

Safety And Efficacy Of Prohormone Administration In Men

Ziegenfuss TN and DJ Kerrigan, Laboratory of Applied Physiology, Department of HPERD, Eastern Michigan University, Ypsilanti, MI 48197

Supported in part by a research grant from Bodyonics, Inc.

Background and Purpose: Despite the relative dearth of data on their safety and efficacy, supplementation with andro products has become widespread. Previously, our laboratory reported significant increases [41.3 nmol/L (98% increase above baseline)] in testosterone levels following acute supplementation with a prohormone compound containing primarily 4-androstene-3, 17-diol. The present investigation employed a placebo-controlled, double-blind design to examine potential changes in performance, body composition, and clinical blood chemistries following four weeks of sublingual/buccal administration of the same supplement [Androstat 6 Popper™ (Popper)]. **Methods:** Fourteen recreationally active, eugonadal men [mean \pm SD age, height, weight (23.7 \pm 4.5 yr, 178.3 \pm 5.7 cm, 83.9 \pm 12.8 kg)] were given weekly aliquots of a placebo or Popper (450 mg per day divided into 3, 150 mg doses) over a four week period. Each Popper dose contained 125 mg 4-androstene-3, 17-diol, and 5 mg each of 5-androstene-3, 17-diol, 4-androstene-3, 17-dione, 5-androstene-3, 17-dione, 19-nor-4-androstene-3, 17-dione, and 19-nor-4-androstene-3, 17-diol. Pre and post-testing included anaerobic power (via 30-second cycle sprint, vertical leap), compartment-specific fluid volumes (via multifrequency bioimpedance), percent body fat (via 7-site skin fold), and clinical blood chemistry (via serum lipids, hepatic and renal enzymes, basal testosterone, estradiol, and LH). **Results:** RM ANOVA revealed significant ($F_{G \times T} = p < 0.05$) increases in body mass (1.8 kg, 2.3%), fat-free mass (0.8 kg, 1.1%), vertical leap (5.1 cm, 9.3%), total body water (5.4 L, 10.5%), and extracellular fluid volume (2.3 L, 11.8%) in the Popper group. Except for a significant increase in HDL-C (main effect over time), no changes in blood chemistry occurred [statistical power [1-B] ≥ 0.60 , see table 1]. **Discussion:** In contrast to supplementation with androstenedione (1), these data suggest that four weeks of sublingual/buccal Popper administration (450 mg/d) may cause anabolic, ergogenic changes in men. Moreover, these effects seem to occur without deleterious changes in serum lipoproteins, organ function, or reproductive hormones. Given the recently reported effects that moderate increases in testosterone may have on health [improvements in bone density (2), coronary blood flow (3), lean body mass (4), and possibly cognitive function (5)] it seems prudent to continue systematically examining the effects of prohormone supplements. **References:** 1. King et al. *JAMA*. 281(21): 2020-2028, 1999. 2. Snyder et al. *J Clin Endocrinol Metab*. 84(6): 1966-1972, 1999. 3. Rosano et al. *Circulation*. 99: 1666-1670, 1999. 4. Bhasin et al. *N Engl J Med*. 335: 1-7, 1996. 5. Tan et al. *Int J Neurosci*. 94: 55-61, 1998.

| Variable | Placebo Group | | Popper Group | | GxT | Reference |
|------------------------|---------------|---------------|---------------|---------------|---------|-----------|
| | Pre | Post | Pre | Post | P-value | Range |
| Basal Hormones | | | | | | |
| Testosterone (nmol/L) | 28.6 (5.0) | 32.0 (6.9) | 31.9 (10.1) | 31.2 (8.0) | 0.34 | 0.34 |
| Estradiol (pmol/L) | 79.1 (56.2) | 98.0 (62.2) | 154.9 (116.7) | 159.1 (125.2) | 0.80 | 55-150 |
| LH (IU/L) | 9.3 (4.2) | 7.6 (5.3) | 6.5 (3.3) | 7.6 (2.4) | 0.32 | 3-25 |
| Lipids | | | | | | |
| Cholesterol (mmol/L) | 4.35 (0.88) | 4.31 (0.92) | 4.20 (0.89) | 4.42 (0.77) | 0.29 | 3.90-5.20 |
| Triglycerides (mmol/L) | 1.22 (0.27) | 1.63 (0.75) | 1.54 (0.47) | 1.25 (0.36) | 0.09 | 0.11-1.80 |
| HDL-C (mmol/L)* | 1.01 (0.17) | 1.10 (0.14) | 1.06 (0.25) | 1.17 (0.22) | 0.66 | 0.80-1.80 |
| LDL-C (mmol/L) | 2.86 (0.73) | 2.58 (0.66) | 2.55 (0.88) | 2.76 (0.64) | 0.08 | 1.30-4.90 |
| Organ Function | | | | | | |
| BUN (mmol/L) | 5.0 (0.9) | 5.4 (1.2) | 5.4 (0.7) | 5.1 (0.9) | 0.43 | 2.9-6.4 |
| Creatinine (mmol/L) | 88.4 (8.8) | 79.6 (8.8) | 97.2 (8.8) | 88.4 (8.8) | 0.85 | 62-125 |
| AST (IU/L) | 20.0 (4.1) | 26.5 (11.2) | 20.3 (7.1) | 21.3 (5.1) | 0.27 | 6-25 |
| ALT (IU/L) | 14.5 (3.9) | 23.0 (7.6) | 14.8 (4.9) | 60.4 (118.3) | 0.57 | 3-30 |
| LDH (IU/L) | 141.0 (11.0) | 186.8 (31.9) | 200.9 (87.9) | 193.6 (72.5) | 0.36 | 125-290 |
| CK (IU/L) | 126.5 (65.7) | 257.0 (194.7) | 134.0 (97.4) | 119.1 (31.6) | 0.36 | 10-100 |

* Significant increase over time, regardless of group (main effect, $p < 0.05$).