STUDY OF THE CHANGES IN SOME PHYSIOLOGICAL SIGNS IN DELAYED ONSET MUSCLE SORENESS IN RACES HORSES TREATED WITH BLACK TEA SUPPLEMENTATION

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ABSTRACT
Background: The purpose of this study was to investigate the effect of Black Tea on physiological signs of delayed onset muscle soreness (DOMS) in Races Horses. Methods: In an experimental study, 15 healthy Stallion Local horses of races, the horses divided randomly into 3 groups, including: Black Tea intake 5 hour before racing (BTBR), Black Tea intake immediately after racing (BTAR) and Control group (C). Treated horses fed 10 % Black Tea in their feed before and after exercise. The exercise protocol consisted of a 20 minute start running all of them at same time under supervision by Racecourse Executive. Muscle soreness scores, isometric strength and surrounding areas of thigh muscle, and hip range of locomotion were recorded at different times. Results: The results revealed a significant decrease of pain in BTBR compared to BTAR after 24 and 48hr of racing and BTAR compared to Control group (p <0.05). The other factor did not change importantly. Conclusion: The outcomes of this study indicate that 10 % of Black Tea may have an analgesic effect on DOMS.

KEYWORDS: Physiological Signs, Muscle Soreness, Races Horses.

INTRODUCTION
Delayed onset muscle soreness (DOMS) is an unfavorable and unsightly feeling with pain and muscle stiffness consequence of training or racing of horses which frequently endure from delayed onset muscle soreness (DOMS) which is muscle soreness or stiffness that can happen 1-3 days after the original action11. While it is a common misconstruction that DOMS is reasoned by lactic acid build up in the muscles, it is it is in fact the product of harm to the muscle cell membranes caused by the free radicals (highly reactive compounds that want to combine with everything) remains from the energy generative processes which support the performance of muscles2. The open muscle cell will then shed its contents of proteins and enzymes into the surrounding areas resulting in inflammation, limb lameness and reduced performance3.

Fortunately, dissimilar to the costly treatments for arthritis, treating muscle pain possibly diminish only by giving careful consideration to the nutrients critical for muscle health4. For steeds encountering either ceaseless or intense muscle soreness, the nutrients most implicated in muscle function and efficiency are vitamin E, thiamine, selenium, and magnesium5. Five important signs of DOMS are acute inflammation, pain, swelling, loss of function and range of motion and increase in Thigh circumference6.

Several treatment planes, both preventive and rehabilitative, have been suggested to help relieve the severity of DOMS. Some of the presented treatments including herbal remedy7. Nutritional supplements8. However, little scientific evidence exists to support the full effectiveness of any of these therapeutic interventions9. Black Tea, commonly known as Camellia sinensis, has been widely used in all around world. It represent Chinese medicine for arthritis, rheumatism, sprains and muscular aches. It has shown analgesic and anti-inflammatory effects10. Black Tea constituents inhibit arachidonic acid metabolism and thus prostaglandin synthesis11. It is found to inhibit cyclooxygenases and prevents specific prostaglandin release and hereby...
interacting with the vanillloid receptor TRPV1, which is
known to play a role in processing nociceptive signals[14].
Daily consumption of raw and heat-treated Black Tea
resulted in moderate-to-large reductions in muscle pain
following exercise induced muscle injury in horses.
Consuming a 90 gm dose of Black Tea has also been
shown to increases recovery of the fast phase of oxygen
consumption after a maximal exercise test and reduces
cardiovascular recovery time[15].

MATERIALS AND METHODS
Horses and Study Design
Fifteen healthy adult local racing Stallion are selected
randomly. The horses were ranging in age from 2 to 5
years old and a mean body weight of 344 ± 12 kg and
had raced five times each time for 20 minutes. During
the experimental period, horses were housed in
individual stalls and consistently fed concentrated
pelleted feed provided with 10% Black Tea and hay
(Cynodon dactylon). Water was given ad libitum. All
horses are managed in the same way with individual
boxes, photoperiod of 4:30 AM to 9 PM, a natural indoor
temperature (18C–20C), and the same feeding and
training schedules. The horses, which appeared healthy,
were submitted to a complete clinical examination, and
then divided into the three experimental groups:
Black Tea intake 5 hours before racing (BTBR), Black
Tea intake immediately after racing (BTAR) and Control
group (C).

Table 1 shows time course of Black Tea
Supplementation.

<table>
<thead>
<tr>
<th>Group</th>
<th>1 hour before racing</th>
<th>Immediately after racing</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTBR</td>
<td>Pelleted Black Tea Ration</td>
<td>No added ration</td>
</tr>
<tr>
<td>BTAR</td>
<td>No added ration</td>
<td>Pelleted Black Tea Ration</td>
</tr>
<tr>
<td>C</td>
<td>No added ration</td>
<td>No added ration</td>
</tr>
</tbody>
</table>

Measurement
Pain was measured by using a self-reporting visual
analog scale (VAS) including a horizontal line, 100 mm
in length, anchored by word descriptors at each end “no
pain” and “severe pain”[16]. All Signs were before and
after racing and then draw a line on the scale
corresponding to their level of soreness. Range of motion
(ROM) of hip was taken by Special Jamar goniometer.
Researcher placed the center of the goniometer on the
greater trochanter of hip[17]. Data were recorded for an
average of three times.

Thigh muscle circumference was measured using a
Gulick anthropometric tape. A mark was placed on each
participant’s thigh for the next measurement[18].

Statistical Analysis
ANOVA was used for checking the differences within
groups in different times and Repeated Measure and
Bonferroni post hoc were used for checking the
differences between groups. Moreover, to compare the
results in different measurement between groups. The
interaction effect of time and group was also measured.
All statistical analysis were performed using SPSS 20.
The significant level was considered at p≤0.05.

RESULTS
According to Table 2, there is significant (P≤0.05)
increasing in Right and Left thigh circumference of
BTAR group in comparing with BTBR and Control
groups. While the result of ANOVA of Right Hip Range
of motion showed no important varies among all groups.
About the left thigh circumference values, there is
significant (P≤0.05) increasing in BTAR group in
comparing with other groups. So statistical analysis
showed significant decreasing in Thigh muscle pain of
BTBR group if had been compared with control group,
while the values of BTAR are recorded lowest level in
comparing with other groups.

Table 2. Mean ± SD of thigh circumference, hip range
of motion and thigh muscle pain.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>C</th>
<th>BTBR</th>
<th>BTAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right thigh circumference</td>
<td></td>
<td>254.7±1.69</td>
<td>254.9±2.15</td>
<td>257.7±1.03*</td>
</tr>
<tr>
<td>Left thigh circumference</td>
<td></td>
<td>254.2±1.37</td>
<td>254.2±1.19</td>
<td>257.4±2.74*</td>
</tr>
<tr>
<td>Right Hip Range Of Motion</td>
<td></td>
<td>197.3±1.52</td>
<td>197.7±2.3</td>
<td>198.6±2.34</td>
</tr>
<tr>
<td>Left Hip Range Of Motion</td>
<td></td>
<td>193±1.19</td>
<td>193±2.08</td>
<td>198.8±2.46*</td>
</tr>
<tr>
<td>Thigh muscle pain</td>
<td></td>
<td>158.75±1.8</td>
<td>153.7±1.32*</td>
<td>133.3±2.85*</td>
</tr>
</tbody>
</table>

* Significant difference (p≤0.05), (mean±SD)

DISCUSSION
The aim of the current study was to examine the
biological effect of oral feeding of 10% Black Tea on
some functional factors of delayed onset muscle soreness
(DOMS) before and after 20 minutes of racing. Right
and left thigh muscle circumference, ROM of right and
left hip, isometric strength of thigh before racing did not
differ between BTBR and control conditions but the ratio
of pain were significantly varied among groups. Black
Tea exhibited hypoalgesic effect on quadriceps pain
intensity in BTBR and BTAR compared with C. Finding
that Black Tea reduced muscle pain as a result of delayed
onset muscle soreness caused by racing or exercise is
consistent with studies[19] demonstrating that 2gm use of
raw Black Tea can reduce arm pain in human after
eccentric elbow action. One study showed that
administration of 15 mg Black Tea powder daily for
three days produce analgesia in students with primary
dysmenorrhea[20]. Black Tea act as a pain relief in
patients with knee’s osteoarthritis[21]. But ingesting 2 gm
of Black Tea doesn’t have any effect on quadriceps
muscle pain during and after moderate-intensity cycling
exercise[16] and this may be because of the sternness of
the protocol was used. Proanthocyanidins (polymer chains of flavonoids) is one of a main biologically active compounds found in the leaves of black tea that have analgesic effects[22]. To explain the impacts of Black Tea on pain relief, it has been informed that Black Tea flavonoids inhibits cyclooxygenase and lipoxygenase pathways in prostaglandin and leukotriene synthesis and the anti-inflammatory property of Black Tea has been attributed to inhibition of prostaglandin synthesis[13]. Inflammatory response ends up in autacoid leukotriene synthesis. ProstaglandinE2 PGE2 directly causes pain by sensitizing types III and IV pain receptors[23]. In the current study, perception of soreness in BTBR was less than BTAR and C and this perhaps caused by the inhibitory effect of Black Tea on prostaglandin’s release. It seems that utilization of Black Tea before exercise could cease the cascade of inflammatory factors and thereby caused a lesser pain report[24]. The main signs of DOMS are ache, diminish in domain of movement, decrease in muscle strength and swelling which is frequently linked to acute inflammation[25]. Many studies investigate an association between DOMS and swelling, loss of function and strength is associated with lack of power generating capacity[26]. Our findings of increased thigh muscle volume and decreases hip ROM and isometric strength, obviously illustrated that the exercise protocol resulted in muscle damage, but Black Tea couldn’t ameliorate these symptoms. Black Tea didn’t change arm volume and elbow ROM after racing. The rise in isometric strength of thigh 1 hour after racing may be owed to better use of dynamometer. The decrease in ROM was related with decrease in isometric strength and this suggests that muscular tightness can impair maximum isometric energy construction[27]. In summery the results of the present study suggest that Black Tea supplement could reduce pain and inflammation caused by racing. It could be used as an effective herbal in healing DOMS.

REFERENCES
20. Chatterjee C. Evaluation of Analgesic Activities of Black Tea Decoction on Experimental Animal


27. Drager CJ. Effect of DHA supplementation on muscle damage and inflammation during the first two weeks of a novice resistance training program: Virginia Polytechnic Institute and State University; 2012.