Biochemistry & Physiology: Open Access

Ssimbwa et al, Biochem Physiol 2018, 7:4
DOI: 10.4172/2168-9652.1000247

Research Article Open Access

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Abstract

Background: Soy contains phytoestrogens which are potent endocrine disruptors. Soy mainly contains phytoestrogens called isoflavones predominantly daizein and genistein.

Main body: The present study determined the effects of isoflavones consumed post-weaning on prepubertal and postpubertal Leydig and Sertoli cell numbers, spermatozoa parameters and body weight to paired testicular weight ratio of Wistar rats. In this study, three diets were formulated containing different amounts of isoflavones. The diets were formulated by adding to the base diet different quantities of novasoy which is an isoflavone concentrate.

The formulated diets contained 74.5, 235.6 and 1046.6 mg total isoflavones/kg pelleted diet, representing the

Keywords: Soy isoflavones; Post weaning; Sertoli cell; Leydig cell; Sperm; Prepubertal; Postpubertal; Testicular function

Introduction

Soy isoflavones have estrogenic activities and are structurally and functionally related to 17β-estradiol [1]. Genistein and daidzein plus their derivatives tend to mimic estrogen through binding to estrogens receptors [1]. Different studies have been carried out in humans indicating that exposure to endocrine disruptors such as phytoestrogens where isoflavones belong has led to decline in the quality of semen [2]. These studies have further shown that a decline in sperm count and semen volume among men have been associated with phytoestrogens [3].

Phytoestrogens have been associated with different reproductive conditions in male animals, exemplified by metaplasia of male accessory

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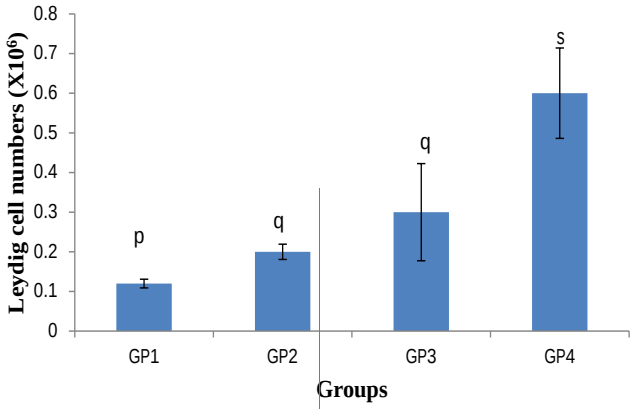
that the research did not give su cient evidence to what is seen in infants fed with soy based infant formula [14] and this suggested further research. e NTP consideration was as a result of technical limitations in the carrying out of the researches which made them not to depict the conditions (period, concentration, and route of exposure) as seen in human infants [14].

is study was therefore aimed at determining the e ect of oral administration during the post-weaning period on the pre-pubertal and post-pubertal testicular cells as well as sperm parameters of Wistar rats.

e route and mode of administration as well as age of consumption would simulate the real situation that occurs in humans, and the parameters determined later in life a er the cessation of soy consumption, for both prepubertal and post pubertal stages.



Sperm count of post pubertal rats fed on di erent amounts of iso avones

Sperm counts (Mean ± SD) for the post-pubertal rats were 87.400 ± 2.302, 74.000 ± 1.414, 71.200 ± 1.643 and 52.600 ± 3.130 million/mL for groups 5-8 respectively. e results of the study indicated that post-weaning consumption of iso avones led to a signi cant decrease ($p<0.05$) in sperm count, as shown in Figure 5.

Sperm motility of post pubertal rats fed on di erent amounts of iso avones

Sperm motility (Mean ± SD) for post-pubertal rats were 94.300 ± 2.427, 94.880 ± 2.149, 90.360 ± 2.158 and 81.700 ± 5.347% for groups 5-8 respectively. e results obtained in this study showed that post-weaning consumption of low and high amounts led to a signi cant ($p<0.05$) decrease in sperm motility as shown in Figure 6.

Sperm deformation of post pubertal rats fed on di erent amounts of iso avones

e sperm deformation percentages (Mean ± SD) for the post-pubertal rats were 1.820 ± 1.018, 3.14 ± 0.835, 4.460 ± 0.586 and 10.200 ± 2.270% for groups 5-8 respectively. e results in obtained in the current study indicated that post-weaning consumption of moderate and high amounts of iso avones led to a signi cant ($p<0.05$) increase in sperm deformation, as shown in Figure 7.

Body weight to paired testicular weight ratio of prepubertal rats fed on di erent amounts of iso avones

e ratios of body weight to paired testicular weight (Mean ± SD) were 212.340 ± 141.100, 197.150 ± 57.191, 220.250 ± 63.834, 298.320 ± 216.672 for groups 1-4 respectively.

e results obtained in the current study indicated that post-weaning consumption of soy iso avones led to a non-signi cant ($p>0.05$) changes in the body weight to paired testicular weight ratios in all groups, as shown in Figure 8.

Body weight to paired testicular weight ratio of post pubertal rats fed on di erent amounts of iso avones

e body weight to paired testicular weight ratios (Mean ± SD) for the post pubertal rats were 105.870 ± 9.374, 92.386 ± 10.941, 143.680 ± 23.193 and 127.360 ± 15.710 for groups 5-8 respectively. e results obtained in the current study indicated that post-weaning consumption of moderate and high amounts of soy iso avones led to a signi cant ($p<0.05$) increase in the body weight to paired testicular ration of post-pubertal rats, as shown in Figure 9.

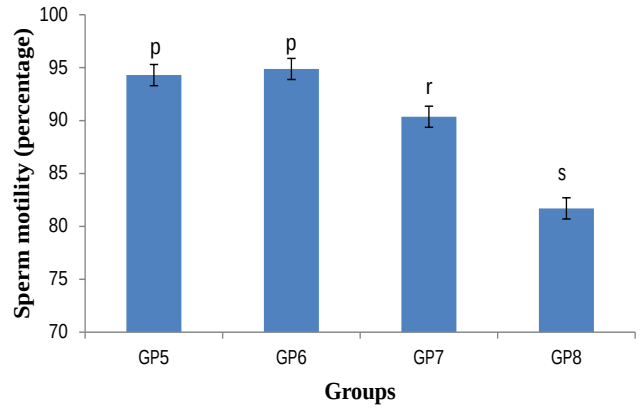


Figure 6: Sperm motility of post pubertal rats fed on different amounts of isoþavones. Bars with the same superscript (p, q, r or s) have no signiýcant differences between them ($p>0.05$). KEY: GP5=Postpubertal group fed on isoþavone free diet (control), GP6=Postpubertal group fed on diet containing 74.5 mg isoþavone/kg base diet, GP7=Postpubertal group fed on diet containing 235.6 mg isoþavone/kg base diet, GP8=Postpubertal group fed on diet containing 1046.6 mg isoþavone/kg base diet.

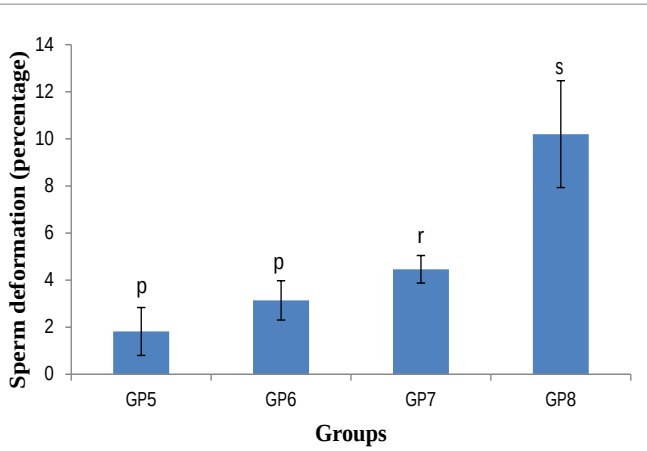


Figure 7: Sperm deformation of postpubertal rats fed on different amounts of isoþavones. Bars with the same superscript (p, q, r or s) have no signiýcant differences between them ($p>0.05$). KEY: GP5=Postpubertal group fed on isoþavone free diet (control), GP6=Postpubertal group fed on diet containing 74.5 mg isoþavone/kg base diet, GP7=Postpubertal group fed on diet containing 235.6 mg isoþavone/kg base diet, GP8=Postpubertal group fed on diet containing 1046.6 mg isoþavone/kg base diet.

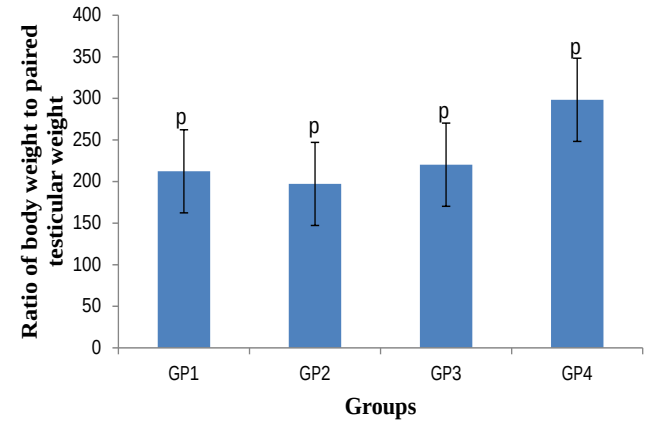


Figure 8:

Discussion

Leydig cells form 20% of mass of adult testis and they secrete androgens [20]. ese cells are clustered near blood vessels in the testicular interstitium [21]. ey are characterized by possession of many mitochondria, large smooth endoplasmic reticulum, much lipids and prominent droplets [22]. ese cells are subjected to changes both in number and function as the animal matures [22]. Results of the current study have indicated a signi cant increase ($p<0.05$) in Leydig cell numbers following soy iso avones administration. e ndings are in line with those reported by Kumi-Diaka [23].

Sertoli cells are described as nurse cells of the testis and these are the supporting cells for the developing spermatozoa [24]. ey provide attachment to the semiferous tubules where the spermatozoa develop from as well as provision of nutrients [25]. e Sertoli cells have fundamental importance to the development and maintenance of spermatogenesis, as well as numerical relationship to sperm production [25].

e present study showed that consumption of low doses of iso avones (74.5 mg/kg) produced a non-signi cant increase in Sertoli cell numbers while the moderate (235.6 mg/kg) and high (1046.6 mg/kg) recorded a signi cant increase in Sertoli cell numbers in prepubertal rats.

e results have also indicated an increase in sertoli cell numbers in post-pubertal rats following iso avones administration. e increase in both the

bisphenolA causes few alterations on measures of postweaning activity and learning. Neurotoxicol Teratol 34: 598-606.

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