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The Protective Effects of Passiflora Extract on Thyroid Function in Shisheh (Met-Amphetamine) Receiving Rats

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***Abstract*:** *Studies show that passiflora extract has various improving effects on body systems including endocrine glands. This study was exerted to determine the effects of passiflora extract on serum T3 and T4 levels in Shisheh (met-amphetamine) receiving rats. In this laboratory experimental study, male Wistar rats were randomly divided to control group, and normal saline1, met-amphetamine (4mg/kg) and "met-amphetamine (4mg/kg) + passiflora extract (150 mg/kg)" receiving rats. The injections were carried out once a week. After 6 weeks, blood samples were collected using cardiac puncture method and following serum collection, the levels of T3 and T4 were measured by radioimmunoassay. The data were statically analyzed using ANOVA. The results of the present study show that there was no significant difference in serum levels of T3 and T4 in rats receiving normal saline compared with control animals. However, serum levels of T3 and T4 significantly increased in rats receiving met-amphetamine compared to control group ($P<0.05$, $P<0.01$, respectively). Serum levels of T3 did not significantly change in "met-amphetamine + passiflora extract)" receiving rats compared to control rats but significantly decreased compared to normal saline receiving ($P<0.05$) and to met-amphetamine receiving ($P<0.001$) rats. Serum levels of T4 did not significantly change in "met-amphetamine + passiflora extract)" receiving rats compared to control and normal saline receiving rats but significantly decreased compared to to met-amphetamine receiving ($P<0.01$) rats. Our finding show that passiflora extract has protective effects on thyroid function in met-amphetamine receiving animals .*

Keywords: *Met-amphetamine, Passiflora Extract, T3, T4, Rat.*

1. Introduction

Passiflora, known also as the passion flowers or passion vines, is a genus of about 500 species of flowering plants. The leaves are used as food plants by the larva of a number of lepidoptera. Also, many Passiflora species produce sweet nutrient-rich liquid from glands on their leaf stems. These fluids attract ants which will kill and eat many pests that they happen to find feeding on the passion flowers. [1]

Amphetamine is a potent central nervous system (CNS) stimulant that is used in the treatment of attention deficit hyperactivity disorder (ADHD), narcolepsy, and obesity. Amphetamine was discovered in 1887. Amphetamine properly refers to a specific chemical, the racemic free base, which is equal parts of the two enantiomers, levoamphetamine and dextroamphetamine, in their pure amine forms. However, the term is frequently used informally to refer to any combination of the enantiomers, or to either of them alone. Historically, it has been used to treat nasal congestion, depression, and obesity. Amphetamine is also used as a performance and cognitive enhancer, and recreationally as an aphrodisiac and euphoriant. It is a prescription medication in many countries, and unauthorized possession and distribution of amphetamine are often tightly controlled due to the significant health risks associated with recreational use.

Amphetamine, through activation of a trace amine receptor, increases biogenic amine and excitatory neurotransmitter activity in the brain, with its most pronounced effects targeting the catecholamine neurotransmitters norepinephrine and dopamine. At therapeutic doses, this causes emotional and cognitive effects such as euphoria, change in libido, increased wakefulness, and improved cognitive control. It induces physical effects such as decreased reaction time, fatigue resistance, and increased muscle strength
Much larger doses of amphetamine may impair cognitive function and induce rapid muscle breakdown. Drug addiction is a serious risk with large recreational doses, but rarely arises from medical use. Very high doses can result in psychosis (e.g., delusions and paranoia) which rarely occurs at therapeutic doses even during long-term use. Recreational doses are generally much larger than prescribed therapeutic doses and carry a far greater risk of serious side effectsIt is also the parent compound of its own structural class, the substituted amphetamines, which includes prominent substances such as bupropion, cathinone, MDMA (ecstasy), and methamphetamine. [2]

The thyroid gland, or simply the thyroid is one of the largest endocrine glands in the body, and consists of two connected lobes. The thyroid gland controls how quickly the body uses energy, makes proteins, and controls the body's sensitivity to other hormones. It participates in these processes by producing thyroid hormones, the principal ones being thyroxine (T4) and triiodothyronine (T3), which is more active. These hormones regulate the growth and rate of function of many other systems in the body. T3 and T4 are synthesized from iodine and tyrosine. The thyroid also produces calcitonin, which plays a role in calcium homeostasis.
Hormonal output from the thyroid is regulated by thyroid-stimulating hormone (TSH) produced by the anterior pituitary, which itself is regulated by thyrotropin-releasing hormone (TRH) produced by the hypothalamus.
Thyroid hormones are important for development, and hypothyroidism secondary to iodine deficiency remains the leading cause of preventable intellectual disability.[3]

The thyroid is composed of spherical follicles that selectively absorb iodine (as iodide ions, I–) from the blood for production of thyroid hormones, and also for storage of iodine in thyroglobulin. Twenty-five percent of the body's iodide ions are in the thyroid gland. Inside the follicles, in a region called the follicular lumen, colloid serves as a reservoir of materials for thyroid hormone production and, to a lesser extent, acts as a reservoir for the hormones themselves. The follicles are surrounded by a single layer of follicular cells, which secrete T3 and T4.The primary function of the thyroid is production of the hormones T3, T4 and calcitonin. Up to 80% of the T4 is converted to T3 by organs such as the liver, kidney and spleen. T3 is several times more powerful than T4, which is largely a prohormone, perhaps four or even ten times more active.
Upon stimulation by the thyroid-stimulating hormone(TSH), the follicular cells reabsorb Tg and cleave the iodinated tyrosines from Tg in lysosomes, forming T4 and T3 (in T3, one iodine atom is absent compared to T4), and releasing them into the blood. Deiodinase enzymesconvert T4 to T3. Thyroid hormone secreted from the gland is about 80-90% T4 and about 10-20% T3.

In the blood, T4 and T3 are partially bound to thyroxine-binding globulin (TBG), transthyretin, and albumin. Only a very small fraction of the circulating hormone is free (unbound) - T40.03% and T3 0.3%. Only the free fraction has hormonal activity. As with the steroid hormonesand retinoic acid, thyroid hormones cross the cell membrane and bind to intracellular receptors ($\alpha 1$, $\alpha 2$, $\beta 1$ and $\beta 2$), which act alone, in pairs or together with the retinoid X-receptor as transcription factors to modulate DNA transcription.
The production of thyroxine and triiodothyronine is regulated by thyroid-stimulating hormone (TSH), released by the anterior pituitary.[4]-[6] This study was exerted to determine the effects of passiflora extract on serum T3 and T4 levels in Shisheh (amphetamine) receiving rats.

2. Material and Methods

In this laboratory experimental study, male Wistar rats were randomly divided to control group, and normal saline1, amphetamine (4mg/kg) and “amphetamine (4mg/kg) + passiflora extract (150 mg/kg)” receiving rats. The injections were carried out once a week. After 6 weeks, blood samples were collected using cardiac puncture method and following serum collection, the levels of T3 and T4 were measured by radioimmunoassay. The data were statically analyzed using ANOVA.

3. Results

Figure I and II show serum T3 and T4 levels in male rats.

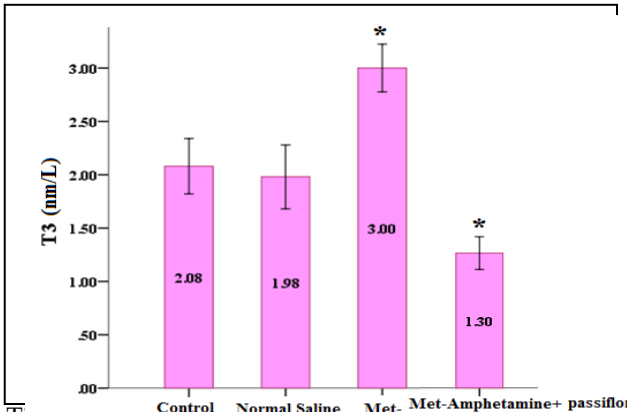

Fig.1: Serum T[illegible] red to control animals.

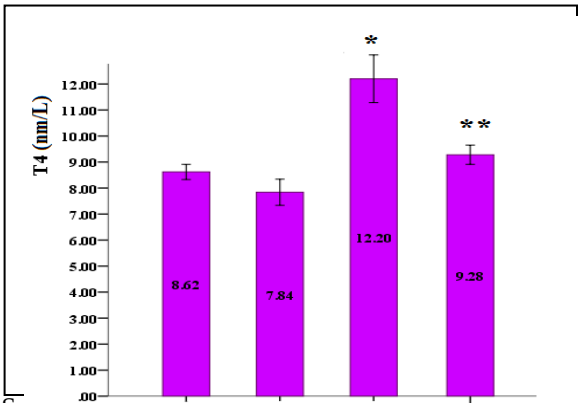

Fig.2: Se[illegible] ice compared to control animals and *[illegible] phetamine receiving animals.

The results of the present study show that there was no significant difference in serum levels of T3 and T4 in rats receiving normal saline compared with control animals. However, serum levels of T3 and T4 significantly increased in rats receiving amphetamine compared to control group ($P<0.05$, $P<0.01$, respectively). Serum levels of T3 did not significantly change in "amphetamine + passiflora extract)" receiving rats compared to control rats but significantly decreased compared to normal saline receiving ($P<0.05$) and to amphetamine receiving ($P<0.001$) rats. Serum levels of T4 did not significantly change in "amphetamine + passiflora extract)" receiving rats compared to control and normal saline receiving rats but significantly decreased compared to to amphetamine receiving ($P<0.01$) rats.

4. Discussion

We have shown that passiflora extract has protective effects on thyroid function in met-amphetamine receiving animals. Studies show that passiflora extract has improving effects on body system such as anti-inflammatory effects. [7] It has also been shown that polysaccharide fraction isolated from Passiflora inhibits the inflammatory response and the oxidative stress in mice. [8] Passiflora extract has antioxidant property. [9] The studies suggest that the plant extract has analgesic and antidiarrhoeal activities, supporting its uses in traditional medicine. [10] Anti-diabetic effects of passiflora were also suggested. [11] The findings suggest that passiflora has beneficial effects on lipid profile and improved lipid peroxidation in Wistar rats.[12] The effects of passiflora extract on metabolism have been shown [13], according to which, it will be expected that the extract influences thyroid gland function.

5. Conclusion

We have shown that passiflora extract has protective effects on thyroid function in amphetamine receiving animals .

6. Acknowledgment

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