

EFFECTS OF CONSUMING TURMERIC AND OMEGA 3 ON PHYSICAL ACTIVITY PRACTITIONERS: A LITERATURE REVIEW

Thatyane Beatriz Alencar Faustino

Centro Universitário do Planalto Central
Apparecido dos Santos - UNICEPLAC
Brasília – DF
<http://lattes.cnpq.br/0273725145261560>

Poliana Silva Gomes Lima

Centro Universitário do Planalto Central
Apparecido dos Santos - UNICEPLAC
Brasília – DF
<http://lattes.cnpq.br/2268474865773434>

Danielle Luz Gonçalves

Centro Universitário do Planalto Central
Apparecido dos Santos - UNICEPLAC
Brasília – DF
<http://lattes.cnpq.br/3195669215940778>

Edilson Francisco Nascimento

Centro Universitário do Planalto Central
Apparecido dos Santos - UNICEPLAC
Brasília – DF
<http://lattes.cnpq.br/0027473616541347>

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



Abstract: INTRODUCTION: Turmeric has bioactive compounds that act as an antioxidant agent, in particular curcumin stands out, which through the hydroxyl group present in its composition is capable of capturing reactive oxygen species (ROS) produced during physical activity. Furthermore, Omega 3 through its compounds EPA and DHA acts as an anti-inflammatory agent, also capable of helping to recover from damage induced by intense physical exercise. **OBJECTIVE:** To observe the effects of turmeric and Omega 3 consumption on physical activity practitioners. **METHODS:** A search for studies was carried out through the Lilacs, SciELO, MedLine and PUBMED databases, as well as books and chapters on the topic. The inclusion criteria were: selecting current studies that reported on the effects of turmeric and Omega 3 and that were associated with the practice of physical activity. Studies that did not discuss the objective in question were excluded. **RESULTS:** 10 articles were used to analyze results, 2 on muscle damage caused by physical activity, 4 on the beneficial effects of turmeric consumption by physical activity practitioners and 4 on the beneficial effects of Omega 3 intake by physical exercise practitioners. From a re-reading of the selected studies, it is possible to affirm that turmeric and Omega 3 have bioactive compounds capable of acting as an antioxidant and anti-inflammatory effect, consequently helping to repair damage caused by physical activity. **CONCLUSION:** The use of these foods with functional property claims promotes beneficial effects on human health. The bioactive compounds present in turmeric and Omega 3 act as antioxidant and anti-inflammatory agents, thus helping to reduce oxidative and inflammatory damage caused by physical activity.

Keywords: “turmeric”, “Omega 3”, “physical activity”.

INTRODUCTION

Practicing long-term, high-impact or exhausting physical exercise can cause, for example, chronic inflammation due to the high production of reactive oxygen species (ROS), a phenomenon also known as oxidative stress. This phenomenon is characterized by an imbalance between the formation of ROS and the body's antioxidant capacity. This can increase the chance of muscle injuries, hinder tissue repair and even lead to a reduction in muscle mass in those who practice physical activities (PETRY, 2010).

Practicing regular physical exercise (EFR) at low and medium intensity has demonstrated a beneficial effect on disease prevention. Among its benefits we can highlight the reduction of oxidants, improvement in the antioxidant defense system, improvement in the resistance of organs and tissues against the damaging effects of free radicals (RL). However, the practice of intense physical exercise (EFI) is subject to an increase in cases of muscle damage, an increase in RL production and a possible decrease in the immune system. EFI is characterized by repetitive movements, which can cause an exacerbated increase in the athlete's energy expenditure. Considering these characteristics of EFI, Omega-3 supplementation has a beneficial effect, as it reduces the inflammatory process and injury recovery time, resulting in a better response during exercise (BRITO et al.; 2019)

Furthermore, depending on its intensity, it can generate pro-inflammatory stimuli, including cytokines such as interleukins 8 (IL-8), interleukin 1 (IL-1) and tumor necrosis factor alpha (TNF- α). Through the anti-inflammatory properties of curcumin, it can act to inhibit the NF-Kappa B signaling pathway and the expression of cytokines, helping to reduce the inflammatory process. According to the latest data obtained from the 2018 International Olympic Committee

(COIC), curcumin supplementation can help improve training capacity, muscle recovery and reduce injuries (PETRY, 2010).

Turmeric (*curcuma longa*), from the Zingiberaceae family, popularly known as curcumin or saffron, has a yellow-orange color belonging to the group of polyphenols, is rich in antioxidants and anti-inflammatory action. The action of curcumin is linked to the modulation of factors involved in the inflammatory response such as nuclear factor kappa B (NF-kappa B) (JUNIOR and LONGO, 2019).

Omega-3 is a long-chain polyunsaturated fatty acid, composed mainly of EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), found mainly in seafood. They exert anti-inflammatory properties in several different mechanisms, and can, for example, act by suppressing the production of IL-2 and inhibiting inflammation induced by lipopolysaccharides (DO NASCIMENTO and SCALABRINI 2020).

Furthermore, omega-3 polyunsaturated fatty acid, more specifically DHA and EPA, is used as a supplement by athletes due to its anti-inflammatory action by causing a reduction in damage caused by high intensity exercise, reducing inflammation and recovery time, favoring a faster response. Therefore, the consumption of omega-3 significantly helps to improve the response to exercise (DO NASCIMENTO and SCALABRINI 2020).

In recent years, it has been observed that concern about the health of the population has increased and that is why researchers have pointed to nutrition as a method of maintaining the functioning of the body and health, in addition to being a method that helps to reduce the development of chronic diseases. Therefore, it is essential to choose good quality foods, foods that, in addition to nutrients, provide beneficial compounds to the body (FIGUEIREDO and CARVALHO, 2015).

Therefore, foods with such characteristics are known as foods with functional properties, which according to ANVISA (National Health Surveillance Agency) defines as follows “food with functional properties: that related to the metabolic or physiological role that the nutrient and/or non-nutrient has on growth, development, maintenance and other normal functions of the human organism” (BRASIL, 1999). Thus, through this literature review, we sought to observe the effects of turmeric and Omega-3 consumption on physical activity practitioners.

SPECIFIC OBJECTIVES

1. Observe the influence of turmeric consumption as an antioxidant effect on those who practice physical activity;
2. Evaluate the harmful effects of ROS – on muscle damage
3. Evaluate the benefits of the antioxidant action of DHA and EPA on oxidative stress
4. Investigate the literature on curcumin dosages used by physical activity practitioners;
5. Search the literature for the dosages of Omega-3 consumed by people who practice physical activity.

LITERATURE REVIEW

FOODS WITH FUNCTIONAL PROPERTY CLAIMS

According to ANVISA (National Health Surveillance Agency), the claim of functional property concerns the physiological role that the nutrient or non-nutrient can play in the human organism, through normal functions, growth or development. Furthermore, the properties can help maintain health and reduce the risk of developing chronic diseases (BRASIL,2019).

The effectiveness of these foods with claims of functional properties is noticeable through

healthy eating habits, which include regular consumption of them associated with the consumption of fruits, vegetables, fiber and whole foods. The benefits of consuming foods with claims of functional properties come from the metabolic and physiological effects that help the human body function better, as these effects are the result of the action of bioactive compounds present in foods (FIGUEIREDO and CARVALHO, 2015).

Therefore, bioactive compounds can bring health benefits, through mechanisms with antioxidant action, in addition to several others such as modulating enzymes, blocking the activity of virus toxins, antibacterials, etc. Researchers explain that these benefits occur since the compounds can act in parallel with different cell bodies, thus resulting in physiological benefits and promoting health to the individual's body (FIGUEIREDO and CARVALHO, 2015).

An antioxidant agent is one capable of inhibiting or delaying damage caused by the action of free radicals, arising from oxidative stress. The antioxidant defense system is known as enzymatic or non-enzymatic (FIGURE 1). In the enzymatic system, the enzymes glutathione peroxidase, superoxide dismutase and catalase act as a means of preventing damage that would be caused by oxidative reactions. On the other hand, the non-enzymatic system is due to the antioxidant action of foods rich in bioactive compounds (FIGURE 2), such as curcumin, etc. (CRUZ et al.; 2018).

Non-enzymatic	Enzymatic
Tocopherol (vitamin E)	L-cysteine
B-carotene	curcumin
Ascorbic acid (vitamin C)	superoxide dismutase
Flavonoids	catalase
Plasma proteins	NADPH-quinone oxidoreductase
Selenium	glutathione peroxidase
Glutathione	repair enzymes
Chlorophyllin	

FIGURE 1: Main antioxidant defense agents
SOURCE: (BIANCHI and ANTUNES, 1999)

Food	Antioxidant	Food	Antioxidant
Papaya	-B-Carotene	Grapes	-ellagic acid
Broccoli	-Flavonoids	parsley	- flavonoids
Orange	-vitamin C	strawberry	-vitamin C
Tea	-Catechins	curry	curcumin
Wine	-Quercetin	walnut	-polyphenols
Carrot	-B-Carotene	spinach	-chlorophyllin
Tomato	-carotenoids	cabbage	-tannins

FIGURE 2: Sources of antioxidants in the diet
SOURCE: (BIANCHI and ANTUNES, 1999)

TURMERIC

Turmeric (*Cúrcuma Longa*) is a species of plant that belongs to the Zingiberácea family, of Asian origin. Turmeric is used as a natural seasoning to add color and flavor to culinary preparations, in addition to being widely used as a form of medicinal treatment due to its antioxidant and anti-inflammatory properties (SAIZ DE COS, 2014).

These properties are the result of the action of phenolic compounds known as curcuminoids found in turmeric, more specifically in its roots. The curcuminoids present are curcumin, demethoxycurcumin and bisdemethoxycurcumin, with curcumin being the main one and currently most studied. (SUHETT et al., 2021)

Curcumin has anti-inflammatory and antioxidant effects due to its ability to eliminate free radicals produced in oxidative stress, thus acting directly to control the inflammatory process (CARNEIRO and MACEDO, 2020).

The antioxidant activity is due to the hydroxyl group (FIGURE 3) or methylene. Curcumin is capable of blocking the pro-inflammatory transcription factor NF-kB, this action prevents the impulse by TNF from occurring (FIGURE 4), thus provoking a rapid response against inflammatory processes (COSTA and HOEFEL, 2019).

Therefore, the literature suggests that curcumin is capable of helping in the recovery process from damage caused by reactive oxygen species (ROS), caused by physical

exercise. (MOURA et al.; 2022)

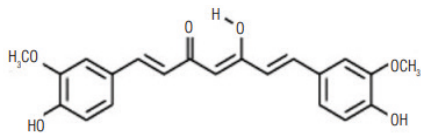


FIGURE 3: Structure of curcumin (BASTOS et al.; 2009)

SOURCE: (BASTOS et al.; 2009)

OMEGA 3

Consisting of two families, the polyunsaturated fatty acids Omega-3 (alpha linoleic acid) and Omega-6 (linoleic acid) are not synthesized by the human body and must be ingested from the diet. Its absence can cause signs and symptoms of deficiencies, which demonstrates its need in the diet as essential (PASCHOAL and NAVES, 2014).

Being an essential component for the body to function properly, Omega-3 is a fat, that is, a polyunsaturated fatty acid. Consisting of a fatty acid EPA (eicosapentaenoic fatty acid), ALA (alpha-linolenic acid) and DHA (docohexaenoic fatty acid) (BRITO et al.; 2019).

We can highlight foods that are potential sources of Omega-3, such as some species of fish, salmon, trout, tuna, some cereals such as oats, flaxseed, among other foods such as tofu, soy milk, nuts, dark green leaves, spinach and broccoli. A lifestyle based on adequate nutrition has demonstrated great positive effects with Omega-3 supplementation. Omega-3 supplementation, combined with an adequate eating plan and regular physical activity, demonstrates improvements in overall health (DELPINO and FIGUEIREDO, 2019)

Supplementation in athletes with omega-3 polyunsaturated fatty acids, particularly DHA and EPA, has been shown to be effective as they have anti-inflammatory action, being able to reduce the inflammatory effects on the injured muscle and favoring a reduction in recovery time. The need to address

nutritional deficiencies in athletes or those involved in intense physical activity has increased significantly in recent times. It was observed that there are several foods capable of improving the athlete's results and being able to reduce the effects caused by intense physical exercise (BRITO et al.; 2019).

PHYSICAL ACTIVITY AND MUSCLE DAMAGE

Physical activity, when practiced regularly, brings several physiological adaptations, with great benefits to the body, even if it is just a few minutes during the day. But such benefits can become harmful when the exercise does not occur continuously or when overload occurs during the exercise, leading to muscle wear or damage. During physical exercise, there is a natural increase in oxygen consumption, which leads to changes in antioxidant systems (SILVA et al.; 2013)

The imbalance of the antioxidant system is known as oxidative stress, where there is the production of free radicals as a consequence of factors such as muscle damage caused during intense physical activity (PASCHOAL and NAVES, 2014). Furthermore, the increased release of reactive oxygen species can be caused by poor diet, poor recovery, inadequate sleep and/or excessive alcohol consumption. Therefore, nutrition aims to help reduce inflammation in the body through a diet rich in antioxidants (BIESEK et al., 2015).

MUSCLE INJURY

Muscle injuries can be classified as direct and indirect, traumatic and atraumatic, partial or total. Direct injuries result from impact situations, resulting from contact or falls, indirect injuries occur when power is required to carry out movements. Thus, traumatic injuries result from bruises, muscle strain, and atraumatic injuries refer to cramps and delayed muscle pain. In short, we say that partial

Compostos bioativos	Fontes alimentares	Efeito na resposta inflamatória
Resveratrol	Grapes (vitis vinifera)	NOS, ↓ JNK, ↓ MEK, ↓ NF- <i>kappa</i> B, ↓ AP-1, ↓ PKC, ↓ 5-LOX, ↓ IL-6, ↓ IL-8, ↓ IL-1, VCAM-1
curcumin	turmeric (turmeric long)	↑ B, ↓ AP-1, ↑ PPAR γ , ↑ Nrf2, ↓ JNK, ↓ PKC, ↓ VCAM-1, ↓ 5-LOX, ↓ COX-2, TNF- α , ↓ IL-6, ↓ IL-8, ↓ IL-12, ↑ GSH-px
genistein	soybean (Glycine max)	↑ B, ↑ GSH-px
quercetin	Citrus fruits, apples	↑ B
sulforaphane	Crucifers	↑ B
capsaicin	Red pepper (capsicum annum)	↑ B
Indole-3-carbinol	Cruciferous	↑ B, ↓ COX-2, ↓ MMP-9
ellagic acid	Pomegranate (punica garanatum)	↓ NF- <i>kappa</i> B, ↓ AP-1, ↓ COX-2, ↓ iNOS, ↓ p38MAPK
6-gingerol	Ginger (Zingiber officinale)	↑ B, ↓ AP-1, ↓ JNK, ↓ COX-2, ↓ MMP-9, ↓ IL-6

Catechins Green tea (Camellia sinensis) ↓ MAPK quinase; NF-*kappa*B: fator nuclear *kappa*B; AP-1: proteína ativadora-1; PKC: proteína quinase C; 5-LOX: 5-lipoxigenase; IL-6: interleucina-6; IL-8: interleucina-8; IL-1: interleucina-1; IL-12: interleucina-12; Nrf2: fator relacionado ao E2; VCAM-1: moléculas de adesão celular vascular-1; GSH-px: glutatona peroxidase; PPAR- γ : receptor ativado por proliferadores de peroxissomos- γ ; MMP-9: metaloproteinase de matriz-9; TNF- α : fator de necrose tumoral.

FIGURE 4: Bioactive compounds present in foods involved in modulating the inflammatory response

SOURCE: (BASTOS et al.; 2009)

injuries cause damage to parts of the muscles and total injuries include the entire muscle and cause visible deformities. This makes it easier to understand the type of injury suffered by the athlete. (LIMA et al.; 2022)

In sports, muscle injuries frequently affect athletes. When we demand greater commitment from the body that it is not prepared for, that is when we put it at risk of injury. Various movements, speed, position changes are performed during a football match, which increases the occurrence of injuries to the lower limbs, as well as a football player who is subjected to high training loads, a reduction in rest time as well. are prone to muscle injuries. The athlete needs to adapt appropriately to the proposed training, as excess will lead to a decrease in performance. It is possible to say that athletes who train beyond their limit tend to have a higher incidence of injuries during their career. (LIMA et al.; 2022)

Football is a sport that demands high physical effort from players, which leads to increased physical demands. Injuries suffered by football athletes account for around 50 to 60% of sports injuries. Even with so much

demand, it is not impossible to use methods that offer personalized training. Requiring multidisciplinary monitoring, such as a physiotherapist, physical trainer, nutritionist, among others, an athlete who trains every day, participates in weekly games, travels, tends to have a greater number of injuries, even with all this monitoring (DE SÁ et al, 2021).

METHODOLOGICAL PROCEDURE

This work was produced using the literature review model based on scientific articles, prioritizing the most current articles that dealt with the subject, as well as books and chapters on the topic. To construct the present study, research was carried out in the following databases: Scielo, Pubmed and ``Revista Brasileira de Nutrição Esportiva``, in addition to books and chapters on the topic, to search for the references cited. The keywords used were turmeric, Omega 3 and physical activity.

DATA PRESENTATION AND ANALYSIS

The tables present the articles found through searches in specific databases, those that fit the requirements framework in accordance with the objective of this review were identified.

Based on the data presented by Lima and collaborators (2022), there is a need for multidisciplinary monitoring of football athletes, as they are subject to injuries that can harm their performance, affect their psychology, rehabilitation of injuries suffered, and adequate nutrition. Football is a sport that is characterized by the physical effort required of the athlete, making them prone to injuries, which represents around 50 to 60% of sports injuries. Football is a sport that requires intense physical effort, thus generating exhaustion for the athlete due to intense physical activity. Intense physical exercise favors the increase in free radicals, reducing antioxidant levels, leading to muscle damage and fatigue.

During the study carried out Córdova and Navas (2000) suggested that there are several possibilities that can induce muscle damage induced by physical exercise. Among which we can highlight the formation of free radicals during physical exercise due to excessive oxygen consumption. Practicing intense physical exercise is capable of causing changes in cell membranes, which triggers an inflammatory process leading to damage in muscle fibers.

By re-reading articles on the antioxidant and anti-inflammatory action of turmeric, DO NASCIMENTO and collaborators (2021) observed that the consumption of 1g to 2.1g of the phenolic compound is capable of helping to safely modulate the inflammatory and oxidative response. The authors also suggest that the consumption of a tablespoon of turmeric powder or two slices of the rhizome can be included in the diet, in order to promote

various beneficial effects on health.

In a data survey carried out by MOURA and collaborators (2022), it was possible to show in the literature the consumption of medicinal plants that, through their bioactive compounds, can act as antioxidant agents helping in the inflammatory process. Curcumin, a phenolic compound present in turmeric, with its anti-inflammatory action is capable of eliminating damage from reactive oxygen species (ROS) caused by intense physical activity. Dosages of 90mg, 150mg and 200mg were used by those who practice physical activity. Despite proving the benefits of turmeric consumption when practicing physical activity, no concrete answer has been reached regarding the dosages to be consumed by those who practice physical activities.

In the systematic review carried out by SUHUETT and collaborators (2020), data was collected where it was possible to show the effects of curcumin consumption on physical activity practitioners. The authors show studies where the consumption of curcumin can help reduce pain and muscle damage, inflammation arising from physical activity and also suggest that the consumption of curcumin can help in better performance of physical exercises. In this survey, curcumin consumption varied between 0.01g and 6g/day.

In the study carried out by COSTA and HOEFEL (2019), the authors show studies where several different dosages were taken, where curcumin consumption varied between 1g and 2.5g/day. Therefore, even in the face of limited studies regarding the consumption of curcumin by those who practice physical activity, studies suggest the intake of curcumin as a good nutritional strategy due to its antioxidant and anti-inflammatory capacity.

In the systematic review by Motta and collaborators (2019), they carried out a data collection where it is possible to verify the benefits and suggested dosages to achieve a

Study title	Author/year	Results
Injuries in football athletes	Lima et al 2022	Injuries in football athletes represent a high risk to health and performance.
Free radicals and muscle damage caused by exercise: role of antioxidants	Córdoba and Navas 2000	The increase in oxygen use during intense exercise drives the production of free radicals and other oxidizing substances that trigger muscle damage.

Table 01: Muscle injury and its harmful effects

Study title	Author/year	Dosage	Results
Efficacy of the functional properties of turmeric: an integrative literature review	NASCIMENTO et al, 2021	1 to 2.1g	Through data obtained from 6 articles analyzed, it was possible to observe the antioxidant and anti-inflammatory capacity of turmeric consumed in different dosages.
Effects of curcumin supplementation on sport and physical exercise: a systematic review	SUHET et al.; 2020	0.01 to 6g	Suggests that curcumin consumption can help reduce pain and injuries caused by physical exercise
Use of herbal medicines: applications in sports performance	MOURA et al.; 2022	90mg to 200mg	Elimination of ROS caused by physical activities
Curcumin supplementation as a repairer for exercise-induced muscle damage	COSTA and HOEFEL, 2019	1 to 2.5g	Suggests benefits to muscle damage induced by physical activity

Table 02: studies on the effects and dosages of turmeric on physical activity practitioners

Study title	Author/year	Dosage	Results
Effects of Omega-3 Fatty Acid Supplementation on Delayed-Onset Muscle Soreness	Motta et al 2019	DHA 50mg – 3000mg/day EPA 300mg – 3000 mg/day	It suggests that doses of EPA and DHA greater than 600 mg and 260 mg, respectively, may reduce late-onset muscle damage. 24h-72h after exercise.
Omega-3 Supplementation in Intense Physical Exercisers	Brito et al 2019	Omega 3 1000mg- 6000mg/day	Different results regarding suggested dosages. Presenting a dosage of 5400mg/day, it showed a protective effect on markers in athletes. On the other hand, with a dosage of 1000mg per day, it was possible to observe a greater performance in the protective function against the inflammatory process induced by physical exercise and dietary restriction.
The Effect of Omega-3 Polyunsaturated Fatty Acid Supplementation on Exercise-Induced Muscle Damage	Kyriakidou et al 2021	3g/day of omega 3	It suggests that supplementation with 3g/day of polyunsaturated omega-3 compensates for the response to pain induced by muscle damage induced by physical exercise.
Assessment of omega-3 polyunsaturated fatty acid consumption by physical exercise practitioners	Delpino and Figueiredo 2020	Daily consumption of foods containing omega-3	Adequate consumption of plant foods that are sources of omega-3, however low in relation to foods that are sources of omega 3 of animal origin.

Table 03: studies on the effects and dosages of Omega 3 in physical activity practitioners

reduction in late-onset muscle damage, acting against inflammation caused by physical exercise. Among the benefits observed, a moderate reduction in fatigue can also be observed, which positively influences mood, creating a feeling of psychological well-being. The most significant results observed were in untrained people, considering that there are few studies carried out with athletes. Needing to look further into studies in order to verify possible improvements in the inflammation caused by late muscle damage.

Based on data obtained by Brito and collaborators (2019), supplementation with omega 3 polyunsaturated fatty acids, especially DHA and EPA, has an anti-inflammatory effect, alleviating the damage caused by the inflammatory process through the injured muscle, thus reducing recovery time in order to favor the response to intense physical exercise. Just as excess can harm health, leading to an excessive reduction in the immune response, an overdose can accentuate the oxidative process, stimulating the production of free radicals. Therefore, it is worth highlighting that omega 3 supplementation has demonstrated great effectiveness in treating inflammatory processes, including those caused by physical exercise.

daily 3g omega - 3 polyunsaturated fatty acid supplementation can compensate for pain resulting from muscle damage induced by high-intensity physical exercise. It is also worth highlighting that the study reveals that supplementation of up to 5g/day of omega 3 is also considered safe by the European Food Safety Authority (EFSA).

In the study carried out by Delpino and Figueiredo (2020), it is possible to observe that the authors were able to highlight the preference regarding the consumption of

foods of plant origin and low consumption of foods of animal origin, which can be explained by the low supply, high cost or not being pleasing to some people's palates. The high consumption of oats and broccoli by those who practice physical activity can serve as complementary sources of omega-3, even though they do not have high concentrations. Consuming foods that are sources of omega-3 can act on the body in ways that help reduce cholesterol levels, reduce and even prevent vascular damage, in addition to playing an important role in the inflammatory process.

FINAL CONSIDERATIONS

According to the research carried out, it was concluded that both foods with functional property claims have beneficial effects on human health. The bioactive compounds present in turmeric and Omega 3 are capable of acting as antioxidant and anti-inflammatory agents, thus helping to reduce oxidative and inflammatory damage caused by physical activity.

However, despite the antioxidant effects of curcumin being proven in the literature on the human body and on the health of those who practice physical activities, studies are still scarce regarding recommended dosages for athletes. Therefore, as a suggestion for future studies, it is suggested to determine the amount of curcumin that must be consumed by those who exercise.

Furthermore, the consumption of EPA and DHA, bioactive compounds present in Omega 3, have high anti-inflammatory power, also helping to repair injuries caused by intense physical activities. Currently, the literature suggests the consumption of omega 3 in up to 6g/day safely, that is, without causing harmful effects to the athlete.

REFERENCES

- BASTOS, Deborah H. M.; ROGERO, Marcelo M.; ARÊAS, José Alfredo. Mecanismo de ação de compostos bioativos dos alimentos no contexto de processos inflamatórios relacionados à obesidade. **Arq Bras Endocrinol Metab**, v. 53, n. 5, p. 646-56, 2009.
- BIANCHI, Maria de Lourdes Pires; ANTUNES, Lusânia Maria Greggi. Radicais livres e os principais antioxidantes da dieta. **Rev. Nutr**, v. 12, n. 2, p. 123-130, 1999.
- BIESEK, Simone; ALVES, Letícia Azen; GUERRA, Isabela. **Estratégias de nutrição e suplementação no esporte**. São Paulo: Manole, 2015.
- BRASIL. Ministério da Saúde. **PORTARIA Nº 398, DE 30 DE ABRIL DE 1999**. Diretrizes básicas para análise de comprovação de propriedades funcionais e ou de saúde alegadas em rotulagem de alimentos. Diário Oficial da União, Poder Executivo, Brasília, DF, Abril de 1999.
- BRITO, Jullyana Vieira Rebouças Del; DE JESUS Flávia Miranda; BESERRA, Janete Ferreira; DE LEÃO, Anna Maly; NEVES, Eduardo. Suplementação de Ômega-3 em praticante de exercício físico intenso. **Revista Divulgação Científica Sena Aires**, v. 8, n. 2, p. 215-227, 2019.
- CARNEIRO, Josiane Aparecida; MACEDO, Darla Silvério. Cúrcuma: princípios ativos e seus benefícios para a saúde. **RBONE – Revista Brasileira de Obesidade, Nutrição e Emagrecimento**, v. 14, n. 87, p. 632-640, 2020.
- COSTA, Rafael Carvalho; HOEFEL, Ana Lúcia. Suplementação da curcumina, como reparador de dano muscular induzido pelo exercício. **Revista Brasileira de Nutrição Esportiva**, v. 13, n. 82, p. 998-1008, 2019.
- CRUZ, Roberta Monteiro de Oliveira; CRUZ, Paula Monteiro de Oliveira; BARRETOS Kelly Cristina Cordeiro; REVOREDO, Camila Maria Simplício; BARROS, Anael Queiros Silva; MOREIRA, Thayna de Nazaré Araújo; SILVA, Dalene Roberta Ramos; HOLANDA, Alderona Oliveira do Nascimento. Consumo de antioxidantes para práticas de exercícios físicos. **Revista Eletrônica Acervo Saúde**, n. 5, p. S199-S202, 2018.
- DE SÁ, Anne Kesy Gomes; ROCHA, Agnelo Weber de Oliveira; OLIVEIRA, Anderson José Santana; PERONDI, Brenda Lúcia Burtuli; SOUZA, Pedro Victor Nogueira; CHAVES, Sandro Nobre; CLAEEL, Sacha; RIBEIRO, Alexandre Lima de Araújo. Associação entre posição e diferentes tipos de lesões em membros inferiores em atletas de futebol. **Brazilian Journal of Health Review**, v. 4, n. 1, p.1478-1486, 2021.
- DELPINO, Felipe Mendes; FIGUEIREDO, Lilian Munhoz. Avaliação do consumo do ácido graxo poliinsaturado ômega-3 por praticantes de exercício físico. **Revista Brasileira de Nutrição Esportiva**, v. 14, n. 84, p. 103-107, 2020.
- DO NASCIMENTO, Maria Beatriz Augusto; MAIA, Jessaminy Teixeira; NASCIMENTO, Edilson Francisco. Eficácia das propriedades funcionais da cúrcuma: uma revisão integrativa da literatura. **Atena**, p. 129-138, 2021.
- DO NASCIMENTO, Paulo Marcos; SCALABRINI, Heloisy Moreira. Benefícios do ômega 3 na prevenção de doença cardiovascular: Revisão integrativa de literatura. **International Journal of Nutrology**, v. 13, n. 03, p. 095-101, 2020.
- FIGUEIREDO, Helena Rodrigues; CARVALHO, Viviel Rodrigo José de. ALIMENTOS FUNCIONAIS: Compostos bioativos e seus efeitos benéficos à saúde. In: **II Congresso Internacional do Grupo Unis**. Fundação de Ensino e Pesquisa do Sul de Minas, 2015.
- LIMA, Wanderson Pereira; SILVA, Paulo Ricardo Donizetti; FILHO, Jorge Antônio Catenaci Cunha. Lesão em atletas de futebol de campo: um estudo teórico. **Vita et Sanitas**, v. 16, n. 1, 2022.
- MOURA, Jennifer de Sousa; XAVIER, Taciana Carla da Silva; DE SOUZA, Lara Barbosa. Uso de fitoterápicos: aplicações no desempenho esportivo. **Brazilian Journal of Development**, v.8, n.1, p.5958-5977, 2022.
- PASCHOAL, Valéria; NAVES, Andréia. **Tratado de nutrição esportiva funcional**. São Paulo: Roca, 2014.
- PETRY, Éder R. et al. Exercício físico e estresse oxidativo: mecanismos e efeitos. **R BrasCi Mov**, v. 18, n. 4, p. 90-9, 2010.
- SAIZ DE COS, Paula; PEREZ-URRIA CARRIL, Elena. Curcuma I (cúrcuma longa I.). **Ene**, v. 8, p. 42, 2015.
- SILVA, Luan Pinho Ortiz; OLIVEIRA, Mariana Fernandes Mendes; CAPUTO, Fabrizio. Métodos de recuperação pós-exercício. **Rev. Educ**, v. 24, n. 3, p.489-508, 2013.
- SUHETT, Lara Gomes; SANTOS, Rodrigo de Miranda Monteiro; SILVEIRA, Brenda Kelly Souza; LEAL, Arieta Carla Gualandi; BRITO, Alice Divina Melo; NOVAES, Juliana Farias; DELLA LUCIA, Ceres Mattos. Effects of curcumin supplementation on Sport and physical exercise: a systematic review. **Critical reviews in food science and nutrition**, v. 61, n. 6, p. 946-958, 2021.