Effects of a 12-week physical training program and nutrition plan on the body composition of overweight police trainers
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EFFECTS OF A 12-WEEK PHYSICAL TRAINING PROGRAM AND NUTRITION PLAN ON THE BODY COMPOSITION OF OVERWEIGHT POLICE TRAINEES

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Although the daily tasks of police officers are mostly sedentary, optimal body composition and physical abilities are important for the occasional high intensity task duties that may occur and for general health.

The question of body composition and its manifestation in the form of obesity is a frequent subject in all segments of society and among different occupations (Lukaski, 2017). As such, it is also present in law enforcement, firefighters and military personnel (Daves et al., 2016; Michaelidis et al. 2011; Friedel, 2012). Apart from proven negative health effects, a sub-optimal body composition can also directly affect the successful job performance of a modern policeman (Daves et al., 2016).

The main goal of this research was to determine the effects of a 12-week intervention of physical training and a caloric deficit in the controlled conditions of the police campus. The leading hypothesis of this research was that, under the influence of planned physical training and a recommended caloric deficit, it was possible to significantly affect the loss of body fat while maintaining and improving the relative values of skeletal muscle mass.
The physical training program consisted of 12 hours per week during the first six weeks and nine hours per week during the second six weeks.

The nutritional plan consisting of six weeks in controlled caloric conditions (caloric deficit 500 Kcal) and six weeks in partially controlled conditions (no insights on food intake over the weekend).

A body composition analyzer (InBody 370) was measured body mass index (BMI), percentage body fat (PBF), and percentage skeletal muscle mass (PSSM).
A convenience sample of overweight male police trainees took part in the study:

- \( n = 55 \); mean age = 28.51 ± 5.26 years,
- mean body height (BH) = 174.58 ± 5.79 cm,
- mean body mass index (BMI) = 32.03 ± 3.03 kg/m\(^2\),
- and mean body mass (BM) = 97.67 ± 11.21 kg.

The inclusion criteria in the training program were BMI > 24.99 kg/m\(^2\) and PBF > 22%
The testing procedure consisted from initial BH assessment and two measurements of the body composition before and after the experimental procedure was completed. Measurements of body composition were carried out on an InBody 370 device (Biospace, Seoul, South Korea).

Trainees were instructed to fast overnight prior to before each body composition measurement and were restricted fluid intake for up to 3 hours beforehand.

Throughout the assessments trainees were barefooted and dressed in shorts and t-shirt. All body composition measurements were conducted in an indoor environment, temperature controlled to 22 °C.
## Training program

Table 1: 12-week training program sample designed for ADPC trainees to lose weight and improve overall fitness.

<table>
<thead>
<tr>
<th>Mesocycle 1</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning</td>
<td>10 min WU</td>
<td>10 min WU</td>
<td>10 min WU</td>
<td>10 min WU</td>
<td>10 min WU</td>
<td>10 min WU</td>
<td></td>
</tr>
<tr>
<td>(06:00-07:00)</td>
<td>20 min W-R</td>
<td>20 min W-R</td>
<td>20 min W-R</td>
<td>20 min W-R</td>
<td>25 min SSR</td>
<td>20 min W-R</td>
<td>Rest</td>
</tr>
<tr>
<td></td>
<td>20 min SC</td>
<td>20 min CC</td>
<td>20 min IT</td>
<td>20 min SC</td>
<td>15 min BE</td>
<td>20 min BE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td></td>
</tr>
<tr>
<td>Afternoon</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>Rest</td>
</tr>
<tr>
<td>(17:00-18:00)</td>
<td>35 min A&amp;C</td>
<td>35 min BE</td>
<td>35 min A&amp;C</td>
<td>35 min C&amp;F</td>
<td>35 min C&amp;F</td>
<td>35 min SC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mesocycle 2</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 7-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning</td>
<td>2 km run</td>
<td>2 km run</td>
<td>2 km run</td>
<td>2 km run</td>
<td>2 km run</td>
<td>15 min WU</td>
<td></td>
</tr>
<tr>
<td>(06:00-07:00)</td>
<td>&lt;12 min</td>
<td>&lt;12 min</td>
<td>&lt;12 min</td>
<td>&lt;12 min</td>
<td>&lt;12 min</td>
<td>15 min WU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35 min SC</td>
<td>35 min CC</td>
<td>35 min IT</td>
<td>35 min SC</td>
<td>30 min SSR</td>
<td>Rest</td>
<td>Rest</td>
</tr>
<tr>
<td></td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>15 min CD</td>
<td></td>
</tr>
<tr>
<td>Afternoon</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>15 min WU</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
</tr>
<tr>
<td>(17:00-18:00)</td>
<td>35 min A&amp;C</td>
<td>35 min BE</td>
<td>35 min A&amp;C</td>
<td>35 min C&amp;F</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
</tr>
<tr>
<td></td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td>10 min CD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WU - Warm up, W-R - Walk and run, SC - Strength circuit, CC - Cardio Circuit, CD - Cool down, A&C - Agility and Coordination, BE - Bodyweight Exercises, C&F - Core and Flexibility, SSR - Steady State Run.
The **nutrition plan** was designed **individually** based on an assessment by a qualified nutritionist and based on the individual caloric needs of the trainees. The basic strategy was based on an estimate of individual daily caloric consumption with the obtained value then reduced by **500** kilocalories (kcal).

It was assumed that trainees belonged to the category of “very active” according to physical activity factor (PA). The PA factor for adult males has four categories (Sedentary [PA=1.00], Low active [PA=1.11], Active [PA=1.25] and Very active [1.48] (Hertzler and Carlson-Philips, 2017). **Estimated energy requirement (EER)** was calculated by the Institute of Medicine formula for male adults (2006):

\[
\text{EER} = 662 - 9.53 \times \text{age in years} + \text{PA} \times (15.91 \times \text{weight [kg]} + 539.6 \times \text{height [m]})
\]

During the **first 6-week period**, the trainees were in completely controlled conditions, since they were not allowed to leave the campus. However, during the **next 6-weeks** they were permitted to leave the campus over the **weekend** period and, as such, there was no insight into their food intake during their weekend leave period.
The statistical analyses were performed using SPSS ver. 20 (IBM, Armrok, USA).

All data were expressed as mean ± standard deviation (SD), range, minimum (Min.) and maximum (Max.) values.

Data were checked for normality using the Kolmogorov–Smirnov test.

A paired sample T-test, significance was set at \( p = 0.05 \) a priori.

and Cohen’s effect size \( (d) \) with percentage differences \( (%) \), were used to evaluate the training effects and magnitude of training and nutrition plan changes.
## Results

Table 2: Descriptive data before and after 12-week intervention and estimated energy requirements (EER) and with 500 kcal deficit (EER$_{-500}$).

<table>
<thead>
<tr>
<th></th>
<th>N=55</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM-1 (kg)</td>
<td>97.67</td>
<td>11.21</td>
<td>56.90</td>
<td>77.80</td>
<td>134.70</td>
<td></td>
</tr>
<tr>
<td>BM-2 (kg)</td>
<td>86.49*</td>
<td>9.35</td>
<td>46.40</td>
<td>70.10</td>
<td>116.50</td>
<td></td>
</tr>
<tr>
<td>BMI-1 (kg/m²)</td>
<td>32.01</td>
<td>3.03</td>
<td>12.60</td>
<td>27.30</td>
<td>39.90</td>
<td></td>
</tr>
<tr>
<td>BMI-2 (kg/m²)</td>
<td>28.27*</td>
<td>2.36</td>
<td>10.30</td>
<td>24.00</td>
<td>34.30</td>
<td></td>
</tr>
<tr>
<td>PBF-1 (%)</td>
<td>32.56</td>
<td>5.75</td>
<td>30.30</td>
<td>20.80</td>
<td>51.10</td>
<td></td>
</tr>
<tr>
<td>PBF-2 (%)</td>
<td>25.81*</td>
<td>5.71</td>
<td>25.90</td>
<td>16.60</td>
<td>42.50</td>
<td></td>
</tr>
<tr>
<td>PSMM-1 (%)</td>
<td>38.06</td>
<td>3.45</td>
<td>17.93</td>
<td>27.31</td>
<td>45.24</td>
<td></td>
</tr>
<tr>
<td>PSMM-2 (%)</td>
<td>41.82*</td>
<td>3.44</td>
<td>15.86</td>
<td>31.87</td>
<td>47.73</td>
<td></td>
</tr>
<tr>
<td>EER (kcal)</td>
<td>4079.86</td>
<td>280.32</td>
<td>1558.26</td>
<td>3530.64</td>
<td>5088.90</td>
<td></td>
</tr>
<tr>
<td>EER$_{-500}$ (kcal)</td>
<td>3579.86</td>
<td>280.32</td>
<td>1558.26</td>
<td>3030.64</td>
<td>4588.90</td>
<td></td>
</tr>
</tbody>
</table>

* Significantly different from initial scores, $p < 0.001$. 

12-week Training Intervention

Overweight Police Trainees

Čvorović, Orr & Bacetić
Results

Table 3: Effect size of experimental intervention on body composition.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Differences</th>
<th>SD±</th>
<th>Effect Size Cohen’s (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM</td>
<td>11.18</td>
<td>3.35</td>
<td>3.34***</td>
</tr>
<tr>
<td>BMI</td>
<td>3.75</td>
<td>1.19</td>
<td>3.14***</td>
</tr>
<tr>
<td>PBF</td>
<td>6.75</td>
<td>2.22</td>
<td>3.04***</td>
</tr>
<tr>
<td>PSMM</td>
<td>3.76</td>
<td>1.27</td>
<td>2.96***</td>
</tr>
</tbody>
</table>

*small (0.2-0.5), **moderate (0.5-0.8), ***large (> 0.8).

Figure 1: Relative percentage changes (%) in body composition, (direction of change: ↑ - increase, ↓ - decrease)
The **practical application** of this or similar programs, especially in controlled conditions of the police academy, military school or similar institutions, is certainly recommended.

The existence of such programs should be a **constant practice** within the framework of any law enforcement system in which implementation is possible.

It is meant not only within the obligatory courses, for employment or promotion, but as a **regular program** for the prevention and reduction of negative impacts of inadequate body composition not only on performance, but also on the overall health of the members of the police workforce.

**Conclusion:** A dedicated 12-week physical training program with a caloric controlled nutritional plan can lead to significant improvements in the body composition of overweight police trainees and reduce their associated health risks.


QUESTIONS and DISCUSSION

Thank you for your attention!!!

Aleksandar Čvorović, Robin Orr, Novak Bacetić