Does the use of Testosterone Enanthate as a Form of Doping in Sports Cause Early Closure of Epiphyseal in Bones?

¿El Uso de Enantato de Testosterona como Forma de Dopaje en el Deporte Causa Cierre Epifisiario Temprano de los Huesos?

Sefa Lok *


SUMMARY: The purpose of this research is to investigate the morphometric effects of short term usage of testosterone enanthate among the anabolic androgenic steroids used as doping by athletes on humerus bones of male rats. 30 rats (35 days) were utilized in this research. The rats were divided into three equal groups. For the experimental group (n= 10), testosterone enanthate at 10 mg/kg dose in 100 µl peanut oil diluents, for the peanut oil group (n= 10), peanut oil of testosterone enanthate’ diluent (100 µl) was executed intraperitoneally 5 days in a week for 3 weeks. The control group (n= 10) was nourished without any practice for 3 weeks. All rats were euthanized end of the research. Humerus bones were exposed by the dissection of rats’ front extremite bones and measurements and the averages were taken. When the length of rats’ humerus bones were analyzed, the growth of humerus bones of rats testosterone enanthate applied in the experimental group stopped significantly and the difference was significant (p<0.05). It was observed that among anabolic androgenic steroids, testosterone enathate’s usage on male rats in puberty period caused early epiphyseal closure and stopped the growth of humerus bones significantly.

KEY WORDS: Sport; Doping; Testosterone enanthate; Bone; Humerus; Morphometry.

INTRODUCTION

Anabolic androgenic steroids (AAS) the speed sports in which high performance, power and endurance is needed (Kanayama et al., 2009); by athletes, body builders and weightlifters (Al-Ismail et al., 2002) to increase muscle mass, strength (Kanayama et al.; Attardi et al., 2011; Fürstenberger et al., 2012; Khan et al., 2012; Azzazy et al., 2009) and used to be able to achieve high performance (Lood et al., 2012; Hildebrandt et al., 2011; Di Luigi et al., 2012).

AAS damages organs such as liver (Tasgin et al., 2010; Pagonis et al., 2008), heart (Lok et al., 2010; Hassan & Kamal, 2013; Kaushik et al., 2010; Bagghish et al., 2010; Tasgin et al., 2011) and kidney (Hassan & Kamal; Neri et al., 2011). Immune system (Khan et al.), endocrine system, urogenital system (Collins & Basaria, 2012) not only cause the problems like that; but also reveal serious side effects on other systems in the body (Bispo et al., 2009) and prompt serious health problems (Di Luigi et al.).

One of the most serious side effects of these substances used for doping by athletes especially, the result of usage at an early age, it causes early epiphyseal closure in long bones and prevent bone from draw out (Al-Ismail et al.; Soma et al., 2008; Lok et al., 2011; Zaman et al., 2012).

The purpose of this research is to investigate among anabolic androgenic steroids short term usage of testosterone enanthate’s, used by athletes for doping, morphometric effects on male rat humerus bones.

MATERIAL AND METHOD

The research was carried on 30 male Wistar rats of 35 days (90–120 g). Rats fed ad libitum and were divided into three groups in standard cages. While control group (n= 10) fed without any application, to the peanut oil group (n= 10) the peanut oil (100 µl, Zade peanut oil, Konay-TURKEY), which is used as testosterone enanthate’s diluent, executed 5 days intraperitoneally, after 2 days the same application was performed. To the experimental group (n=
testosterone enanthate on (Androne® 250 Enj, Caspian tamin pharmaceutical Co, Rasht-IRAN) 10 mg/kg dose (Lok and Yalcın, 2010), was applied intraperitoneally 5 days by diluting in 100 µl peanut oil and after 2 days break, it was applied again. All processes have been resumed 3 weeks.

Before, at the beginning and during the study, one day in a week weight of rats in all groups were measured and weekly weight averages were taken. Weekly dose adjustment was done in the weight measures of testosterone enanthate applied group. All rats were euthanized at the end of 3 weeks with pentobarbital (Nembutal sodium, Abfar). Humerus bones of rats were revealed by the dissection of front extremite bones.

Humerus bones were measured in the right anatomical references (A) length, corpus thickness [B1 (craniocaudal) + B2 (mediolateral) / 2], cortex-cortical bone thickness [C1 (caudal) + C2 (cranial) + C3 (medial) + C4 (lateral) / 4] and medullar diameter-cavum medullare [D1 (craniocaudal) + D2 (mediolateral) / 2] (Lok et al., 2011) each of these points were found and necessary morphometric measures were done (Fig. 1).

RESULTS

The length, thickness of corpus, cortex and medullar diameters of humerus bones of experimental, control and peanut oil groups were compared (Table I).

When the length of humerus bone of rats was examined; in the testosterone enanthate applied group (experiment) growth of the humerus bones stopped and difference found significant (p<0.05). It was found that there is no significant difference at the thickness of corpus and cortex, diameters of medullar of humerus bones between experiment, control and peanut oil groups (p>0.05).

DISCUSSION

Short term use of testosterone enanthate’s morphometric effects on male rats, in puberty period, and length, corpus thickness, cortex thickness and medullar diameter of humerus bone were analyzed.

Rats’ length of humerus (testosterone enanthate applied) in experiment group was found shorter than other groups (p<0.05). In the other studies (Lok et al., 2011; Li et al., 2000) of AAS’, it was reported that anabolic androgenic steroids causes early epiphyseal closure and avoid bone from growth. Literature findings show parallelism with this study findings.

Among three groups (experiment, control and peanut oil) in this study, no difference was found in medullar diameter, corpus and cortex thickness of humerus bone. In other words; testosterone enanthate had no significant effect on medullar diameter, corpus and cortex thickness of humerus (p>0.05). In the studies done with

Table I. Comparison of length and thickness of corpus, cortex and medullar diameters of humerus bones (Mean±SD).

<table>
<thead>
<tr>
<th></th>
<th>Experimental</th>
<th>Control</th>
<th>Peanut oil</th>
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<tr>
<td><strong>n</strong></td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td></td>
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<tr>
<td>23.63±0.52</td>
<td>24.90±0.48</td>
<td>25.38±0.81</td>
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<tr>
<td><strong>Corpus</strong></td>
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<tr>
<td>2.63±0.09</td>
<td>2.66±0.08</td>
<td>2.66±0.12</td>
<td></td>
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<tr>
<td><strong>Cortex</strong></td>
<td></td>
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<tr>
<td>0.52±0.02</td>
<td>0.52±0.02</td>
<td>0.53±0.02</td>
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<tr>
<td><strong>Medullar</strong></td>
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<tr>
<td>1.55±0.09</td>
<td>1.63±0.10</td>
<td>1.59±0.10</td>
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</table>

a, b= Different letters in the same line are statistically significant (Duncan test, p<0.05).
different research groups, it was reported that AAS’ did not have any impact on bone corpus thickness (Lok & Yalcin, 2010), cortex thickness (Windahl et al., 1999) and medullar diameter (Lok et al., 2012; Kim et al., 2003). Literature diagnosis shows parallelism with labour findings.

CONCLUSIONS

As a result, short term use of testosterone enanthate’s morphometric effects on male rats’ humerus bone, in puberty period, causes early epiphyseal closure and shuts down the growth of bone as seen in anabolic androgenic steroids.


RESUMEN: El objetivo de esta investigación fue estudiar en el húmero de ratas macho, los efectos morfométricos del uso a corto plazo de Enantato de testosterona entre los esteroides anabólicos usados como dopaje por atletas. En esta investigación se utilizaron 30 ratas divididas en tres grupos iguales. Un grupo experimental (n= 10), que se le administró Enantato de testosterona en dosis de 10 mg/kg en 100 µl diluido en aceite de maní, a otro grupo sólo se le administró aceite de maní (n= 10). La administración fue realizada por vía intraperitoneal 5 días a la semana durante 3 semanas. El grupo control (n= 10) fue alimentado durante 3 semanas. Todas las ratas fueron sacrificadas al término de la investigación. Los húmeros fueron expuestos por disección, se realizaron las mediciones y se tomaron los promedios. Cuando se analizó la longitud de los húmeros se observó que su crecimiento en las ratas del grupo experimental que recibieron Enantato de testosterona, se detuvo de manera significativa (p<0.05). Se observó que entre los esteroides anabólicos androgénicos, el uso de testosterona en ratas macho en el periodo de la pubertad causó el cierre epifísario temprano y detuvo el crecimiento del húmero de manera significativa.

PALABRAS CLAVE: Deporte; Doping; Enantato de testosterona; Hueso; Húmero; Morfometría.

REFERENCES


