

Effect of *Allium cepa* seed extract on body and testicular weight, mature gametes and parietal cells of male rats

Hosseini Ahar, N.^{1*} and Safi, SH.²

¹Young Researchers and Elite Club, Karaj Branch, Islamic Azad University, Karaj, Iran

²Department of Clinical sciences , Faculty of Veterinary Specialized Sciences, Science and Research Branch, Islamic Azad University, Tehran, Iran.

ABSTRACT

Allium cepa has been used throughout history as a medicinal drug. It has many compounds mostly contain a sulfuric content such as Alicin, Di-alkyl Di-sulfide (DAS), that caused antioxidant and protective properties. The present study examined body weight and testicular weight and spermatogenesis in mice. All these reactions were performed by using *Allium cepa*. This study was conducted on 10 adult male rats, ranging from 6 to 8 weeks. Animals were divided in to two groups, a control group and the experimental group that received *Allium cepa* (0.5 cc) for a period of 30 days. After 30 days, the rats were weighted and after anesthesia, their testes were taken out and tissue dissections were obtained. T-test was applied for statistical analysis. The results show that the body and testis weight and spermatogenesis increased in the rats. This study shows the anti-oxidant characteristics of *Allium cepa*, and also its effect on reducing harmful metabolites. It seems that using it in infertile patients has beneficial effects.

KEY WORDS: ANTIOXIDANT, ALLIUM CEPA, MATURE GAMETES, PARIETAL CELLS, BODY WEIGHT, TESTICULAR WEIGHT.

INTRODUCTION

Onion (*Allium cepa*) is one of the most commonly cultivated species of the family Liliaceae, and has long been used in dietary and therapeutic applications. Onions such as *Allium cepa* are rich in two chemical groups

that have perceived benefits to human health. These are the flavonoids such as quercetin and the alkenyl cysteine sulphoxides (ACSOs). *Allium cepa* has been reported to have medicinal potentials. Compounds isolated from onions have been shown to possess anti-carcinogenic, hypolipidaemic, antithrombotic, antiasth-

ARTICLE INFORMATION:

*Corresponding Author: shirazia@tums.ac.ir

Received 3rd Aug, 2016

Accepted after revision 19th Nov, 2016

BBRC Print ISSN: 0974-6455

Online ISSN: 2321-4007



Thomson Reuters ISI ESC and Crossref Indexed Journal

NAAS Journal Score 2015: 3.48 Cosmos IF : 4.006

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Online Contents Available at: <http://www.bbrc.in/>

matic, antibacterial and antifungal properties .A number of varieties of *A. cepa* are available commercially with varietal differences in phytoconstituents and biological activities. Studies have also documented the antioxidant value of *A. cepa*. Research has shown that onion contains exogenous and endogenous antioxidants such as selenium, glutathione, vitamins A, B, and C, and flavonoids such as quercetin and isorhamnetin. The antioxidant effect of *A. cepa* has been associated with reduced lipid peroxidation index malondialdehyde (MDA) and increased superoxide dismutase (SOD), (Ige et al, 2011, Guercio et al., 2014 and Kumar et al 2016).

It also protects DNA and other important molecules from oxidation and damages, and could improve sperm health parameters, increasing the rate of fertility in men (Rajeev and Narmada, 2006; Yang et al. 2006). Both ACE (*Allium cepa* extract) and QCT (component quercetin) have broad ranging pharmacological effects, particularly free radical scavenging properties, that protect against oxidative injury, due to their ability to modulate intracellular signals and promote cell survival (Dai et al, 2013). Compounds from onion have been reported to have a range of health benefits which include anticarcinogenic properties, antiplatelet activity, antithrombotic activity, antiasthmatic and antibiotic effects (Griffiths et al, 2002). Recent epidemiological data provides robust evidence that consumption of onions reduces the risk of gastric cancer (Guercio et al., 2014). Previous studies have also shown that *A. cepa* antagonizes the toxic effects of AlCl₃ and improves the antioxidant status and sperm quality of male rats, (Ige and Akhigbe,2012).

Pre-treatment of rat with *Allium cepa* extract prevented CdSO₄-induced reproductive toxicity by improving sperm quality and enhancing testicular lipid peroxidation status (Ige et al, 2012). onion and garlic supplementation enhances semen quality characteristics in Hubbard white breeder broiler cocks (Okoro et al, 2015). The present study reports the antioxidant effect and possible role of *Allium cepa* extract on spermatogenesis parameters such as body weight, testes weight, mature gametes and parietal cells in rats.

MATERIALS AND METHODS

The experiment was carried out with 10 male Wistar rats (6-8 months and 200 ± 20 g body weight) and randomly divided into two groups. They were housed in a temperature controlled room (25 -30 °C) with 12-h light and 12-h dark cycles with free access to water and food in cages placed in Animal Husbandry. All animals were treated in accordance with the Principles of Laboratory Animal Care. The rats randomly divided into two experimental and control groups. Onion (*Allium cepa*) seeds were bought from local market in Tehran City of Iran.

Seeds (100g) were washed and dried, and were extracted with 80% methanol in Soxhlet apparatus for 72 h. After extraction, the solvent was filtered and then evaporated by rotatory evaporator and dried (Eidi et al,2006 ; Swami et al,2008).

The rats were fed normal diets and divided into 2 groups, each with five rats. A total of 10 rats were used. Group one served as the control group and just received an equal volume of distilled water daily with no extract. Groups 2 received 0.5 mg/kg body weight of the extract. They were observed daily for any observable change. At the end of the treatment period (30th day), the rats were weighed and anesthetized using intra peritoneal pentobarbital sodium (40mg/kg), then killed. The peritoneal cavity was opened through a lower transverse abdominal incision. Testes in control and experimental groups were immediately removed and fixed by perfusion with 4% formaldehyde in buffered solution for 20 minutes and afterwards their left testes were taken out and weighed.(A&D GF600, Germany).

Testes were fixed in 10% formal saline, blocks embedded in paraffin and sections cut at 5 micron which was then stained with H&E and mounted. Microscopic examination of the sections was then carried out under a light microscope.All experimental data are presented as means± SD. Each experiment was performed at least three times and subjected to statistical analysis. For statistical analysis, analysis of variance was performed to determine whether there were differences among two groups (P < 0.05). P value below 0.05 was considered significant.

RESULTS AND DISCUSSION

The obtained results in this study were illustrated in table 1. There was no significant difference in body weights between two groups, although (P<0.465). Testis weight was increased significantly in experimental group in comparison with the control group (p<0.009).

Comparative study of samples from the two groups showed that administration of *A. cepa* (0.5 mg/kg for 30 days) led to significant increase in mature gametes. Experimental animals showed significant increase in parietal cells comparing to normal control (table 1). After about 4 weeks of treatment, control rats showed normal morphology of seminiferous tubules. Treatments with *Allium cepa* extract at doses of 0.5 mg/kg induced significant changes in the seminiferous tubules. The histological features of the experimental group can increase the inner diameter of the tubules and the number of mature gametes.

In this study, the use of morphological and morphometric methods were performed to determine body and testes weight and different classes of gametes from

Table 1: Body weight, Testis weight, mature gametes and Parietal cells of control and experimental groups.

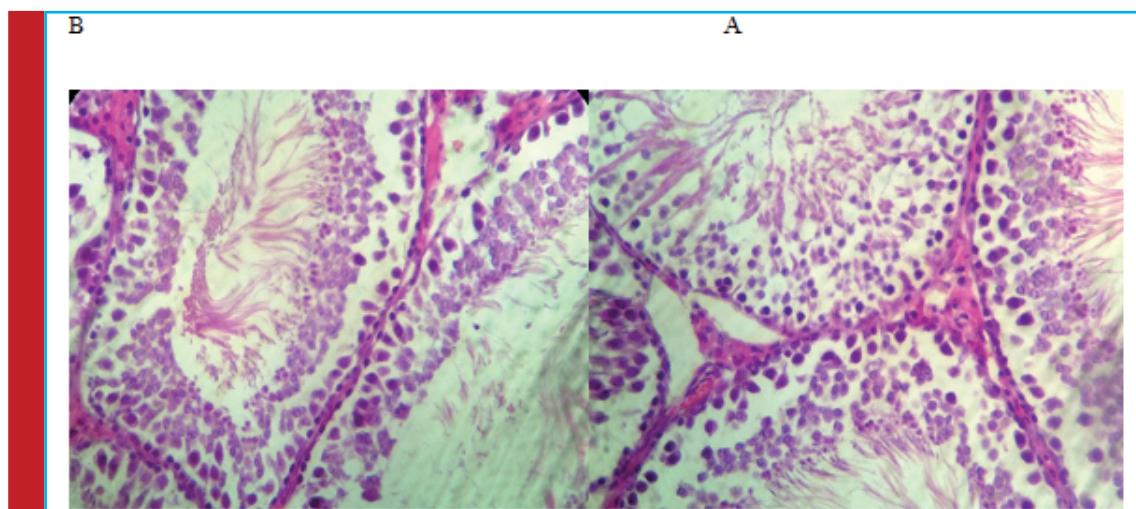
Variables groups	N.	Body weight(g)	Testis weight(g)*	Mature gametes*	Parietal cells(mm) ³ *
Control	5	301±22.47	1.45±0.1	98.6±8.96	197.8±2.77
Extract	5	307.49.94	1.95±0.16	168.4±18.87	315.6±13.93

*: p<0/05

control and experimental groups. It was tried to assess possible effects of onion extracts on the process of spermatogenesis. As shown in Table 1, this study showed that *A. cepa* extract has significant effect on mature gametes and parietal cells. Furthermore, it affected the body weight and testis weight in experimental group in comparison with the control group. Onion contains a wide variety of phytochemicals and micro constituents such as trace elements, vitamins, fructans, flavonoids, and sulphur compounds, which may have a protective effect against free radicals. Recently, much attention has been focused on the protective effects of onion against colon cancers in rats (Ola-Mudathir et al, 2008; Prasad and Oberleas, 1973). Some unique properties of onion such as antilipidaemic and antioxidant potentials have been studied (Corzo-Martinez et al, 2007; Lewin and Popov, 1994; Prasad, 1996). Many studies were done to shows Onion peels exhibited strong antioxidant activity and abundant phytochemicals (Duan et al, 2015) and to elucidate their mechanism of action (Rahman and Bilington, 2000; Lau, 2001; Dillon et al, 2003). significant

remedy effect on sperm parameters and also increase in the number of leydig cells was showed (Khaki et al, 2016).

Several factors have effect on very sensitive and complex process named spermatogenesis, and Lead to infertility or reduced fertility (Hosseini et al, 2014). The present results clearly indicate that *Allium cepa* has a good effect on spermatogenesis in rats. The biological activity of an extract of onion or garlic depends on its mode of preparation (Shashikanth et al, 1986; Kleijnen, 1989; Corzo-Martinez et al, 2007). In the present study, the alcohol extract of onion was separately prepared. Quercetin, as a natural antioxidant, is ubiquitously distributed in fruits and vegetables. Onion is a rich source of quercetin (McAnlis et al, 1999). Previous study found that flavonoid quercetin and daizein have protective effects on cadmium or polychlorinated biphenyls-induced oxidative damage in mice testes (Zhang et al, 2008; Bu et al, 2011). Studies showed that C, E, and B vitamins are useful in reducing the poisonous effects on tissue of the testes (Yang et al, 2006) *Allium cepa*

FIGURE 1. Testes from control group (A) and extract group (B).H&E.(x640) The role of *Allium cepa* on aluminum-induced reproductive dysfunction in experimental male rat models.

could prescribed as an effective pharmacological supplement to moderate exposure degenerative effects (khaki et al, 2016). Structure-activity relationships of quercetin were investigated (Cao et al, 1997). The antioxidant activities of quercetin may depend upon its hydroxyl groups. It is supposed that flavonoids prevent the progression of the radical chain reaction by trapping free radicals at the interface of the membranes (Ross et al, 2002). In addition to its free-radical scavenging properties, quercetin can also chelate those transition metal ions responsible for the generation of reactive oxygen species (Rice-Evans et al, 1996). The neuroprotective potential of *Allium cepa* was seen that might be due to the PPAR γ agonistic action pertaining to its flavonoidal content (Singh and Goel, 2015).

CONCLUSION

The present study provides detailed information on the effects of *Allium cepa* extract on testis weight, body weight, mature gametes and Parietal cells count. Morphometric results obtained from this study showed that the administration of *A.cepa* extract also influences the seminiferous tubules, cell proliferation and spermatogenesis in the experimental group compared to control group. Onion with rich compounds may be useful for inclusion in the diets of those who are suffering from sexual disorders and can be effective in relieving disability.

ACKNOWLEDGMENTS

This research was supported by Young Researchers and Elite Club,Islamic azad University ,Karaj Branch, Iran. The code of this research protocol was "92341".

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