



## Effect of *Citrullus lanatus* Seeds Extracts on Serum Total Testosterone in Rat

Arash Khaki<sup>1\*</sup>, Fatemeh Fathiazad<sup>2</sup>, Mohammad Nouri<sup>1</sup>, Amir Afshin Khaki<sup>1</sup>

### Abstract

**Objective:** *Citrullus lanatus* is an antioxidant and it has been shown to reduce oxidative stress. Previous study confirmed antioxidants have essential effect on infertility by their role on reactive oxygen's spaces.

**Materials and Methods:** Wistar male rat (n = 20) were allocated into two groups, control group (n = 10) and *C. lanatus* group that received 30 mg/kg, (n = 10), by gavage method, daily for, 4 weeks, respectively; however, the control group just received an equal volume of distilled water daily. Animals were kept in standard condition. In 28 day, for measurement blood glucose and testosterone, 5 cc blood of each rat were collected then prepared for analysis.

**Results:** Serum testosterone significantly was increased in group that has received 30 mg/kg of extract, (P < 0.05) in comparison to control group (P < 0.05). Blood glucose was decreased in extract group but was not significantly when compared to control group (P > 0.05).

**Conclusion:** Since in our study 30 mg/kg *C. lanatus* has significantly increased serum testosterone and hence it seem this results can beneficial effects on fertility and need more evaluations in next researches.

**Keywords:** *Citrullus lanatus*, Rat, Testosterone

### Introduction

Watermelon is usually a light green or white color, is also edible and contain many hidden nutrients and widely distributed in Africa and Asia, but originates from southern Africa occurring naturally in South Africa, Zimbabwe, Mozambique, Zambia and Malawi. Watermelon is thought to have been domesticated at least 4000 years ago, and the plant was grown as a crop in the Nile valley (1,2). The indigenous people of the Kalahari, in their search for water-containing foods, selected varieties with low glycoside content. From there followed the spread to the Mediterranean areas and in an eastern direction to India. Watermelons were developed as a crop in Egypt in ancient times and according to Encyclopedia Britannica "The history of watermelons is a long one; there is a Sanskrit word for watermelon, and fruits are depicted by early Egyptian artists, indicating an antiquity in agriculture

of more than 4000 years". The flavonoids are a group of benzopyran derivatives which occur widely in plants. 92% of watermelon weight contains water and 6% contain sugar. Many it sources many vitamins such as A, B6 and C groups and minerals such as magnesium, potassium. Citrulline is the important amino-acid that extracted from watermelon. Watermelon is mildly diuretic and contains large amounts of beta carotene. Watermelon with red flesh is a significant source of lycopene. Preliminary research indicates the consumption of watermelon may have antihypertensive effects. Previous studies have showed that lycopene holds nutraceutical potential and as an antioxidant, it provides protection boy cells against oxidative and free radical damage (3,4). In the mammalian body Free radicals are produced via normal-oxidation-reduction reactions and are needed for many physiological processes. However, production in excess leads body defense mechanism and cell

Received: 10 Sep 2013, Revised: 21 Oct 2013, Accepted: 21 Dec 2013, Available online: 15 Jan 2014

<sup>1</sup> Women's Reproductive Health Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>2</sup> Department of Pharmacognosy, Tabriz University of Medical Sciences, Tabriz, Iran

\*Corresponding Author: Arash Khaki, Women's Reproductive Health Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Tel: +98 9143138399, Email: arashkhaki@yahoo.com

membranes and organelles to a long-term deterioration. These degenerative processes result in life-threatening ailments (5,6). Certain antioxidants will help improve infertility and understanding the mechanisms of action of oxidative stress and antioxidants are important issues in this direction. Human spermatozoa are capable of generating controlled low amounts of endogenous reactive oxygen species that play a significant role in inducing sperm capacitation/acrosome reaction and acquisition of sperm-fertilizing ability (7). The aim of this study was the effect of *Citrullus lanatus* seeds as an antioxidant on serum testosterone and blood glucose.

### Materials and Methods

Twenty adult Wistar albino male rats were 8 weeks old and weighing  $250 \pm 10$  g, they were obtained from animal facility of pasture institute of Iran. Male rats were housed in temperature controlled rooms (25 °C) with constant humidity (40-70%) and 12 h/12 h light/dark cycle prior to use in experimental protocols. All animals were treated in accordance to the Principles of Laboratory Animal Care. The experimental protocol was approved by the Animal Ethical Committee in accordance with the guide for the care and use of laboratory animals prepared by Tabriz Medical University. All rats were fed a standard diet and water. The daily intake of animal water was monitored at least 1 week prior to start of treatments in order to determine the amount of water needed per experimental animal. Thereafter, the Wistar male rat (n = 20) were allocated into two groups, control group (n = 10) and *C. lanatus* group that received 30 mg/kg, (n = 10), by gavage method, daily for, 4 weeks, respectively; however, the control group just received an equal volume of distilled water daily.

*C. lanatus* fruit were bought from local market in Tabriz, Iran. Seeds of it were removed and dried in room temperature. This hydro alcoholic extract was kept in refrigerator for all experiments. Seeds were washed and dried in room temperature. This hydro alcoholic extract was kept in refrigerator for all experiments.

Total serum concentration of testosterone was measured using a double-antibody radioimmunoassay kit (Immunotech Beckman Coulter Co., USA). The testosterone detection sensitivity per assay tube was 0.025 ng/ml.

Blood samples were collected from the tail vein male rats in all groups. Basal glucose levels were determined, using an automated blood glucose analyzer (glucometer elite XL).

Statistical analysis was performed using the t-test

for comparison of data in the control group with the experimental groups. The results were expressed as mean  $\pm$  standard error of mean ( $P < 0.05$ ) were considered as significant and are written in the parentheses.

### Results

#### *Results of serum testosterone and blood glucose*

Administration of 30 mg/rat *C. lanatus* extract for 28 consecutive days significantly increased serum testosterone in experimental group when compared with the control group in control group. Blood glucose level not shows significantly difference between groups (Table 1).

### Discussion

It is believed that for males with idiopathic infertility, dietary supplementation with a combination of well-tolerated, clinically efficacious, and noninvasive vitamins and vitamin-like agents, such as L-carnitine, acetylcaritine, vitamins E and C, fructose, citric acid, selenium, and zinc provide an alternate pharmacological therapy to improve sperm quality and greater likelihood of success of assisted reproductive technology procedures (8). Our results in this study showed total serum testosterone in group that received 30 mg/kg *C. lanatus* was significantly increased when compared to control group and this enhancing belong to total antioxidant and minerals of this fruit. Many of researchers have reported that antioxidants and vitamin A, B, C, and E in diet can protect sperm DNA from free radicals and increase blood test is barrier stability (9-11). Evidence suggests that certain phytochemicals found in citrus sources, such as flavonoids and limonoids, play a major role in treating or retarding chronic diseases, including anti-oxidative, anti-carcinogenic, cardiovascular protective, neuro-protective, bone health promotion and anti-inflammatory diseases. Antioxidants protect DNA and other important molecules from oxidation and damage, and can improve sperm quality and consequently increase fertility rate in men (12). This increase in sperm population, motility and viability of experimental group in comparison to control group could be due to the protective effect of *citrullus vulgaris* seeds extract administration. Beside, these productive effects are reflected may be by the decrease of malonaldehyde level and increase in total anti-oxidants capacity. Antioxidants can interfere with the oxidation process by reacting with free radicals, chelating catalytic metals, acting as oxygen scavengers (13) and prevent lipid auto oxidation (14).

**Table 1.** The effect of the 30 mg/kg/rat *C. lanatus* on serum testosterone, and blood glucose

	Control (n = 10)	<i>C. lanatus</i> (30 mg/kg/day) (n = 10)
Serum testosterone (ng/ml)	1.044 $\pm$ 0.33	3.75 $\pm$ 0.55*
Blood glucose (g/l)	1.000 $\pm$ 3.30	1.00 $\pm$ 0.11

Data are presented as mean  $\pm$  SEM, \*Significant different at  $P < 0.05$  level, (compared with the control group); SEM: Standard error of means; *C. lanatus*: *Citrullus lanatus*

Worldwide studies have been done to make use of herbal medicine in different fields of medicine. Base on ancient Persians traditional books Use of herbal medicine has positive effect on treatment of different diseases, especially on diabetes mellitus. Onion contains A, B, C vitamins, flavonoids and selenium, which their antioxidant role has been proved (15) such as herbal antioxidant can improve sperm parameters and increase chances in infertile couple to get new life.

### Conclusion

This finding confirm that administration of antioxidant to normal animal diet with rich in flavanols that not suffering from inducing oxidative stress, show improve in testicular and hormonal functional, suggesting this hypothesis that oxidative stress is a consistence feature of testis physiology.

### Ethical issues

The study was approved by the ethic committee of Tabriz University of Medical Sciences.

### Conflict of interests

We declare that we have no conflict of interests.

### Acknowledgments

This research was supported by Women's Reproductive Health Research Center, Tabriz University of Medical Sciences. We gratefully thank for their help and financial support.

### References

- Bates DM, Robinson RW. Cucumbers, melons and water-melons. In: Smartt J, Simmonds NW, Editors. Evolution of Crop Plants. New Jersey, NJ: Wiley; 1995.
- Jeffrey C. Cucurbitaceae. In: Launert E, Editor. Flora Zambesiaca. London, UK: Flora Zambesiaca Managing Committee; 1978. p. 433-4.
- Ansari MS, Gupta NP. Lycopene: a novel drug therapy in hormone refractory metastatic prostate cancer. *Urol Oncol* 2004; 22: 415-20.
- Crozier A, Del RD, Clifford MN. Bioavailability of dietary flavonoids and phenolic compounds. *Mol Aspects Med* 2010; 31: 446-67.
- Heber D, Lu QY. Overview of mechanisms of action of lycopene. *Exp Biol Med (Maywood)* 2002; 227: 920-3.
- Matos HR, Di MP, Medeiros MH. Protective effect of lycopene on lipid peroxidation and oxidative DNA damage in cell culture. *Arch Biochem Biophys* 2000; 383: 56-9.
- de Lamirande E, Gagnon C. Impact of reactive oxygen species on spermatozoa: a balancing act between beneficial and detrimental effects. *Hum Reprod* 1995; 10: 15-21.
- Wong WY, Thomas CM, Merkus JM, Zielhuis GA, Steegers-Theunissen RP. Male factor subfertility: possible causes and the impact of nutritional factors. *Fertil Steril* 2000; 73: 435-42.
- Garcia-Lafuente A, Guillamon E, Villares A, Rostagno MA, Martinez JA. Flavonoids as anti-inflammatory agents: implications in cancer and cardiovascular disease. *Inflamm Res* 2009; 58: 537-52.
- Machha A, Achike FI, Mustafa AM, Mustafa MR. Quercetin, a flavonoid antioxidant, modulates endothelium-derived nitric oxide bioavailability in diabetic rat aortas. *Nitric Oxide* 2007; 16: 442-7.
- Khaki A, Fathiazad F, Nouri M. Effects of Watermelon Seed Extract (*Citrullus Vulgaris*) on Spermatogenesis in Rat. *Int J Women's Health Reproduction Sci* 2013; 1: 99-104.
- Kato A, Minoshima Y, Yamamoto J, Adachi I, Watson AA, Nash RJ. Protective effects of dietary chamomile tea on diabetic complications. *J Agric Food Chem* 2008; 56: 8206-11.
- Jan AT, Kamli MR, Murtaza I, Singh JB, Haq QM. Dietary Flavonoid Quercetin and Associated Health Benefits-An Overview. *Food Reviews International* 2010; 26: 302-17.
- Jaskani MJ, Kwon SW, Kim DH, Haider A. Seed treatments and orientation affects germination and seedling emergence in tetraploid watermelon. *Pakistan Journal of Botany* 2006; 38: 89-98.
- Middleton E, Kandaswami C, Theoharides TC. The effects of plant flavonoids on mammalian cells: implications for inflammation, heart disease, and cancer. *Pharmacol Rev* 2000; 52: 673-751.

**Citation:** Khaki A, Fathiazad F, Nouri M, Khaki AA. **Effect of *Citrullus lanatus* Seeds Extracts on Serum Total Testosterone in Rat.** *Crescent J Med & Biol Sci* 2014; 1(1): 25-7.