄ and TSH, 50 µL of it were used. 100 µL of conjugate solution was added and were incubated for 60 min in room temperature. After that 300 µL of rinsing solution was added and rinsing was done for three times. 100 µL of ready made substrate was added to each sample and plate was incubated in room temperature and darkness for 15 min. Then 50 µL of stop solution was added and plate was shaked by hand for 15-20 sec and at last plate was read at wave length of 450 nm.

Obtained data were analyzed using SAS program and mean comparison was done using Duncan multiple ranges test.

RESULTS

There were significant differences (p<0.05) between T₃ hormone of high dose groups (third and fourth groups with 0.5 and 1% of extract) and control (Fig. 1) but according to results, T₄ amount of various groups was not different (Fig. 2). The level of TSH hormone was significantly different (p<0.05) in third and fourth groups and control group (Fig. 3).
DISCUSSION

Thyroid hormones (T₃ and T₄) are dividing from thyrosin amino acid. About 95% of thyroid secreting hormones are T₄ (thyroxin) whereas T₃ plays the main role. The main part of T₃ is obtained from converting T₄ to T₃ in peripheral tissues like liver, kidney and placentum. Some tissues like brain and hypophysis can also convert T₄ to T₃ but obtained hormone can not be entered to blood and remains there. On the whole, 80% of blood’s T₃ is made in liver and 20% in thyroid. Secreting Thyroid Stimulating Hormone (TSH) controls releasing thyroid hormones. The amount of TSH secreting is also adjusted by level of thyroid hormones in blood. By reduction in these hormones TSH secreting will be increased and then T₃ and T₄ secreting will be raised. Thyrothrypine Releasing Hormone (TRH) secreted from hypothalamus adjusts TSH releasing from hypophysis somehow (Maleknia, 2004). In this study, TSH was increased significantly. Previous studies show that marshmallow’s root extract can affect endocrine actions via releasing hypothalamus-hypophysis axis which is probably because of increase in TSH (Booth, 1998). Scientist have shown that extract of marshmallow’s root can affect the action of hypophysis gland via controlling receptor conjunction and affect T₃, T₄ and TSH (Lau et al., 1991).

Considering that somatoacetatin secreting is increased by effect of insulin like factor type one (IGF-1) and it controls Thyrotropin Releasing Hormone (TRH), it can be a reason for reducing TSH amount but the extract could eliminate this controlling effect and TSH amount has been increased by stimulating negative feedback to save basic metabolism. The main part of T₃ is made in liver and 20% in thyroid.

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REFERENCES


