Morphometric effect of nandrolone decanoate used as doping in sport on femur of rats in puberty period

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Abstract

Background: The aim of this research is to show the morphometric effect of nandrolone that is used as doping in sport on femur of rats in puberty period.

Material/Methods: A total of 60 Sprague-Dawley rats (30 days old) were divided into three equal groups. The control group (male n=10, female n=10) was nourished for 4 weeks without any substance being administered. For the peanut oil group (male n=10, female n=10), peanut oil was used as diluent of nandrolone decanoate (500 mcl). It was administered for 5 days via intraperitoneal injection, with a pause of 2 days and the same application was done for 4 weeks. Nandrolone decanoate was applied for 5 days to the Nandrolone group (male n=10, female n=10) in 10 mg/kg dose by being diluted in 500 mcl peanut oil via intraperitoneal injection and the same was applied for 4 weeks having taken a 2-day long pause. Rats were euthanatized at the end of fourth week. Back extremity bones of materials were revealed by being dissected and put to maceration operation.

Results: Morphometric measures were taken by determining the anatomic reference points (length, corpus, cortex-cortical bone thickness-substantiate compact, medullar wide-cavity medullar) that would be measured of femur bones that are on right side. It was determined that nandrolone caused shortening in femur length (p<0.05) in male and female rats when compared to peanut oil and control groups.

Conclusions: Nandrolone may delay the bone formation in the puberty period.

Key words: nandrolone • morphometric • femur

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General side effects are androgenous are hirsutism, hoarseness, acne, clitoral hypertrophy, amenorrhea, spermatogenesis inhibition, early epiphyseal closure, virilisation of woman fetus [5].

It has been reported that AASs increased the metacarpal bone length and weight of ram [8]. Effect of nandrolone on bone mineral density after ovariectomy in female monkeys has been examined, it has been reported that nandrolone increases the bone mineral density after ovariectomy [9].

Although many side effects of androgenic steroids had been generally described in literatures, it has been determined that an effect of nandrolone on bone development in puberty period had not been researched. When AASs’ general side effects are evaluated, it may be set forth that nandrolone also has an effect on bone development.

The aim of this study is to determine whether the nandrolone that is used as doping in sport has a morphometric effect on femur of rats that are in puberty period.

**Material and Methods**

The research was conducted on 60 Sprague-Dawley rats 30 days old (female n=30, 107±8.62 g, male n=30, 121±13.3 g, Selcuk University Experimental Medicine Research and Application Centre). The research was approved by Selcuk University Veterinary Faculty Ethical Committee. Rats were nourished ad libitum and put in the standardized cages, males and females separately (five for each cage). The temperature of laboratory, in which the study was done, was kept at approximately 25°C, moisture gradient was approximately 52.00% Rh. Male and female rats were divided into three groups. The control group (male n=10, female n=10) was nourished for 4 weeks without any substance being administered. For the peanut oil group (male n=10, female n=10) peanut oil was used as diluent of nandrolone decanoate (500 ml, Zade peanut oil, Konya). It was administered for 5 days via intraperitoneal injection, with a pause of 2 days and the same application was done for 4 weeks. Nandrolone decanoate (Nandrolone Decanoate® Inc., Norma Hellas SA, Menandrou, Greece) was administered to the Nandrolone group (male n=10, female n=10) for five days via intraperitoneal injection by being diluted in 500 ml arachis oil with 10 mg/kg dose [10], and the same was applied for 4 days with a 2-day long pause. All rats were euthanized at the end of fourth week with intraperitoneal injection of pentobarbital (Nembutal sodium Flk, Abfar, Istanbul) medicine. Back extremity bones of materials were revealed by being dissected and put to maceration operation. Then, revealed femur bones were dried.

To determine the anatomic reference that would be measured [A (height), B (corpus), C1-C2 (cortex-cortical bone thickness-substantiate compact) and D points (medullar wide-cavity medullar)] of femur bones that are on right side, necessary morphometric measures were done to each of these points with 0–100 mm stick (Stainless hardened digital calliper, China) (Figure 1).

Photos of the bones were taken with digital camera (Nikon D200, China) (Figure 1). Besides, average body weight of all samples before euthanasia was measured for the last time with microbalances.

**Results**

It was determined that nandrolone application caused shortening (p<0.05) in length of femur when compared to oil groups in both sexes (Table 1). It was determined that nandrolone application had no effect on corpus thickness, cortex thickness and medullar calibre (p>0.05).

**Discussion**

The anabolic androgenic steroid (AAS) used for medical purposes, appear to have a lot of side effects [1,5]. It has been frequently stated that AASs are used by sportsmen...
In the present study, nandrolone did not affect on the measurement values of femur except its length (Table 1). Weismann et al. [17] examined effect of testosterone on bone cell in male and female rats. They separated experiment and control groups with respective sexes in their study. They stated that nandrolone had no effect on average cortex thickness of humerus bone in both male and female rats. Qu et al. [18] stated that there was no statistically meaningful difference between them in terms of medullar length calibre averages of femur and humerus bones of estrogen female rats. Vidal et al. [19] examined the effects of estrogen receptors on bone growth and maturation in male mice. They confirmed that the difference between femur bones of male experiment and control groups in terms of cortex thickness was meaningful. The probable reason for differences between this research and the existing research may be difference in the active substance applied age group.

**Conclusions**

Consequently, it can be assumed that nandrolone can stop bone growth and cause short stature especially when used by sportsmen in puberty period.

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**References:**


