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## Osteopathic Manipulative Treatment combined with Body Composition Analysis and Caloric Balance improves Pain and Performance in an Amateur Cyclist suffering from Chronic Neck-Pain. A Case-Report.

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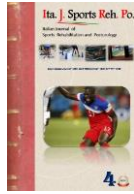
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### Abstract

**Introduction:** This Case-Report analyses the potential efficacy of the Osteopathic Manipulative Treatment (OMT) combined with caloric balance in an amateur cyclist, both in relation to pain onset and perception, and performance enhancement. Following an accurate analysis of the literature through the main biomedical data banks, the authors did not find previous studies focusing on these specific parameters in the case of amateur cyclists. **Case description:** This case is about Mr. M. M., an amateur cyclist with chronic Neck-Pain, severe anxiety, overweight, low energy and poor performance. The authors carried out an osteopathic evaluation together with a multi-compartmental body composition analysis and caloric balance, and administered specific measuring scales. The primary composite outcome was identified by the Rate of Perceived Exertion (BORG/RPE) and the Visual Analogue Scale (VAS). The Hamilton Anxiety Rating (HAMg-A) and Post-Race Heart Rate reduction identified the secondary outcomes. **Results:** After 4 test-based OMT sessions and the adjustment of the daily calorie intake, at 60 day follow-up, the subject did not show any cervical pain; anxiety was significantly reduced, the body composition analysis showed a significant decrease of fat mass and performance improved significantly. **Conclusions:** This Case-Report shows that continuous benefits can be obtained with a multifactorial approach, both in amateur and professional athletes. The authors hope that the originality of this study might stimulate other researchers to focus on these issues with a larger cohort.

**Key words:** Osteopathic Manipulative Treatment (OMT), Body Composition Analysis, Neck-Pain, Amateur Cyclist, Performance.



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## Introduction

Non-professional (amateur) sport activity is usually focused on the fitness profile, rather than on performance; however, the competitive spirit is often present. Any sport that involves the use of a tool/machine requires great adaptability of the subject. In particular, cycling requires the subject to have a hunched posture with 5 points of contact with the bike (Figure 1) in linear cyclic exercise expressed in Closed Kinetic Chain (CKC) and to use specific muscular patterns<sup>12,13</sup>; this sport also requires a significant amount of oxygen ventilation<sup>14</sup> and all these features can lead to significant stress for the body. This case-report analyses the detected changes in relation to Performance and Neck Pain after Caloric Balance (CB) and Osteopathic Manipulative Treatment (OMT) in an amateur cyclist.



**Figure 1.** Hunched posture with 5 points of contact in linear cyclic exercise.

## Case Description

We describe the case of Mr. M. M., an architect and amateur cyclist. The subject provided his written consent, and then underwent Osteopathic Evaluation (OE) and OMT. The subject has no cardiovascular, joint, metabolic risk factors, and he exercises on his bike 4/5 days per week, in the morning, for about 90 minutes/daily. The subject complains of severe chronic neck pain, high anxiety and high stress; no neurovegetative dystonia is detected, but several orthodontic interventions are present, including a deep bite treated with the permanent use of braces on his lower teeth. A multi-compartmental skinfold body composition analysis was performed by



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means of ISSA PT Software©. Table 1 shows anthropometric measures and the body composition analysis.

| E  | P     | A   | BMI  | Total skinfolds    | Included skinfolds     | Bone diameter         | Muscle circumference | Fat mass | Lean body mass  |
|--|-------|-----|------|--------------------|------------------------|-----------------------|----------------------|----------|---|
| 43   | 76 Kg | 170 | 23.6 | M=15±10;<br>(7.13) | M=17.5± 7.5;<br>(6.75) | M=8.03±2.8;<br>(0.11) | M=69±32;<br>(25.16)  | 17.72 Kg | 52.28 Kg; 76.69%<br><br>Bone =<br>10.31 Kg: 13.57%<br><br>Muscle =<br>47.97 Kg 63.12% |
| Caption: Age (E); Weight (P); Height (A); Body Mass Index (BMI); Standard Deviation (SD) |       |     |      |                    |                        |                       |                      |          |   |

**Table 1.** Anthropometric measures (SD)

Taking into account the subject’s bio-typology, Williams’ 4-skinfold generalized equation<sup>8,9</sup> was used for skinfold measurements. The Matiegka’s skinfold formula was used for the multi-compartmental analysis (bone diameters and skinfolds)<sup>10,11</sup>. The analysis did not take into account lean body mass based on muscle circumferences due to the standard deviation (SD) among excessively high levels, which was not considered reliable. With reference to aerobic parameters, VO<sub>2</sub> average value expressed in Metabolic Equivalent (METs) was calculated; this value was not obtained from the Graded Exercise Test (GXT) or from a direct test, but rather by means of the following formula for male subjects:  $(57.8-0.445 [age]) / 3.5 = 11.04 \text{ Mets} \rightarrow \sim 38.64 \text{ mlO}_2/\text{kg}/\text{min}$ , high Standard Error of Estimate (SEE). The average training intensity was 7-12 METs; this value was not changed on the basis of the subject’s request.

## Materials and Methods

### Outcome Measures

- Maximum, at rest and post-race cardiovascular parameters (GARMIN EDGE 705)
- Perceived exertion (BORG scale)
- Neck Pain Perception (Visual Analogue Scale, VAS)
- (HAM-A)

### Osteopathic evaluation/OMT

Following the osteopathic evaluation, 4 test-based OMT sessions were scheduled every 15 days, with a follow-up at 60 days. OMT was directed towards the treatment of spinal somatic dysfunctions using only HVLA-Thrust<sup>1,2,3,4</sup>, and myofascial release techniques (trigger point therapy)<sup>16</sup>. OMT focused on the following:

- C0-C1; C1-C2; C2-C3
- D4-D5; D9-D10
- Psoas and piriform muscles
- Pelvic diaphragm.



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With reference to the daily metabolic rate assessed at 2000 kcal (1819 kcal + Specific Dynamic Action/SDA 182 kcal), Grande & Keys formula (FFM + PLICO)<sup>7</sup> was used for CB, with a correction for his working activity as an architect assessed at 333 kcal and for the bike activity assessed at 1010 kcal, with an average intensity of <7-12 METs; total daily calories was 3343 kcal for the exercise days and 2333 for non-exercise days, divided into 3 meals and 2 daily snacks.

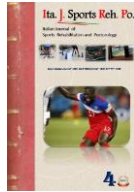
The subject did not show adverse signs or symptoms, Red-Flags or other events that might have justified the early interruption of the study.

The subject explained that this multifactorial approach was absolutely bearable and non-invasive; the total compliance to treatment protocol and instructions shows that the process itself is acceptable.

## Discussion

One of the main aims of OMT is the development of a pain-free Range of Motion (ROM), as well as the enhancement of the neuromuscular function, in order to express the maximum performance.

Due to the lack of studies on OMT and Neck-Pain in the cyclist, we had to rely on our anatomophysiological knowledge, on literature data related to pre-competition treatment<sup>17</sup> and, above all, on data related to the efficacy of osteopathic manipulative techniques in Neck-Pain based on randomized clinical trials<sup>1,3</sup>, and systematic reviews<sup>2</sup>. With reference to a correct caloric balance for performance optimization and, in particular, with reference to VO<sub>2</sub> hemodynamic parameters, on the basis of the scarce data in the literature, we focused on the increase and the maintenance of a coherent relation between Cell Mass/Oxygen consumption<sup>14</sup> and suggested the subject to follow a balanced fitness diet divided as follows: 60% carbohydrates, 20% proteins, and 20% lipids, aimed at reaching a weight loss of 5.8 kg of the fat mass only<sup>5,6</sup>. We also tried to avoid muscle mass depletion and to keep a suitable tissue anabolism. Weight loss was achieved in 2 months and half; it aimed at lighten the total weight and improve ventilatory and cardiovascular efficiency. End Point data show changes in cardiovascular parameters, perception of exertion (BORG), perception of anxiety (HAM-A), and perception of Neck Pain (VAS), as confirmed by the follow-up at 60 days. Data are summarized in Table 2. Cardiovascular parameters show an effective improvement, with the capability to change performance levels both during training and competition. These changes were likely due to the reduction of fat mass and to OMT, which has successfully treated somatic dysfunctions in the cervical, dorsal, and pelvic areas.



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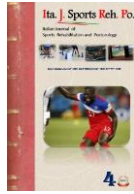
|  | Baseline  | End Points |
|--|-----------|------------|
| <b>Cardiovascular parameters (HR)</b>  |           |            |
| Max BPM  | 191       | 188        |
| BPM at rest  | 60 -65    | 50 -54     |
| BPM post-race  | 115 – 120 | 108 - 102  |
| <b>Perception of exertion</b>  |           |            |
| BORG (RPE)   | 15 -17    | 8 -11      |
| <b>Perception of Neck-Pain</b>   |           |            |
| VAS  | 8         | 2          |
| <b>Perception of Anxiety</b>   |           |            |
| HAM – A  | 31        | 7          |
| <b>Caption:</b> HR = Heart Rate expressed in BPM (b/min); VAS= Visual Analogue Scale; HAM –A = Hamilton Anxiety Rating Scale; BORG= RPE-Rate of Perceived Exertion |           |            |

**Table 2.** Outcome Measures

### Conclusions

These preliminary data show that OMT and CB may lead to systemic improvements by means of a multifactorial approach.

The lack of iatrogenic effects during the study and the follow-up, as well as the total compliance and tolerability reported by the subject, prove that the approach is absolutely safe. On the basis of the above considerations, the authors believe that it is appropriate to confirm this data and carry out further studies on a larger cohort.



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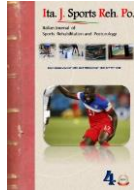
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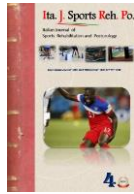
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#### **Informed consent**

The subject read, understood and signed the informed consent to take part to this study.

#### **Conflict of interest**

The authors declare they have no conflict of interest.

#### **Funding**

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This Case-Report was designed, carried out and published in compliance with CARE Checklist (2013).

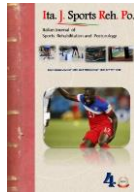
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