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Adverse Cardiovascular Function Secondary to Inappropriate Exogenous Androgenic Anabolic Steroid Usage in Young Adult Males

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In today’s society body image and athletic performance are emphasized and influenced by peer’s perception. The inappropriate use of AAS in young males has steadily increased over the past few decades. The purpose of this study is to determine the long-term effects AAS have on the cardiovascular system. The review of literature will explore studies that identify long-term adverse effects of injected AAS, which are used by adult males. Studies were compared to those equivalent male athletes who have never used any form of drugs or steroids and their effects on the cardiovascular system. The researcher plans to analyze the data of those studies to better determine how to diagnose, detect, and educate those patients who are susceptible to injury due to AAS usage. The research findings indicated that there is a direct correlation between AAS and young athletic males. Several research studies found a direct correlation between the usage of anabolic steroids and severe cardiovascular effects within the same age group of athletes. The data indicated that providers need to be aware of the increase in AAS users among the younger generation. With a strong emphasis on an athletic males ability to perform one sport to the highest level along with displaying an ideal body image and athletic performance are emphasized and influenced by peer’s perception (Evans, 2004). Evans (2004) found that only 15%-30% of 3 million AAS users in the United States alone, and of those 3 million, 2.7%-5% which is responsible for development of primary and secondary sexual characteristics (Sachtleben, 1993). As anabolic androgenic steroids (AAS) in the young adult male is gaining popularity. Anabolic androgenic steroids are synthesized from testosterone, which is responsible for development of primary and secondary sexual characteristics (Figure 1). A recent survey indicated that there are as many as 2.5 million AAS users in the United States alone, and of those 2.5 million, 27%-37% are American adolescents who have experimented at least once during their lifetime (Evans, 2004). Evans (2004) found that only 15%-30% of inappropriate use of AAS in the young adult male in the community attend gyms, and health clubs, and are weight-based trainers or athletes. However, with a few cases of those individuals who are non-competitive recreational body builders or non-athletes who have strictly utilized AAS for cosmetics and to obtain the perfect body image and increase libido, see figure 1. In a society where athletic performance is exemplified of an individual, one’s future career and financial income, is based upon this pressure. This pressure directly correlated with the increase in the utilization of AAS in young adult male athletes (Sachtleben, 1993).

**Research Question**

**What are the long-term effects of anabolic androgenic steroids on cardiac function?**

**Inappropriate abuse of anabolic androgenic steroids in the United States is a growing problem and concern, what are the multiple comorbidities that can develop from the chronic abuse?**

**Literature Review**

- **Ansell and John Moores University (2013)** conducted a study to investigate the effects of AAS on the cardiac structure and function and cardiovascular risk factors. Strengthened participants underwent cardiovascular magnetic resonance imaging (CMR). The data analysis determined that participants who inappropriately used AAS had:
  - Higher absolute left ventricular (LV) mass (220 ± 45 g) compared to non-anabolic androgenic steroid participants (NAAS).
  - Reduced right ventricular (RV) function index (AAS 51 ± 4 vs. NAAS 59 ± 3; p < 0.05).
  - Significantly lower left ventricular (LV) myocardial tissue velocity ratio (AAS 0.90 ± 0.4 vs. NAAS 1.78 ± 0.46; p < 0.003).
  - Peak LV systolic strain was lower in AAS users (AS-14.2 ± 2.7 % vs. NAAS -16.8 ± 1.9 %; p < 0.05).
- **Kaisikcioglu et al. (2007)** conducted a study to investigate the effects of AAS usage had:
  - Systolic, diastolic and pulse pressures were significantly higher in user athletes compared with non-user athletes.
  - Aortic strain present value in user athletes was significantly less than that of the non-user group (p = 0.02).
  - Aortic stiffness index in AAS users was significantly higher than that of NAAS (21.1 ± 1.1 vs. 3.8 ± 1.4 cm² dyn-1 · m² · s; p < 0.01; 9.3 ± 3.7 vs. 5.9 ± 2.5; p < 0.003, respectively).
- **Another cross-sectional study conducted by Sader et al. (2001)** support the findings of left ventricular hypertrophy, increased LV mass, cardiomyopathy and sudden death.

**Statement of the Problem**

- **In young adult male athletes what effects does the long-term use of anabolic androgenic steroids have on the cardiovascular system?**

**Figure 1: Anabolic Steroids (Evans, 2004)**

**Figure 2: An anterior-posterior view of the left coronary system. The left anterior artery demonstrates a 95% stenosis after the first septal branch (Sader, 2001).**

**Table 1:** Structural and Functional Data for the LV and Lipid Profiles in Anabolic Androgenic Steroid Users (Sader, 2001)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>NAAS (2.1 ± 1.1 vs. 3.8 ± 1.4 cm² dyn⁻¹ · m² · s)</th>
<th>p = 0.02</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV mass</td>
<td>16.8 ± 1.9 vs. 14.2 ± 2.7%</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>LV hypertrophy</td>
<td>0.01; 9.3 ± 3.7 vs. 5.9 ± 2.5; p &lt; 0.003, respectively</td>
<td></td>
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</tbody>
</table>

**Figure 3:** Pathway of Human Steroidogenesis (Walters, 2003)

**Figure 4:** Bodybuilders autopsy heart left ventricular hypertrophy (Sader, 2001)

**References**


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