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Muscle Skeletal Disorders and Factors of Stress in Handball Athletes

Distúrbios Músculo Esqueléticos e Fatores de Estresse em Atletas de Handebol

Rosângela Maria da Silva Miranda[a]; Kamilla Johnny Yoshi Lopes[a]; Mariney Bruce Fragata[a]; Drucila Coelho Boaes[a]; Murilo Sousa Ramos[b]; Grasiely Faccin Borges[*c]

[a]Federal University of Amazonas, Physical Therapy Course AM, Brazil.
[b]Federal University Southern Bahia, Course of Medicine. BA, Brazil.
[c]Federal University Southern Bahia. BA, Brazil.
*E-mail: grasiely.borges@gmail.com
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Abstract

The increasing demand for competitive exercises causes a high level of stress and risk of injury to performance athletes. To verify the prevalence of stress symptoms and musculoskeletal disorders in Coari-AM handball 6 locks. The study included athletes from the aforementioned municipality handball. After regular workouts, the questionnaires were applied: Nordic Skeletal Muscle Disorders and Daily Analysis of Life Demands in Athletes- DALDA. The participants were 45 athletes aged between: 15.24 ± 1.64 years, being 64.44% male and 35.55% female. The most affected regions by pain, tingling/numbness in the last 12 months were: knee (57.77%) and ankle/feet (48.88%), shoulders (42.22%) and upper back (42.2%). As for musculoskeletal disorders, the most affected regions that compromised normal activities in the last 12 months were knees (24.44%), ankles/feet (22.22%), hips/thighs (11.11%) and upper back (11.11%). DALDA evaluated the Sources and Symptoms of Stress in part A, the climate appeared as the main cause of stress (44.44%) followed by sleep issues (20%). In part B, muscle pain (40.00%) appeared as the main cause followed by fatigue (28.89%). In order for the athlete to present better performance in sports practices it is necessary to balance the internal and external factors and an adequate sports practice.

Keywords: Athletic Injuries. Exercise. Exercise Test.

Resumo

O aumento da demanda por exercícios competitivos provocou elevação do nível de estresse e do risco de lesões para atletas de todas as esferas de rendimento. Verificar a prevalência de sintomas de estresse e distúrbios músculo esqueléticos em atletas de handebol de Coari-AM. Participaram do estudo atletas de handebol do município supracitado. Após treinos regulares foram aplicados os questionários: Nórdico de Distúrbios Músculo Esquelético e o Daily Analysis of Life Demands in Athletes- DALDA. Participaram 45 atletas com idade média:15,24±1,64 anos, dos gêneros masculino 64,44% e feminino 35,55%. As regiões mais acometidas por problemas como dor, formigamento/dormência nos últimos 12 meses foram: o joelho (57,77%) e tornozelo/pés (48,88%), ombros (42,22%) e parte superior das costas (42,2%). No que se refere a sintomas de distúrbios músculo esqueléticos, as regiões mais afetadas e que comprometeram o desempenho de atividades normais nos últimos 12 meses foram joelhos (24,44%), tornozelos/pés (22,22%), quadril/coxas (11,11%) e parte superior das costas (11,11%). O DALDA avaliou as Fontes e Sintomas de Estresse, na parte A, o clima apareceu como a principal causa de estresse (44,44%) seguido por problemas no sono (20%). Já na parte B, as dores musculares (40,00%) apareceram como a principal causa seguido do cansaço (28,89%) Para que o atleta demostre um melhor desempenho nas práticas esportiva é necessário o equilíbrio entre os fatores internos e externos e uma prática esportiva adequada.

Palavras-chave: Traumatismos em Atletas. Exercício. Teste de Esforço.

1 Introduction

In recent years the number of athletes has increased who undertake intense training or participate in sports games of High intensity[1]. The practitioners of these modalities tend to have musculoskeletal injuries, which can be attributed to mechanical factors[2]. The big problem is the need for coaches and athletes seek limits to their activities and not to exceed the adaptation phase, which can result in exhaustion[3].

Despite the benefits of sports practice, the increased demand for modern and competitive exercises causes an increase in the risk of injury. This has caused concern both for the practitioners, as well as for trainers, because it stops the evolutionary process of systematic adjustments imposed by training[4].

Handball is a game that allows physical contact among the athletes. The main movements are: dribbling, passing, and the pitches, being the sport practiced in closed place for both genders. A handball match is characterized by repeated movements of running with accelerations, sprints, jumps and rapid changes of direction. Thus, it is a sport that leads its practitioners to susceptible traumatic impacts, direct or indirect, as imbalances and falls or wrong jumps[5].

After the completion of exhaustive exercises such as handball, the body reacts with manifestations of discomfort, decreased range of motion and muscle edema. These manifestations limit the daily life activities and sports practice

and are associated with muscle damage[6].

In view of this, the present study aims to verify the prevalence of symptoms of stress, and causative factors of skeletal muscle disorders in handball athletes from Coari-AM.

2 Material and Methods

Handball athletes aged between 13 and 17 years were invited to participate in the research. The sample was composed of 45 athletes of the modality of juvenile handball male and female. As inclusion criterion it was necessary to the achievement of at least two weekly workouts. As an exclusion criterion it was defined: the absence of the athlete on the day of data collection, their irregular participation in training, he or she (the) having suffered any type of physical injury in the last six months, having consumed alcoholic drinks recently and be ingesting any substance of prohibited use.

The athletes invited to participate in the project had to sign the informed consent form and then answered a structured questionnaire. This research was approved by the Committee for Ethics in Research with Human Beings at the Federal University of Amazonas with number CAAE 44055715.5.0000.5020 under opinion No. 1.033.132.

The Nordic questionnaire was applied to skeletal muscle dysfunction (Nordic Musculoskeletal Questionnaire), in the version translated into the Portuguese language[7]. The questionnaire is used as a source of identification of musculoskeletal disorders, not being an instrument for clinical diagnosis. It is composed of 4 questions about the anatomical regions, where the athlete responds if he or she has muscle pain: if in the last 12 months the athlete referred pain, tingling, numbness; if in the last 12 months the athlete was prevented from performing normal activities; if in the last 12 months the athlete sought professional service and if the last week presented some physical problem. The questions were made to athletes and they had to stress out in what area of the body was affected, such as the neck, elbows, knees, upper and lower back, among others.

To evaluate the sources and Symptoms of Stress the questionnaire Daily Analysis of Life Demands in 6 Athletes was used - DALDA in its translated version into Portuguese language[8]. The questionnaire DALDA is divided into two parts, namely A and B, which represent the sources and symptoms of stress. The athlete should indicate each variable as being "worse than normal" (PQN), "normal" (N) or "better than normal" (MQN), according to their perception of each source or symptom of stress.

The athletes were subjected to the evaluation of stature and body mass with the use of a scale with a precision of 0.1kg and a stadiometer with a precision of 0.1cm, the calculation of body mass index (BMI) was performed by using the quotient body mass/height^2 (Kg/m^2).

For statistical analysis, the data were initially tabulated in Office Excel software. Descriptive statistics was used, and the data were expressed as mean and standard deviation. To facilitate the visualization of the results found the percentages were used.

3 Results and Discussion

The sample was composed of 45 athletes of the modality of juvenile handball, genders male 64.44% and female 35.55%, with a mean age of 15.24±1.64 years, body mass of 30.52±32,83kg, height of 1.43±0,55m; BMI of 22.56±1,64kg/m^2 and training time of 36.84±34.09 months. The position of the athletes on court was identified as: "winger" (28.88%), "forward" (20.00%), "backcourt" (22.22%), "keeper" (15.55%) and "circle runner" (13.33%).

It was verified, from the obtained data, that the most affected regions by pain, tingling/numbness in the last 12 months were: knee (57.77%) and ankle/feet (48.88%), shoulders (42.22%) and upper back (42.2%). (Table 1).

Table 1 - Frequency and percentage of skeletal muscle disorders that interfere in the performance of the athletes of handball, Coari, AM (n=45).

Anatomic region	Regions with problems such as pain, tingling/ numbness) in the last 12 months. Frequency (Percentage%)	Regions reported that prevented the athletes to perform normal activities in the last 12 months. Frequency (Percentage%)	Regions that have led the athletes to seek professional care in the health area in the last 12 months. Frequency (Percentage%)	Regions in which the athletes reported a problem in the last 7 days Frequency (Percentage%)
Neck	15 (33.33%)	2 (4.44%)	3 (6.66%)	5 (11.11%)
Shoulders	19 (42.22%)	2 (4.44%)	3 (6.66%)	7 (15.55%)
Upper part of the back	19 (42.22%)	5 (11.11%)	6 (13.33%)	9 (20.00%)
Elbows	9 (20.00%)	3 (6.66%)	0 (0.00%)	2 (4.44%)
Wrists/hands	16 (35.5%)	1 (2.22%)	1 (2.22%)	6 (13.33%)
Lower part of the back	14 (31.11%)	5 (11.11%)	3 (6.66%)	6 (13.3%)
Hips/Thighs	15 (33.33%)	5 (11.11%)	2 (4.44%)	5 (11.11%)
Knees	26 (57.77%)	11 (24.44%)	7 (15.55%)	13 (28.88%)
Ankles/ Feet	22 (48.88%)	10 (22.22%)	5 (11.11%)	8 (17.77%)

Source: Research data.

As for musculoskeletal disorders, the most affected regions that compromised normal activities in the last 12 months were knees (24.44%), ankles/feet (22.22%), hips/thighs (11.11%) and upper back (11.11%).

The regions due to which the athletes have sought professional service in the area of health in the last 12 months were knees (15.55%), upper part of the back (13.33%) and ankles/feet (11.11%).

The most affected regions with a problem, in the last 7 days, were the knees (28.88%), upper part of the back (20.00%) and ankles/feet (17.77%).

It was found that the largest sources and symptoms of stress among athletes of handball, described as "worse than normal", were: the climate (44.44%), problems with sleep (20.00%) and the diet (15.56%). On the other hand, the appropriate sports training (46.67%), the presence of friends (44.44%) and the frequency at school/ college/ work (24.44%) collaborated with the reduction of the symptoms of stress and better implementation of activities (Table 2).

Table 2 - Frequency of Sources and Symptoms of Stress of handball athletes of part A of the questionnaire DALDA (n=45), a= worse than normal (PQN); b=normal (N); c=better than normal (MQN), Coari, AM.

Part A	Worse Than Normal Frequency (%)	Normal Frequency (%)	Worse Than Normal Frequency (%)
Diet	7 (15.56%)	33 (73.33%)	5 (11.11%)
Domestic life	3 (6.67%)	39 (86.66%)	3 (6.67%)
School/ College/work	4 (8.89%)	30 (66.67%)	11 (24.44%)
Friends	1 (2.22%)	24 (53.33%)	20 (44.44%)
Sports Training	2 (4.44%)	22 (48.89%)	21 (46.67%)
Climate	20 (44.44%)	25 (55.56%)	0 (0.00%)
Sleep	9 (20.00%)	27 (60.00%)	9 (20.00%)
Leisure activities	4 (8.89%)	33 (73.33%)	8 (17.78%)
Health	6 (13.33%)	31 (68.89%)	8 (17.78%)

Source: Research data.

In part B of the questionnaire, the largest sources and symptoms of stress were: the muscle aches (40.00%), tiredness (28.89%), insufficient sleep (26.67%) and imbalances of weight (26.67%). On the other hand, factors such as: the interest of practitioners (66.67%), the strength technique (33.33%) and the reserved time to recovery (28.89%) collaborated positively in reducing the burden of stress among the players (Table 3).

Table 3 - Frequency of Sources and Symptoms of Stress of handball athletes of part A of the questionnaire DALDA (n=45), a= worse than normal (PQN); b=normal (N); c=better than normal (MQN), Coari, AM.

Part B	Worse Than Normal Frequency (%)	Normal Frequency (%)	Worse Than Normal Frequency (%)
Muscle aches	18 (40.00%)	24 (53.33%)	3 (6.67%)
Technical	2 (4.44%)	31 (68.89%)	12 (26.67%)
Tiredness	13 (28.89%)	28 (62.22%)	4 (8.89%)
Need to rest	9 (20.00%)	33 (73.33%)	3 (6.67%)
Extra Work	2 (4.44%)	39 (86.67%)	4 (8.89%)
Boredom/ bored	11 (24.44%)	31 (68.89%)	3 (6.67%)
Recovery Time	8 (17.78%)	24 (53.33%)	13 (28.89%)
Irritability	9 (20.00%)	34 (75.56%)	2 (4.44%)
Weight	12 (26.67%)	29 (64.44%)	4 (8.89%)
Throat	8 (17.78%)	35 (77.78%)	2 (4.44%)
Internally	5 (11.11%)	39 (86.67%)	1 (2.22%)
Unexplained aches	11 (24.44%)	32 (71.12%)	2 (4.44%)
Technical Force	2 (4.44%)	28 (62.23%)	15 (33.33%)
Sufficient sleep	12 (26.67%)	29 (64.44%)	4 (8.89%)
Recovery among sessions	3 (6.67%)	37 (82.22%)	5 (11.11%)
General weakness	8 (17.77%)	34 (75.56%)	3 (6.67%)
Interest:	1 (2.22%)	14 (31.11%)	30 (66.67%)
Discussions	11 (24.44%)	30 (66.67%)	4 (8.89%)
Skin irritations	8 (17.78%)	35 (77.78%)	2 (4.44%)
Congestion	9 (20.00%)	34 (75.56%)	2 (4.44%)
Effort Training	3 (6.67%)	16 (35.56%)	26 (57.77%)
Behavior / mood	6 (13.33%)	28 (62.23%)	11 (24.44%)
Swelling	5 (11.11%)	39 (86.67%)	1 (2.22%)
Kindness	3 (6.67%)	27 (60.00%)	15 (33.33%)
Coryza	7 (15.56%)	33 (73.33%)	5 (11.11%)

Source: Research data.

The skeletal muscle disorders in sports of impact are major causes of injuries and affect the performance of the athletes. In view of this, the present study aims to verify the prevalence of

symptoms of stress, and causative factors of skeletal muscle disorders in handball athletes from Coari-AM.

Verhagen et al.[9] and Bonza et al.[10] indicate that the practice of excessive repetition of some functional gestures seems to be more associated with the occurrence of damages in the sport. For example, in sports like soccer and futsal, the knee pain occurs mainly due to the collision with other players [1].

A large part of the studies about handball reports that the knee and ankle are the anatomical sites most affected among the practitioners of the sport[11.12]. Although handball be characterized as a sport of pitch, the shoulder lesions were less evident than in other states, corroborating the work of Langevoort et al.[11] and Junge et al.[13]. A possible explanation for this fact is that the shoulder is usually the focus of chronic lesions and overload, and often the athletes live with this complaint due to considering it culturally normal[14].

In this study, the most affected regions by skeletal muscle disorders in the last 12 months were knees (57.77%), ankles/feet (48.88%), followed by the upper part of the back (42.22%) and shoulders (42.22%). In a general way in the literature, the limbs are the most affected by injuries, but there is not a consensus, highlighting also the upper limbs. Thus, studies claim to be the ankle and knee the most affected joints by injuries[15]. Similar results to those of the present study were also reported by Allen et al.[16] and Chen et al.[17], indicating the ankle and knee as the location of higher incidence of injuries in handball and corroborating with those obtained in our study.

In this study, it was identified that the most affected regions and which affected the performance of normal activities in the last 12 months (such housework, climbing stairs) were knees (24.44%), ankles/feet (22.22%), hip/thighs (11.11%) and upper part of the back (11.11%).

The practice of sports can be the limiting factor of certain daily activities due to painful symptoms. It is believed that the pain without direct traumatic cause in the sport is correlated to the gestures, impacts, overload of trainings and postures maintained during the realization of constant movements that the game itself demands from athletes. This symptom, besides harming performance in sport, can compromise basic activities, since, after the practice of strenuous exercise the human body reacts with manifestations of discomfort, decreased range of motion and muscle edema may limit the achievement of daily activities and sports practice[6].

It was observed that in the last seven days prior to the study surveyed athletes presented skeletal muscle disorders with a higher rate of commitment in the knees (28.88%), upper part of the back (20%) and ankles/feet (17.77%). Studies report that the majority of injuries occur in the knees, mainly in sports that require continuous and rapid changes of direction[18], as is characteristic of handball.

In Volleyball, for example, the ankle sprain is the most frequently found acute injury. In this sport, complaints of pain or previous symptoms in the back (lower and upper part), shoulders, hips/thighs, knees and ankles are also triggered after the practice of sport[19.20].

In a study with female Handball players, the anatomical location was the most affected of the lower limbs. The anatomical locations that have suffered most injuries were: the knees, fingers, ankles and shoulders. Also says that the lesions in the lower limbs may occur due to lack of coordination, increase of fatigue and the large number of training and matches[21.22].

The results obtained about the stress factors showed that the climate appeared as the most frequent (44.44%) followed by difficulties with sleep (20.00%) and the diet (15.56%). Whereas in part B of the questionnaire, stress was triggered more by factors such as: the muscle aches (40.00%), tiredness (28.89%), insufficient sleep (26.67%) and imbalances of weight (26.67%). The study of Nederhof et al.[23] corroborates the findings of this research indicating that the intensification of training, intentionally or not, may lead the athlete to experience sensations of acute fatigue, change in sleep pattern, feeding, concentration problems, changes in mood state, as well as decrease in performance. These changes are widely related to changes in the various systems of the body on account of the increased stress.

However, there are many factors that have the potential to reduce stress among the sportsmen. In the present study, the young people pointed out the interest (66.67%), the most appropriate sports training (46.67%), the proximity with friends (44.44%) and access to the living environment and study (24.44%) as mitigation of stress.

4 Conclusion

So that the athletes have a good performance in sports practices, it is necessary to balance a number of factors, both internal (muscle pain, fatigue, training time, hassle) and external (climate, health, diet). From the study, it is possible to infer that the performance of the athletes is directly related to the stress factors which affect them. These factors are prevalent and need to be mitigated to the maximum, since they can impair quite enough the performance and productivity of sportsmen. In a complementary manner, it is necessary to investment in humanizing practices and to collaborate with the integral development of individuals, valuing the proper and conscious training, solidarity and fellowship.

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