

6-Week Supplementation with Tribulus terrestris L. to Trained Male CrossFit® Athletes on Muscle, Inflammation, and Antioxidant Biomarkers: A Randomized, Single-Blind, Placebo-Controlled Trial

**Tipo de elemento** Artículo de revista académica

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**Resumen** Tribulus terrestris L. (TT) ingredients have anti-inflammatory and antioxidant activities, but their effects on exercise-induced muscle damage (EIMD) in trained athletes are uncertain. The purpose of this single-blind placebo-controlled trial, in accordance with CONSORT guidelines, was to examine the effect of 6 weeks of TT supplementation on muscle metabolism, inflammation biomarkers, and oxidant status. Thirty trained male CrossFit® athletes were randomly assigned to be supplemented with 770 mg/day of TT (intervention group (IG)) or receive a placebo daily (control group (CG)) for 6 weeks. Muscle damage enzymes, inflammation biomarkers, and Total Antioxidant Status (TAS) were assessed at baseline (T1), 21 days after baseline (T2), and after 42 days (T3). Grace, a Workout of the Day, was measured in T1 and T3. Statistical significance ( $p < 0.05$ ) was found between IG and CG in Lactate Dehydrogenase (LDH), C-reactive protein (CRP), and TAS levels at the end of the follow-up. Furthermore, TAS levels were significantly ( $p < 0.05$ ) lower at T2 and T3 relative to baseline in the IG, also LDH and CRP increased significantly ( $p < 0.05$ ) at T2 and T3 relative to baseline in the CG. No significant ( $p > 0.05$ ) decreases in muscle damage or inflammation biomarkers were observed, although a slight downward trend was observed after 6 weeks for supplemented athletes. TT supplementation could attenuate the CrossFit® training program-induced oxidative stress, muscle damage, and inflammation which could be due to the natural antioxidant and anti-inflammatory properties of TT.

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**Título corto** 6-Week Supplementation with Tribulus terrestris L. to Trained Male CrossFit® Athletes on Muscle, Inflammation, and Antioxidant Biomarkers

**Catálogo de biblioteca** PubMed Central

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## Adjuntos

- PubMed Central Full Text PDF
- PubMed Central Link

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## A systematic review: Role of dietary supplements on markers of exercise-associated gut damage and permeability

**Tipo de elemento** Artículo de revista académica

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**Autor** Adrian Holliday

**Autor** Ben Jones

**Resumen** Nutrition strategies and supplements may have a role to play in diminishing exercise associated gastrointestinal cell damage and permeability. The aim of this systematic review was to determine the influence of dietary supplements on markers of exercise-induced gut endothelial cell damage and/or permeability. Five databases were searched through to February 2021. Studies were selected that evaluated indirect markers of gut endothelial cell damage and permeability in response to exercise with and without a specified supplement, including with and without water. Acute and chronic supplementation protocols were included. Twenty-seven studies were included. The studies investigated a wide range of supplements including bovine colostrum, glutamine, probiotics, supplemental carbohydrate and protein, nitrate or nitrate precursors and water across a variety of endurance exercise protocols. The majority of studies using bovine colostrum and glutamine demonstrated a reduction in selected markers of gut cell damage and permeability compared to placebo conditions. Carbohydrate intake before and during exercise and maintaining euhydration may partially mitigate gut damage and permeability but coincide with other performance nutrition strategies. Single strain probiotic strains showed some positive findings, but the results are likely strain, dosage and duration specific.

Bovine colostrum, glutamine, carbohydrate supplementation and maintaining euhydration may reduce exercise-associated endothelial damage and improve gut permeability. In spite of a large heterogeneity across the selected studies, appropriate inclusion of different nutrition strategies could mitigate the initial phases of gastrointestinal cell disturbances in athletes associated with exercise. However, research is needed to clarify if this will contribute to improved athlete gastrointestinal and performance outcomes.

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**Título corto** A systematic review  
**Catálogo de biblioteca** PubMed Central  
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**Páginas** e0266379  
**Publicación** PLoS ONE  
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**Número** 4  
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- PubMed Central Full Text PDF
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Bifidobacterium longum subsp. longum OLP-01 Supplementation during Endurance Running Training Improves Exercise Performance in Middle- and Long-Distance Runners: A Double-Blind Controlled Trial

**Tipo de elemento** Artículo de revista académica  
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**Autor** Yung-Cheng Chang  
**Autor** Yi-Wei Kuo  
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**Resumen** Bifidobacterium longum subsp. longum Olympic No. 1 (OLP-01) has been shown in previous animal experiments to improve exercise endurance performance, but this effect has not been confirmed in humans, or more particularly, in athletes. Toward this end, the current study combined OLP-01 supplementation with regular exercise training in well-trained middle- and long-distance runners at the National Taiwan Sport University. The study was designed as a double-blind placebo-controlled experiment. Twenty-one subjects (14 males and seven females aged 20–30 years) were evenly distributed according to total distance (meters) traveled in 12 min to one of the following two groups: a placebo group (seven males and three females) and an OLP-01 ( $1.5 \times 10^{10}$  colony forming units (CFU)/day) group (seven males and four females). All the participants received placebo or OLP-01 supplements for five consecutive weeks consisting of three weeks of regular training and two weeks of de-training. Before and after the experiment, the participants were tested for 12-min running/walking distance, and body composition, blood/serum, and fecal samples were analyzed. The results showed that OLP-01 significantly increased the change in the 12-min Cooper’s test running distance and the abundance of gut microbiota. Although no significant change in body composition was found, OLP-01 caused no adverse reactions or harm to the participants’ bodies. In summary, OLP-01 can be used as a sports nutrition supplement, especially for athletes, to improve exercise performance.

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**Idioma** en

**Título corto** Bifidobacterium longum subsp. longum OLP-01 Supplementation during Endurance Running Training Improves Exercise Performance in Middle- and Long-Distance Runners

**Catálogo de biblioteca** www.mdpi.com

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**Etiquetas:**

<i>Bifidobacterium longum</i>, athletes, exercise performance, OLP-01, probiotic

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**Can Photobiomodulation Therapy (PBMT) Minimize Exercise-Induced Oxidative Stress? A Systematic Review and Meta-Analysis**

**Tipo de elemento** Artículo de revista académica

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**Autor** João Vitor Ferlito

**Autor** Marcos Vinicius Ferlito

**Autor** Mirian Salvador

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**Resumen** Oxidative stress induced by exercise has been a research field in constant growth, due to its relationship with the processes of fatigue, decreased production of muscle strength, and its ability to cause damage to the cell. In this context, photobiomodulation therapy (PBMT) has emerged as a resource capable of improving performance, while reducing muscle fatigue and muscle damage. To analyze the effects of PBMT about exercise-induced oxidative stress and compare with placebo therapy. DATA SOURCES: Databases such as PubMed, EMBASE, CINAHL, CENTRAL, PeDro, and Virtual Health Library, which include Lilacs, Medline, and SciELO, were searched to find published studies. STUDY SELECTION: There was no year or language restriction; randomized clinical trials with healthy subjects that compared the application (before or after exercise) of PBMT to placebo therapy were included. STUDY DESIGN: Systematic review with meta-analysis. DATA EXTRACTION: Data on the characteristics of the volunteers, study design, intervention parameters, exercise protocol and oxidative stress biomarkers were extracted. The risk of bias and the certainty of the evidence were assessed using the PEDro scale and the GRADE system, respectively. RESULTS: Eight studies (n = 140 participants) were eligible for this review, with moderate to excellent methodological quality. In particular, PBMT was able to reduce damage to lipids post exercise (SMD = -0.72, CI 95% -1.42 to -0.02, I2 = 77%, p = 0.04) and proteins (SMD = -0.41, CI 95% -0.65 to -0.16, I2 = 0%, p = 0.001) until 72 h and 96 h, respectively. In addition, it increased the activity of SOD enzymes (SMD = 0.54, CI 95% 0.07 to 1.02, I2 = 42%, p = 0.02) post exercise, 48 and 96 h after irradiation. However, PBMT did not increase CAT activity (MD = 0.18 CI 95% -0.56 to 0.91, I2 = 79%, p = 0.64) post exercise. We did not find any difference in TAC or GPx biomarkers. CONCLUSION: Low to moderate certainty evidence shows that PBMT is a resource that can

reduce oxidative damage and increase enzymatic antioxidant activity post exercise. We found evidence to support that one session of PBMT can modulate the redox metabolism.

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<b>Título corto</b>	Can Photobiomodulation Therapy (PBMT) Minimize Exercise-Induced Oxidative Stress?
<b>Catálogo de biblioteca</b>	PubMed
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Etiquetas:

exercise, laser therapy, oxidative damage, phototherapy, reactive species

Adjuntos

- PubMed entry
- Texto completo

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CrossFit Overview: Systematic Review and Meta-analysis

<b>Tipo de elemento</b>	Artículo de revista académica
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**Autor** Julio Cerca Serrão

**Resumen** Background CrossFit is recognized as one of the fastest growing high-intensity functional training modes in the world. However, scientific data regarding the practice of CrossFit is sparse. Therefore, the objective of this study is to analyze the findings of scientific literature related to CrossFit via systematic review and meta-analysis. Methods Systematic searches of the PubMed, Web of Science, Scopus, Bireme/MedLine, and SciELO online databases were conducted for articles reporting the effects of CrossFit training. The systematic review followed the PRISMA guidelines. The Oxford Levels of Evidence was used for all included articles, and only studies that investigated the effects of CrossFit as a training program were included in the meta-analysis. For the meta-analysis, effect sizes (ESs) with 95% confidence interval (CI) were calculated and heterogeneity was assessed using a random-effects model. Results Thirty-one articles were included in the systematic review and four were included in the meta-analysis. However, only two studies had a high level of evidence at low risk of bias. Scientific literature related to CrossFit has reported on body composition, psycho-physiological parameters, musculoskeletal injury risk, life and health aspects, and psycho-social behavior. In the meta-analysis, significant results were not found for any variables. Conclusions The current scientific literature related to CrossFit has few studies with high level of evidence at low risk of bias. However, preliminary data has suggested that CrossFit practice is associated with higher levels of sense of community, satisfaction, and motivation. Electronic supplementary material The online version of this article (10.1186/s40798-018-0124-5) contains supplementary material, which is available to authorized users.

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**Título corto** CrossFit Overview

**Catálogo de biblioteca** PubMed Central

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- PubMed Central Full Text PDF
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# Differential Health Effects on Inflammatory, Immunological and Stress Parameters in Professional Soccer Players and Sedentary Individuals after Consuming a Synbiotic. A Triple-Blinded, Randomized, Placebo-Controlled Pilot Study

**Tipo de elemento** Artículo de revista académica

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**Autor** Luis Andreu-Caravaca

**Autor** María Dolores Hinchado

**Autor** Isabel Gálvez

**Autor** Eduardo Ortega

**Resumen** The main objective of this research was to carry out an experimental study, triple-blind, on the possible immunophysiological effects of a nutritional supplement (synbiotic, Gasteel Plus®, Heel España S.A.U.), containing a mixture of probiotic strains, such as *Bifidobacterium lactis* CBP-001010, *Lactobacillus rhamnosus* CNCM I-4036, and *Bifidobacterium longum* ES1, as well as the prebiotic fructooligosaccharides, on both professional athletes and sedentary people. The effects on some inflammatory/immune (IL-1 $\beta$ , IL-10, and immunoglobulin A) and stress (epinephrine, norepinephrine, dopamine, serotonin, corticotropin-releasing hormone (CRH), Adrenocorticotrophic hormone (ACTH), and cortisol) biomarkers were evaluated, determined by flow cytometer and ELISA. The effects on metabolic profile and physical activity, as well as on various parameters that could affect physical and mental health, were also evaluated via the use of accelerometry and validated questionnaires. The participants were professional soccer players in the Second Division B of the Spanish League and sedentary students of the same sex and age range. Both study groups were randomly divided into two groups: a control group—administered with placebo, and an experimental group—administered with the synbiotic. Each participant was evaluated at baseline, as well as after the intervention, which lasted one month. Only in the athlete group did the synbiotic intervention clearly improve objective physical activity and sleep quality, as well as perceived general health, stress, and anxiety levels. Furthermore, the synbiotic induced an immunophysiological bioregulatory effect, depending on the basal situation of each experimental group, particularly in the systemic levels of IL-1 $\beta$  (increased significantly only in the sedentary group), CRH (decreased significantly only in the sedentary group), and dopamine (increased significantly only in the athlete group). There were no significant differences between groups in the levels of immunoglobulin A or in the



metabolic profile as a result of the intervention. It is concluded that synbiotic nutritional supplements can improve anxiety, stress, and sleep quality, particularly in sportspeople, which appears to be linked to an improved immuno-neuroendocrine response in which IL-1 $\beta$ , CRH, and dopamine are clearly involved.

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Adjuntos

- PubMed Central Full Text PDF
- PubMed Central Link

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Effect of a probiotic intake on oxidant and antioxidant parameters in plasma of athletes during intense exercise training

**Tipo de elemento** Artículo de revista académica  
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**Autor** M.C. Verdenelli  
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**Resumen** The aim of this study was to evaluate the effect of Lactobacillus rhamnosus IMC 501® and Lactobacillus paracasei IMC 502® on oxidative stress in athletes during a four-week period of intense physical activity. Two groups of twelve subjects each were selected for this analysis. The first group consumed a daily dose of a mixture of the two probiotic strains (1:1 L. rhamnosus IMC 501® and L. paracasei IMC

502®; ~109 cells/day) for 4 weeks. The second group (control) did not consume any supplements during the 4 weeks. Blood samples collected immediately before and after the supplementation were analyzed, and plasma levels of reactive oxygen metabolites and biological antioxidant potential were determined. Faeces were also collected and analyzed before and at the end of the probiotic supplementation. Antioxidative activity and oxidative stress resistance of the two strains were determined in vitro. Results demonstrated that intense physical activity induced oxidative stress and that probiotic supplementation increased plasma antioxidant levels, thus neutralizing reactive oxygen species. The two strains, *L. rhamnosus* IMC 501® and *L. paracasei* IMC 502®, exert strong antioxidant activity. Athletes and all those exposed to oxidative stress may benefit from the ability of these probiotics to increase antioxidant levels and neutralize the effects of reactive oxygen species. © 2011 Springer Science+Business Media, LLC.

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Idioma	English
Archivo	Scopus
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## Effect of a Protein Supplement on the Gut Microbiota of Endurance Athletes: A Randomized, Controlled, Double-Blind Pilot Study

Tipo de elemento	Artículo de revista académica
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**Autor** Claudia Carabaña  
**Autor** Mar Larrosa

**Resumen** Nutritional supplements are popular among athletes to improve performance and physical recovery. Protein supplements fulfill this function by improving performance and increasing muscle mass; however, their effect on other organs or systems is less well known. Diet alterations can induce gut microbiota imbalance, with beneficial or deleterious consequences for the host. To test this, we performed a randomized pilot study in cross-country runners whose diets were complemented with a protein supplement (whey isolate and beef hydrolysate) (n = 12) or maltodextrin (control) (n = 12) for 10 weeks. Microbiota, water content, pH, ammonia, and short-chain fatty acids (SCFAs) were analyzed in fecal samples, whereas malondialdehyde levels (oxidative stress marker) were determined in plasma and urine. Fecal pH, water content, ammonia, and SCFA concentrations did not change, indicating that protein supplementation did not increase the presence of these fermentation-derived metabolites. Similarly, it had no impact on plasma or urine malondialdehyde levels; however, it increased the abundance of the Bacteroidetes phylum and decreased the presence of health-related taxa including Roseburia, Blautia, and Bifidobacterium longum. Thus, long-term protein supplementation may have a negative impact on gut microbiota. Further research is needed to establish the impact of protein supplements on gut microbiota.

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**Título corto** Effect of a Protein Supplement on the Gut Microbiota of Endurance Athletes

**Catálogo de biblioteca** PubMed Central

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- PubMed Central Full Text PDF
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## Effect of Intensity and Duration of Exercise on Gut Microbiota in Humans: A Systematic Review

**Tipo de elemento** Artículo de revista académica

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**Autor** Carlos Jorquera-Aguilera

**Autor** Andrés Rodríguez-Rodríguez

**Autor** Fernando Rodríguez-Rodríguez

**Resumen** (1) Background: The gut microbiota might play a part in affecting athletic performance and is of considerable importance to athletes. The aim of this study was to search the recent knowledge of the protagonist played by high-intensity and high-duration aerobic exercise on gut microbiota composition in athletes and how these effects could provide disadvantages in sports performance. (2) Methods: This systematic review follows the PRISMA guidelines. An exhaustive bibliographic search in Web of Science, PubMed, and Scopus was conducted considering the articles published in the last 5 years. The selected articles were categorized according to the type of study. The risk of bias was assessed using the Joanna Briggs Institute's Critical Appraisal Tool for Systematic Reviews. (3) Results: Thirteen studies had negative effects of aerobic exercise on intestinal microbiota such as an upsurge in I-FABP, intestinal distress, and changes in the gut microbiota, such as an increase in Prevotella, intestinal permeability and zonulin. In contrast, seven studies observed positive effects of endurance exercise, including an increase in the level of bacteria such as increased microbial diversity and increased intestinal metabolites. (4) Conclusions: A large part of the studies found reported adverse effects on the intestinal microbiota when performing endurance exercises. In studies carried out on athletes, more negative effects on the microbiota were found than in those carried out on non-athletic subjects.

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**Título corto** Effect of Intensity and Duration of Exercise on Gut Microbiota in Humans

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**Etiquetas:**

adults, aerobic exercise, elite athletes, gut microbiota, large intestine

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Effect of Probiotic Yogurt Supplementation(*Bifidobacterium animalis* ssp. *lactis* BB-12) on Gut Microbiota of Female Taekwondo Athletes and Its Relationship with Exercise-Related Psychological Fatigue

Tipo de elemento

Artículo de revista académica

Autor

Jiang Zhu

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Yuping Zhu

Autor

Gang Song

Resumen

Objective: The gut microbiota plays a critical role in regulating human health and athletic performance. Probiotic supplementation has been shown to modulate gut microbiota composition and improve exercise performance. This study aimed to investigate the effect of probiotic yogurt supplementation on gut microbiota and its relationship with exercise-related psychological fatigue in female taekwondo athletes. Methods: Twenty female taekwondo athletes were randomly assigned to either a dietary intervention group (DK) or a control group (CK). The athletes’ exercise-related psychological fatigue was measured using the Athlete Burnout Questionnaire (ABQ) before and after an 8-week intervention. High-throughput sequencing was used to profile the gut microbiota, and functional prediction of the microbial community was performed. The effect of the dietary intervention on the athletes’ exercise-related psychological fatigue clearance rate and its relationship with the gut microbiota were explored. Results: (1) The probiotic supplementation of *Bifidobacterium animalis* ssp. *lactis* BB-12 for 8 weeks significantly increased the ABQ scores of the DK group compared to the CK group ( $p < 0.05$ ). (2) The abundances of *Bifidobacterium*, *Bacteroides*, *Lachnospiraceae*, family *\_Lactobacillaceae*, and genus

\_Lactobacillus were significantly higher in the DK group than in the CK group after probiotic supplementation, while Escherichia coli was significantly lower in the DK group than in the CK group. (3) The ABQa scores were positively correlated with Proteus; ABQb scores were positively correlated with Streptococcus and Enterococcus; and ABQc scores were positively correlated with Klebsiella, Bacteroides, and Streptomyces. (4) The DK group had significantly higher levels of L-arginine biosynthesis I (via L-ornithine), fatty acid biosynthesis and oxidation, and L-isoleucine biosynthesis III pathways compared to the CK group. Tyrosine degradation I (via 2,3-dihydroxyphenylpropionate) was significantly lower in the DK group than in the CK group. Conclusions: Probiotic yogurt supplementation of Bifidobacterium animalis ssp. lactis can promote the clearance of exercise-related psychological fatigue in female taekwondo athletes by upregulating beneficial gut microbiota, inhibiting harmful gut microbiota, and regulating relevant metabolic pathways.

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<b>Catálogo de biblioteca</b>	PubMed Central
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<b>Publicación</b>	Microorganisms
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Effects of Probiotic (Bifidobacterium longum 35624) Supplementation on Exercise Performance, Immune Modulation, and Cognitive Outlook in Division I Female Swimmers

<b>Tipo de elemento</b>	Artículo de revista académica
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**Autor** Andreas Kreutzer  
**Autor** Andrew C. Fry

**Resumen** Our aim was to determine the effects of probiotic supplementation (Bifidobacterium longum 35624; 1 billion CFU·d<sup>-1</sup>) on exercise performance, immune modulation, and cognitive outlook in collegiate female athletes during six weeks of offseason training. Seventeen National Collegiate Athletic Association (NCAA) Division 1 collegiate female swimmers participated in this two-group matched, double-blind, placebo controlled design. Via stratified randomization, participants were assigned to probiotic (B. longum 35624; n = 8) or placebo (n = 9) groups. Pre, mid, and post-training, all participants completed exercise performance testing (aerobic/anaerobic swim time trials and force plate vertical jump) as well as provided serum (cytokine and gastrointestinal inflammatory markers) and salivary immunoglobulin A samples. Recovery-stress questionnaire for athletes (RESTQ-Sport) was administered at baseline and conclusion of each week. Data were analyzed by analysis of covariance (ANCOVA) by time point with the respective baseline values of each dependent variable being the covariate. No significant differences in exercise performance and biochemical markers were observed between groups following offseason training. Recovery-Stress Questionnaire for Athletes (RESTQ-sport) values in B. longum 35624 group had significantly higher (i.e., more desired; p < 0.05) values in sport recovery (weeks five and six) than placebo. Probiotic supplementation in collegiate female swimmers did not affect exercise performance or immune function throughout offseason training, but did indicate alterations in cognitive outlook.

**Fecha** 2018-10-10  
**Catálogo de biblioteca** PubMed Central  
**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6315752/>  
**Accedido** 4/11/2023 18:54:51  
**Adicional** PMID: 30308984 PMCID: PMC6315752  
**Volumen** 6  
**Páginas** 116  
**Publicación** Sports  
**DOI** 10.3390/sports6040116  
**Número** 4  
**Abrev. de revista** Sports (Basel)  
**ISSN** 2075-4663  
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**Adjuntos**

- PubMed Central Full Text PDF
- PubMed Central Link

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## Effects of Probiotic Supplementation on Exercise with Predominance of Aerobic Metabolism in Trained Population: A Systematic Review, Meta-Analysis and Meta-Regression

**Tipo de elemento** Artículo de revista académica

**Autor** Asier Santibañez-Gutierrez

**Autor** Julen Fernández-Landa

**Autor** Julio Calleja-González

**Autor** Anne Delextrat

**Autor** Juan Mielgo-Ayuso

**Resumen** The scientific literature about probiotic intake and its effect on sports performance is growing. Therefore, the main aim of this systematic review, meta-analysis and meta-regression was to review all information about the effects of probiotic supplementation on performance tests with predominance of aerobic metabolism in trained populations (athletes and/or Division I players and/or trained population:  $\geq 8$  h/week and/or  $\geq 5$  workouts/week). A structured search was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA®) statement and PICOS guidelines in PubMed/MEDLINE, Web of Science (WOS), and Scopus international databases from inception to 1 November 2021. Studies involving probiotic supplementation in trained population and execution of performance test with aerobic metabolism predominance (test lasted more than 5 min) were considered for inclusion. Fifteen articles were included in the final systematic review (in total, 388 participants were included). After 3 studies were removed due to a lack of data for the meta-analysis and meta-regression, 12 studies with 232 participants were involved. With the objective of assessing the risk of bias of included studies, Cochrane Collaboration Guidelines and the Physiotherapy Evidence Database (PEDro) scale were performed. For all included studies the following data was extracted: authors, year of publication, study design, the size of the sample, probiotic administration (dose and time), and characteristics of participants. The random effects model and pooled standardized mean differences (SMDs) were used according to Hedges' g for the meta-analysis. In order to determine if dose and duration covariates could predict probiotic effects, a meta-regression was also conducted. Results showed a small positive and significant effect on the performance test with aerobic metabolic predominance (SMD = 0.29; CI = 0.08–0.50;  $p < 0.05$ ). Moreover, the subgroup analysis displayed significant greater benefits when the dose was  $\geq 30 \times 10^9$  colony forming units (CFU) (SMD, 0.47; CI, 0.05 to 0.89;  $p < 0.05$ ), when supplementation duration was  $\leq 4$  weeks (SMD, 0.44; CI, 0.05 to 0.84;  $p$



< 0.05), when single strain probiotics were used (SMD, 0.33; CI, 0.06 to 0.60; p < 0.05), when participants were males (SMD, 0.30; CI, 0.04 to 0.56; p < 0.05), and when the test was performed to exhaustion (SMD, 0.45; CI, 0.05 to 0.48; p < 0.05). However, with references to the findings of the meta-regression, selected covariates did not predict probiotic effects in highly trained population. In summary, the current systematic review and meta-analysis supported the potential effects of probiotics supplementation to improve performance in a test in which aerobic metabolism is predominant in trained population. However, more research is needed to fully understand the mechanisms of action of this supplement.

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**Título corto** Effects of Probiotic Supplementation on Exercise with Predominance of Aerobic Metabolism in Trained Population  
**Catálogo de biblioteca** PubMed Central  
**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8840281/>  
**Accedido** 4/11/2023 19:15:39  
**Adicional** PMID: 35276980 PMCID: PMC8840281  
**Volumen** 14  
**Páginas** 622  
**Publicación** Nutrients  
**DOI** 10.3390/nu14030622  
**Número** 3  
**Abrev. de revista** Nutrients  
**ISSN** 2072-6643  
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- PubMed Central Full Text PDF
- PubMed Central Link

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Effects of Probiotic Supplementation on Immune and Inflammatory Markers in Athletes: A Meta-Analysis of Randomized Clinical Trials

**Tipo de elemento** Artículo de revista académica  
**Autor** Yi-Ting Guo  
**Autor** Yu-Ching Peng  
**Autor** Hsin-Yen Yen  
**Autor** Jeng-Cheng Wu  
**Autor** Wen-Hsuan Hou

**Resumen** Background and Objectives: Probiotic supplementation can prevent and alleviate gastrointestinal and respiratory tract infections in healthy individuals. Markers released from the site of inflammation are involved in the response to infection or tissue injury. Therefore, we measured the pre-exercise and postexercise levels of inflammation-related markers—tumor necrosis factor (TNF)- $\alpha$ , interleukin (IL)-6, IL-8, IL-10, interferon (IFN)- $\gamma$ , salivary immunoglobulin A (IgA), IL-1 $\beta$ , IL-2, IL-4, and C-reactive protein (CRP)—in probiotic versus placebo groups to investigate the effects of probiotics on these markers in athletes. Probiotics contained multiple species (e.g., *Bacillus subtilis*, *Bifidobacterium bifidum*, etc.). Materials and Methods: We performed a systematic search for studies published until May 2022 and included nine randomized clinical trials. Reporting followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses guideline. Fixed-effects meta-analyses and sensitivity analyses were performed. Subgroup analyses were conducted on the basis of the period of probiotic intervention and timing of postassessment blood sampling. Results: The levels of IFN- $\gamma$  and salivary IgA exhibited a significant positive change, whereas those of TNF- $\alpha$  and IL-10 demonstrated a negative change in the probiotic group. The subgroup analysis revealed that the probiotic group exhibited significant negative changes in TNF- $\alpha$  and IL-10 levels in the shorter intervention period. For the subgroup based on the timing of postassessment blood sampling, the subgroup whose blood sample collection was delayed to at least the next day of exercise exhibited significant negative changes in their TNF- $\alpha$  and IL-10 levels. The subgroups whose blood samples were collected immediately after exercise demonstrated negative changes in their TNF- $\alpha$ , IL-8, and IL-10 levels. Conclusions: Probiotic supplementation resulted in significant positive changes in the IFN- $\gamma$  and salivary IgA levels and negative changes in the IL-10 and TNF- $\alpha$  levels. No significant changes in the IL-1 $\beta$ , IL-2, IL-4, IL-6, IL-8, or CRP levels were observed after probiotic use in athletes.

**Fecha** 2022-8-31

**Título corto** Effects of Probiotic Supplementation on Immune and Inflammatory Markers in Athletes

**Catálogo de biblioteca** PubMed Central

**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9505795/>

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**Volumen** 58

**Páginas** 1188

**Publicación** Medicina

**DOI** 10.3390/medicina58091188

**Número** 9

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**ISSN** 1010-660X

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## Effects of probiotics on strength and power performance in a trained population: a systematic review and meta-analysis

**Tipo de elemento** Artículo de revista académica**Autor** Asier Santibañez**Autor** Julen Fernández-Landa**Autor** Nikola Todorović**Autor** Julio Calleja Gonzalez**Autor** Marko Stojanovic**Autor** Juan Mielgo-Ayuso

**Resumen** The main purpose of this systematic review and meta-analysis was to evaluate the effects of probiotics intake on strength and power performance in a trained population. This study was designed following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guidelines. The review was registered in PROSPERO with the following registration number: CRD42021248173. PubMed/ MEDLINE, Web of Science, and Scopus databases were searched from their inception to the 18 th March 2022 to find original research studies evaluating the effects of probiotic supplementation on strength and power performance tests in a trained population. The following inclusion criteria were applied to select studies: probiotics supplementation; trained population; strength and power performance measurements; human experimental trial; controlled with a placebo group; peer-reviewed and original articles written in English language. Random effects model and standardized mean differences (SMD) were used following Hedges' G for the meta-analysis. Seven studies were finally included after the inclusion/exclusion criteria were applied (n=142 participants). Results of the meta-analysis identified a significant benefit of probiotics compared to placebo treatments ( $p=.04$ ), with a small pooled effect size ( $SMD=0.36$  [ $0.02-0.70$ ];  $I^2=43\%$ ), and no funnel plot asymmetry was present. In summary, this systematic review and meta-analysis demonstrated that probiotic supplementation could effectively enhance strength and power performance in a trained population.

**Fecha** 2023-04-19**Título corto** Effects of probiotics on strength and power performance in a trained population

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**Volumen** 55  
**Páginas** 62-72  
**Publicación** Kinesiology  
**DOI** 10.26582/k.55.1.7  
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**Modificado** 4/11/2023 19:13:24

**Adjuntos**

- Full Text PDF
- ResearchGate Link

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Estrategias de suplementacion y función gastrointestinal en atletas de resistencia

**Tipo de elemento** Artículo de revista académica  
**Autor** Vivian Ximena Duarte  
**Autor** Jaume Giménez-Sánchez  
**Fecha** 09/2015  
**Catálogo de biblioteca** SciELO  
**URL** [https://scielo.isciii.es/scielo.php?script=sci\\_abstract&pid=S2174-51452015000300007&lng=es&nrm=iso&tlng=es](https://scielo.isciii.es/scielo.php?script=sci_abstract&pid=S2174-51452015000300007&lng=es&nrm=iso&tlng=es)  
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**Adicional** Publisher: Academia Española de Nutrición y Dietética  
**Volumen** 19  
**Páginas** 167-174  
**Publicación** Revista Española de Nutrición Humana y Dietética  
**DOI** 10.14306/renhyd.19.3.134  
**Número** 3  
**ISSN** 2174-5145  
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**Modificado** 4/11/2023 19:51:28

**Adjuntos**

- Full Text PDF
-

# Exercise Training Combined with Bifidobacterium Longum OLP-01 Supplementation Improves Exercise Physiological Adaption and Performance

**Tipo de elemento** Artículo de revista académica

**Autor** Wen-Ching Huang

**Autor** Yi-Ju Hsu

**Autor** Chi-Chang Huang

**Autor** Hsuan-Chen Liu

**Autor** Mon-Chien Lee

**Resumen** Probiotics exert multiple health benefits, including gastrointestinal health, immunoregulation, and metabolic disease improvement, by modulating microbiota to maintain eubiosis via the hypothalamic–pituitary–adrenal (HPA) and brain–gut–microbiome axes. Physiological fatigue, mental stress, and gastrointestinal discomfort under the demands of athletic performance as well as immunosuppression are common during endurance training and competition. Limited studies investigated the functional effects of probiotic supplementation on endurance training. Bifidobacterium longum subsp. Longum OLP-01 (OLP-01), isolated from an elite Olympic athlete, was combined with a six-week exercise training program with gradually increasing intensity. In this study, Institute of Cancer Research (ICR) mice were assigned to sedentary, exercise, OLP-01, or exercise + OLP-01 groups and administered probiotic and/or treadmill exercise training for six weeks to assess exercise performance, physiological adaption, and related metabolites. The exercise + OLP-01 group demonstrated higher performance in terms of endurance and grip strength, as well as improved fatigue-associated indexes (lactate, ammonia, creatine kinase (CK), lactate dehydrogenase (LDH), and glycogen content), compared with the other groups. OLP-01 supplementation significantly ameliorated inflammation and injury indexes (platelet/lymphocyte ratio (PLR), aminotransferase (AST), and CK) caused by prolonged endurance exercise test. Moreover, acetate, propionate, and butyrate levels were significantly higher in the exercise + OLP-01 group than in the sedentary and OLP-01 groups. Athletes often experience psychological and physiological stress caused by programmed intensive exercise, competition, and off-site training, often leading to poor exercise performance and gastrointestinal issues. Functional OLP-01 probiotics are considered to be a nutritional strategy for improving physiological adaption, oxidative stress, inflammation, and energy balance to ensure high physical performance. Based on these results, probiotics combined with exercise training is a potential strategy for ensuring high physical performance of athletes, which should be further investigated through microbiota validation.

**Fecha** 2020-4-19

**Catálogo de biblioteca** PubMed Central

**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7231274/>

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**Adicional** PMID: 32325851 PMCID: PMC7231274  
**Volumen** 12  
**Páginas** 1145  
**Publicación** Nutrients  
**DOI** 10.3390/nu12041145  
**Número** 4  
**Abrev. de revista** Nutrients  
**ISSN** 2072-6643  
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**Adjuntos**

- PubMed Central Full Text PDF
- PubMed Central Link

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Four weeks of probiotic supplementation alters the metabolic perturbations induced by marathon running: insight from metabolomics | Cochrane Library

**Tipo de elemento** Página web  
**Idioma** es-ES  
**Título corto** Four weeks of probiotic supplementation alters the metabolic perturbations induced by marathon running  
**URL** <https://www.cochranelibrary.com/es/central/doi/10.1002/central/CN-02302234/full>  
**Accedido** 4/11/2023 19:43:35  
**Adicional** DOI: 10.1002/central/CN-02302234  
**Fecha de adición** 4/11/2023 19:43:35  
**Modificado** 4/11/2023 19:43:35

**Adjuntos**

- Snapshot

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Impact of probiotics on the performance of endurance athletes: A systematic review

**Tipo de elemento** Artículo de revista académica  
**Autor** J. Díaz-Jiménez

**Autor** E. Sánchez-Sánchez  
**Autor** F.J. Ordoñez  
**Autor** I. Rosety  
**Autor** A.J. Díaz  
**Autor** M. Rosety-Rodriguez  
**Autor** M.Á. Rosety  
**Autor** F. Brenes

**Resumen** Background: Probiotic supplements contain different strains of living microorganisms that promote the health of the host. These dietary supplements are increasingly being used by athletes to improve different aspects such as athletic performance, upper respiratory tract infections (URTIs), the immune system, oxidative stress, gastrointestinal (GI) problems, etc. This study aimed to identify the current evidence on the management of probiotics in endurance athletes and their relationship with sports performance. Methods: A systematic review of the last five years was carried out in PubMed, Scopus, Web of science, Sportdiscus and Embase databases. Results: Nine articles met the quality criteria. Of these, three reported direct benefits on sports performance. The remaining six articles found improvements in the reduction of oxidative stress, increased immune response and decreased incidence of URTIs. There is little scientific evidence on the direct relationship between the administration of probiotics in endurance athletes and sports performance. Conclusions: Benefits were found that probiotics could indirectly influence sports performance by improving other parameters such as the immune system, response to URTIs and decreased oxidative stress, as well as the monitoring of scheduled workouts. © 2021 by the authors. Licensee MDPI, Basel, Switzerland.

**Fecha** 2021  
**Idioma** English  
**Título corto** Impact of probiotics on the performance of endurance athletes  
**Archivo** Scopus  
**Catálogo de biblioteca** Scopus  
**Volumen** 18  
**Publicación** International Journal of Environmental Research and Public Health  
**DOI** 10.3390/ijerph182111576  
**Número** 21  
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**Etiquetas:**

athletic, Athletic performance, Endurance training, Probiotics, URTIs

**Notas:**

Cited By :10

## Adjuntos

- Snapshot
- Texto completo

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## In vitro assessment of the probiotic properties of an industrial preparation containing *Lactobacillus paracasei* in the context of athlete health

**Tipo de elemento** Artículo de revista académica

**Autor** L. Brunelli

**Autor** V. De Vitis

**Autor** R. Ferrari

**Autor** M. Minuzzo

**Autor** W. Fiore

**Autor** R. Jäger

**Autor** V. Taverniti

**Autor** S. Guglielmetti

**Resumen** Intense physical activity is often associated with undesirable physiological changes, including increased inflammation, transient immunodepression, increased susceptibility to infections, altered intestinal barrier integrity, and increased oxidative stress. Several trials suggested that probiotics supplementation may have beneficial effects on sport-associated gastro-intestinal and immune disorders. Recently, in a placebo-controlled human trial, the AminoAlta™ probiotic formulation (AApf) was demonstrated to increase the absorption of amino acids from pea protein, suggesting that the administration of AApf could overcome the compositional limitations of plant proteins. In this study, human cell line models were used to assess in vitro the potential capacity of AApf to protect from the physiological damages that an intense physical activity may cause. The obtained results revealed that the bacteria in the AApf have the ability to adhere to differentiated Caco-2 epithelial cell layer. In addition, the AApf was shown to reduce the activation of NF-κB in Caco-2 cells under inflammatory stimulation. Notably, this anti-inflammatory activity was enhanced in the presence of partially hydrolyzed plant proteins. The AApf also triggered the expression of cytokines by the THP-1 macrophage model in a dose-dependent manner. In particular, the expression of cytokines IL-1β, IL-6, and TNF-α was higher than that of the regulatory cytokine IL-10, resembling a cytokine profile characteristic of M1 phenotype, which typically intervene in counteracting bacterial and viral infections. Finally, AApf was shown to reduce transepithelial permeability and increase superoxide dismutase activity in the Caco-2 cell model. In conclusion, this study suggests that



the AApf may potentially provide a spectrum of benefits useful to dampen the gastro-intestinal and immune detrimental consequences of an intense physical activity. Copyright © 2022 Brunelli, De Vitis, Ferrari, Minuzzo, Fiore, Jäger, Taverniti and Guglielmetti.

<b>Fecha</b>	2022
<b>Idioma</b>	English
<b>Archivo</b>	Scopus
<b>Catálogo de biblioteca</b>	Scopus
<b>Volumen</b>	13
<b>Publicación</b>	Frontiers in Pharmacology
<b>DOI</b>	10.3389/fphar.2022.857987
<b>ISSN</b>	1663-9812
<b>Fecha de adición</b>	4/11/2023 19:37:51
<b>Modificado</b>	4/11/2023 19:37:51

**Etiquetas:**

aminoalta, CaCo-2, L. paracasei DG, L. paracasei LPC-S01, NF-κB, superoxide dismutase, teer, THP-1

**Notas:**

Cited By :1

**Adjuntos**

- Snapshot
- Texto completo

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[Intestinal fatty acid-binding protein (I-FABP) as a new biomarker for intestinal diseases]

<b>Tipo de elemento</b>	Artículo de revista académica
<b>Autor</b>	Hiroyuki Funaoka
<b>Autor</b>	Tatsuo Kanda
<b>Autor</b>	Hiroshi Fujii
<b>Resumen</b>	Fatty acid binding protein (FABP) is one of the intracellular proteins, with a low molecular weight of approximately 15 kDa, that plays important roles in the transportation and metabolism of long-chain fatty acids. FABP family proteins could be used as tissue specific injury marker based on the following characteristics of FABP: (1) a soluble protein in the cytoplasm, (2) high tissue specificity, (3) abundance in the

tissue, and (4) low molecular weight. Among the FABP family proteins, intestinal fatty acid-binding protein(I-FABP) is specifically and abundantly present in epithelial cells of the mucosal layer of the small intestinal tissue. I-FABP is also considered to be rapidly released into the circulation just after small intestinal mucosal tissue is injured. Based on this mechanism, many investigators have already reported the relationship between serum I-FABP concentration and small intestinal diseases from early 1990s. Recently, we have succeeded in establishing a sandwich ELISA system for measuring human I-FABP concentration by using the combination of antibodies highly specific to I-FABP. This ELISA system did not show any cross-reactivity with other types of FABP and indicated excellent quantitative characteristics such as reproducibility, dilution linearity, and recovery. Using this ELISA system, we determined that the reference value of serum I-FABP concentration is designated to 2.0 ng/mL or less in the circulation of normal healthy individuals. In considering the clinical potential of serum I-FABP concentration, this sandwich ELISA system may contribute as a tool to perform differential diagnosis of acute abdomen with mucosal damage of the small intestine.

<b>Fecha</b>	2010-02
<b>Idioma</b>	jpn
<b>Catálogo de biblioteca</b>	PubMed
<b>Adicional</b>	PMID: 20229815
<b>Volumen</b>	58
<b>Páginas</b>	162-168
<b>Publicación</b>	Rinsho Byori. The Japanese Journal of Clinical Pathology
<b>Número</b>	2
<b>Abrev. de revista</b>	Rinsho Byori
<b>ISSN</b>	0047-1860
<b>Fecha de adición</b>	4/11/2023 19:57:45
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**Etiquetas:**

Adult, Animals, Biomarkers, Diagnosis, Differential, Enzyme-Linked Immunosorbent Assay, Fatty Acid-Binding Proteins, Fatty Acids, Female, Humans, Intestinal Diseases, Male, Middle Aged, Rats, Reference Values

**Adjuntos**

- PubMed entry

# Is Probiotics Supplementation an Appropriate Strategy to Modulate Inflammation in Physically Active Healthy Adults or Athletes? A Systematic Review

**Tipo de elemento** Artículo de revista académica

**Autor** Diego Fernández-Lázaro

**Autor** Nerea Sánchez-Serrano

**Autor** Roshina Rabail

**Autor** Rana Muhammad Aadil

**Autor** Juan Mielgo-Ayuso

**Autor** Krizia Radesca Fabiano

**Autor** Evelina Garrosa

**Resumen** Supplementation with probiotics in sports is on the rise with the aim of improving health and athletic performance. Since intense exercise-induced muscle damage leads to an inflammatory process by increasing circulating inflammatory cytokines, probiotic supplementation may modulate and correct the inflammation. We systematically reviewed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines in the Scopus, Web of Science, and Medline databases for the 10 years until January 2023. This review aimed to evaluate probiotic supplementation as a strategy for modulating inflammation in healthy physically active adults or athletes. Studies were indexed to assess the effect of probiotic supplementation on cytokine behavior in the inflammatory response in physically active individuals. Of the 136 studies identified in the search, 13 met the inclusion criteria, and their quality was assessed using the McMaster Critical Review Form. The results of these trials indicated a significant improvement in inflammatory cytokines in probiotic-supplemented participants, with a significant increase in anti-inflammatory cytokines (IL-10) and a significant decrease in proinflammatory cytokines (IL-6, TNF- $\alpha$ , and IL-8). This would create uncertainty about probiotics' effect on interleukins' behavior after exercise, and further clinical trials are needed to establish a solid basis.

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**Idioma** en

**Título corto** Is Probiotics Supplementation an Appropriate Strategy to Modulate Inflammation in Physically Active Healthy Adults or Athletes?

**Catálogo de biblioteca** www.mdpi.com

**URL** <https://www.mdpi.com/2076-3417/13/6/3448>

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**Adicional** Number: 6 Publisher: Multidisciplinary Digital Publishing Institute

**Volumen** 13

**Páginas** 3448

Publicación

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Número

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Etiquetas:

athletes, cytokines, inflammation-related biomarkers, physical activity, probiotics, sport supplementation

Adjuntos

- o Full Text PDF

Lactobacillus plantarum PS128 Improves Physiological Adaptation and Performance in Triathletes through Gut Microbiota Modulation

Tipo de elemento

Autor

Autor

Autor

Autor

Artículo de revista académica

Wen-Ching Huang

Chun-Hsu Pan

Chen-Chan Wei

Hui-Yu Huang

**Resumen** A triathlon is an extremely high-intensity exercise and a challenge for physiological adaptation. A triathlete’s microbiome might be modulated by diet, age, medical treatments, lifestyle, and exercise, thereby maintaining aerobiosis and optimum health and performance. Probiotics, prebiotics, and synbiotics have been reported to have health-promoting activities (e.g., immunoregulation and cancer prevention). However, few studies have addressed how probiotics affect the microbiota of athletes and how this translates into functional activities. In our previous study, we found that Lactobacillus plantarum PS128 could ameliorate inflammation and oxidative stress, with improved exercise performance. Thus, here we investigate how the microbiota of triathletes are altered by L. plantarum PS128 supplementation, not only for exercise performance but also for possible physiological adaptation. The triathletes were assigned to two groups: an L. plantarum 128 supplement group (LG, 3 × 1010 colony-forming units (CFU)/day) and a placebo group (PG). Both groups continued with their regular exercise training for the next 4 weeks. The endurance performance, body composition, biochemistries, blood cells, microbiota, and associated metabolites were further investigated. PS128 significantly increased the athletes’ endurance, by about 130% as compared to the PG group, but there was no significant difference in

maximal oxygen consumption (VO2max) and composition between groups. The PS128 supplementation (LG) modulated the athlete's microbiota with both significant decreases (*Anaerotruncus*, *Caproiciproducens*, *Coprobaillus*, *Desulfovibrio*, *Dielma*, *Family\_XIII*, *Holdemania*, and *Oxalobacter*) and increases (*Akkermansia*, *Bifidobacterium*, *Butyricimonas*, and *Lactobacillus*), and the LG showed lower diversity when compared to the PG. Also, the short-chain fatty acids (SCFAs; acetate, propionate, and butyrate) of the LG were significantly higher than the PG, which might be a result of a modulation of the associated microbiota. In conclusion, PS128 supplementation was associated with an improvement on endurance running performance through microbiota modulation and related metabolites, but not in maximal oxygen uptake.

**Fecha** 2020-8-01  
**Catálogo de biblioteca** PubMed Central  
**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7468698/>  
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**Adicional** PMID: 32752178 PMCID: PMC7468698  
**Volumen** 12  
**Páginas** 2315  
**Publicación** Nutrients  
**DOI** 10.3390/nu12082315  
**Número** 8  
**Abrev. de revista** Nutrients  
**ISSN** 2072-6643  
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Adjuntos

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Live and Heat-Killed Probiotic *Lactobacillus paracasei* PS23 Accelerated the Improvement and Recovery of Strength and Damage Biomarkers after Exercise-Induced Muscle Damage

**Tipo de elemento** Artículo de revista académica  
**Autor** M.-C. Lee  
**Autor** C.-S. Ho  
**Autor** Y.-J. Hsu  
**Autor** C.-C. Huang

**Resumen** Excessive, high-intensity or inappropriate exercise may cause muscle damage. How to speed up recovery and reduce exercise discomfort are currently very important issues for athletes and sports people. Past research has shown that probiotics can improve inflammation and oxidative stress, as well as improve exercise performance and antifatigue. However, further research is needed to confirm the recovery benefits for muscle damage. In this double-blind design study, all subjects were randomly assigned to placebo, a live *Lactobacillus paracasei* group (L-PS23,  $2 \times 10^{10}$  colony forming unit (CFU)/day), or a heat-killed *L. paracasei* group (HK-PS23,  $2 \times 10^{10}$  cells/day), and supplemented for six consecutive weeks. Afterwards, subjects completed 100 maximal vertical jumps to bring about exercise-induced muscle damage (EIMD). Countermovement jump (CMJ), isometric mid-thigh pull (IMTP), and Wingate anaerobic test (WAnT), as well as blood tests for markers of muscle damage and inflammation were made pre-exercise and 3, 24, 48 h post exercise. The results show that both L-PS23 and HK-PS23 supplementation significantly slowed the loss of muscle strength after muscle injury, and they significantly reduced the production of markers of muscle damage and inflammation ( $p < 0.05$ ). In addition, L-PS23 and HK-PS23 had the benefits of accelerating the recovery and improvement of muscle strength, the blood markers of muscle injury and inflammation, and slowing the decline in testosterone concentrations ( $p < 0.05$ ). Especially in the HK-PS23 supplemented group, there was a better trend. In conclusion, we found that L-PS23 or HK-PS23 supplementation for six weeks prevented strength loss after muscle damage and improved blood muscle damage and inflammatory markers, with protective, accelerated recovery and anti-fatigue benefits. © 2022 by the authors.

<b>Fecha</b>	2022
<b>Idioma</b>	English
<b>Archivo</b>	Scopus
<b>Catálogo de biblioteca</b>	Scopus
<b>Volumen</b>	14
<b>Publicación</b>	Nutrients
<b>DOI</b>	10.3390/nu14214563
<b>Número</b>	21
<b>ISSN</b>	2072-6643
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**Etiquetas:**

exercise, heat-killed bacteria, *Lactobacillus paracasei* PS23, muscle damage, probiotic

**Notas:**

Cited By :1

**Adjuntos**

- o Texto completo

**Microbiota in sports****Tipo de elemento** Artículo de revista académica**Autor** Katarzyna Mańkowska**Autor** Małgorzata Marchelek-Myśliwiec**Autor** Piotr Kochan**Autor** Danuta Kosik-Bogacka**Autor** Tomasz Konopka**Autor** Bartłomiej Grygorcewicz**Autor** Paulina Roszkowska**Autor** Elżbieta Cecerska-Heryć**Autor** Aldona Siennicka**Autor** Justyna Konopka**Autor** Barbara Dołęgowska

**Resumen** The influence of microbiota on the human body is currently the subject of many studies. The composition of bacteria colonizing the gastrointestinal tract varies depending on genetic make-up, lifestyle, use of antibiotics or the presence of diseases. The diet is also important in the species diversity of the microbiota. This study is an analysis of the relationships between physical activity, diet, and the microbiota of the gastrointestinal tract in athletes. This review shows the differences in the microbial composition in various sports disciplines, the influence of probiotics on the microbiome, the consequence of which may be achieved even better sports results. Physical activity increases the number of bacteria, mainly of the Clostridiales order and the genus: Lactobacillus, Prevotella, Bacteroides, and Veillonella, and their number varies depending on the sports discipline. These bacteria are present in athletes in sports that require a high VO2 max. The players' diet also influences the composition of the microbiota. A diet rich in dietary fiber increases the amount of Lactobacillus or Bifidobacterium bacteria, probiotic microorganisms, which indicates the need to supplement the diet with probiotic preparations. It is impossible to suggest an unambiguous answer to how the microbiota of the gastrointestinal tract changes in athletes and requires further analyzes.

**Fecha** 2022**Catálogo de biblioteca** PubMed Central**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9283338/>

**Accedido** 4/11/2023 18:49:29  
**Adicional** PMID: 35834007 PMCID: PMC9283338  
**Volumen** 204  
**Páginas** 485  
**Publicación** Archives of Microbiology  
**DOI** 10.1007/s00203-022-03111-5  
**Número** 8  
**Abrev. de revista** Arch Microbiol  
**ISSN** 0302-8933  
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Photobiomodulation Therapy Combined with a Static Magnetic Field Applied in Different Moments Enhances Performance and Accelerates Muscle Recovery in CrossFit® Athletes: A Randomized, Triple-Blind, Placebo-Controlled Crossover Trial

**Tipo de elemento** Artículo de revista académica  
**Autor** Pinto Hd  
**Autor** Casalechi Hl  
**Autor** de Marchi T  
**Autor** Dos Santos Monteiro Machado C  
**Autor** Dias Lb  
**Autor** Lino Mma  
**Autor** de Azevedo Jb  
**Autor** Tomazoni Ss  
**Autor** Leal-Junior Ecp  
**Resumen** The ergogenic effects of photobiomodulation therapy combined with a static magnetic field (PBMT-sMF) on exercises with characteristics similar to those of CrossFit® are unknown. This study was aimed at investigating the effects of PBMT-sMF applied at different times on recovery and physical performa ...  
**Fecha** 07/19/2022  
**Idioma** en



**Título corto** Photobiomodulation Therapy Combined with a Static Magnetic Field Applied in Different Moments Enhances Performance and Accelerates Muscle Recovery in CrossFit® Athletes

**Catálogo de biblioteca** pubmed.ncbi.nlm.nih.gov

**URL** <https://pubmed.ncbi.nlm.nih.gov/35910832/>

**Accedido** 4/11/2023 15:35:48

**Adicional** Publisher: Oxid Med Cell Longev PMID: 35910832

**Volumen** 2022

**Publicación** Oxidative medicine and cellular longevity

**DOI** 10.1155/2022/9968428

**ISSN** 1942-0994

**Fecha de adición** 4/11/2023 15:35:48

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## Adjuntos

- PubMed entry
- Snapshot
- Texto completo

## Probiotics in sports nutrition

**Tipo de elemento** Sección de un libro

**Autor** M.P. Miles

**Resumen** Probiotics may provide support for athletes to counter the stresses of high physical activity levels by enhancing gut barrier function, immune function, antioxidant defenses, energy harvest, and other potential benefits. These impacts have the potential to increase the tolerable training load and resultant benefits as well as competition performance. Probiotic single and multistrain cocktails from the genera *Lactobacillus* and *Bifidobacterium* have demonstrated benefits of modest attenuation of both upper respiratory tract symptoms during high-level training and gastrointestinal tract symptoms during exercise. Multistrain probiotic cocktails for periods of at least 12 weeks appear to be most efficacious. Available research does not support probiotic efficacy for enhanced barrier function, attenuation of exercise-induced muscle damage, and exercise performance for athletes during training or competition. Evidence regarding the use of probiotics to limit the negative impacts of oxidative stress and to enhance absorption of some nutrients is promising but further research is needed. © 2022 Elsevier Inc. All rights reserved.

**Fecha** 2021

**Idioma** English

**Archivo** Scopus

**Catálogo de biblioteca** Scopus  
**Adicional** DOI: 10.1016/B978-0-323-85170-1.00024-5  
**ISBN** 978-0-323-85170-1  
**Páginas** 277-295  
**Título del libro** Probiotics: Advanced Food and Health Applications  
**Fecha de adición** 4/11/2023 19:38:16  
**Modificado** 4/11/2023 19:38:16

**Etiquetas:**

Dietary supplements, Exercise, Gut microbiota, Nutrition, Physical activity

**Notas:**

Cited By :1

**Adjuntos**

- Snapshot

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The effect of probiotic yoghurt consumption on oxidative stress and inflammatory factors in young females after exhaustive exercise

**Tipo de elemento** Artículo de revista académica  
**Autor** M. Mazani  
**Autor** A. Nemati  
**Autor** A.N. Baghi  
**Autor** M. Amani  
**Autor** K. Haedari  
**Autor** R. Alipanah-Mogadam  
**Resumen** Objective: To evaluate the effect of probiotic yoghurt consumption on oxidative stress and inflammatory factors in young females after exhaustive exercise. Method: This study included 27 healthy participants with an age range of 18-25. For two weeks, 450 grams of probiotic yoghurt and 450 grams of ordinary yoghurt were given to the supplement and control groups, respectively. Fasting blood samples were taken at baseline and at the end of study. At the end of the intervention, the participants were given one exhaustive exercise and then fasting blood samples were taken to test for blood antioxidant enzymes, inflammatory markers, and oxidative markers. Data were analyzed using descriptive statistics as well as paired and independent samples t-test. Results: In supplement group, the glutathione peroxidise (GPX) blood levels and serum levels of total antioxidant capacity (TAC) significantly increased

at the end of two weeks of intervention ( $p<0.05$ ). After intense physical activity, the blood levels of superoxide dismutase (SOD), GPX and serum levels of TAC significantly increased, whereas the serum level of tumour necrosis factor alpha (TNF- $\alpha$ ), matrix metalloproteinase 2 (MMP2), matrix metalloproteinase 9 (MMP9), and malondialdehyde (MDA) significantly decreased in the supplement group compared to the control group ( $p<0.05$ ). Besides, there were no significant changes in other biochemical factors. Conclusion: Regular probiotic yoghurt consumption significantly modulated MMP2, MMP9 and some inflammatory factors, and thus guarded against exhaustive exercise-inducing oxidative injury in young healthy females. © 2018, Pakistan Medical Association. All rights reserved.

<b>Fecha</b>	2018
<b>Idioma</b>	English
<b>Archivo</b>	Scopus
<b>Catálogo de biblioteca</b>	Scopus
<b>Volumen</b>	68
<b>Páginas</b>	1748-1754
<b>Publicación</b>	Journal of the Pakistan Medical Association
<b>Número</b>	12
<b>ISSN</b>	0030-9982
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**Etiquetas:**

Exhaustive exercise, Inflammation, Oxidative stress, Probiotic

**Notas:**

Cited By :21

**Adjuntos**

- Snapshot

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The Effects of 6 Weeks of Tribulus terrestris L. Supplementation on Body Composition, Hormonal Response, Perceived Exertion, and CrossFit® Performance: A Randomized, Single-Blind, Placebo-Controlled Study

<b>Tipo de elemento</b>	Artículo de revista académica
<b>Autor</b>	Diego Fernández-Lázaro
<b>Autor</b>	Juan Mielgo-Ayuso

**Autor** Miguel del Valle Soto  
**Autor** David P. Adams  
**Autor** Jerónimo J. González-Bernal  
**Autor** Jesús Seco-Calvo

**Resumen** Tribulus terrestris L. (TT) supplementation have been shown to enhance sports performance in many but not all studies. Moreover, data regarding the potential impact of TT supplementation on CrossFit® endurance is limited. This study aimed to determine whether TT supplementation improve body composition, hormonal response, and performance among CrossFit® athletes. In a randomized, single-blind, placebo-controlled trial, a total of 30 healthy CrossFit®-trained males were randomly allocated to receive either 770 mg of TT supplementation or a placebo daily for 6 weeks. Body mass, fat mass, fat composition, testosterone and cortisol levels, and CrossFit® performance (5 common Workouts of the Day: back squat, bench press, dead lift, Grace, and CrossFit® Total) were assessed before and after intervention. There were no significant group x time interactions for the outcomes of the study except for testosterone levels and bench press performance (p < 0.05). TT supplementation did not impact enhance performance or body composition in CrossFit® male athletes. However, TT supplementation may act as a testosterone booster helping the recovery after physical loads and mitigating fatigue.

**Fecha** 2021-11-07

**Título corto** The Effects of 6 Weeks of Tribulus terrestris L. Supplementation on Body Composition, Hormonal Response, Perceived Exertion, and CrossFit® Performance

**Catálogo de biblioteca** PubMed Central

**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8623187/>

**Accedido** 4/11/2023 18:59:28

**Adicional** PMID: 34836225 PMCID: PMC8623187

**Volumen** 13

**Páginas** 3969

**Publicación** Nutrients

**DOI** 10.3390/nu13113969

**Número** 11

**Abrev. de revista** Nutrients

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**Adjuntos**

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# The Effects of Exercise on Indirect Markers of Gut Damage and Permeability: A Systematic Review and Meta-analysis

**Tipo de elemento** Artículo de revista académica

**Autor** Sarah Chantler

**Autor** Alex Griffiths

**Autor** Jamie Matu

**Autor** Glen Davison

**Autor** Ben Jones

**Autor** Kevin Deighton

**Resumen** Aim Exercise appears to cause damage to the endothelial lining of the human gastrointestinal tract and elicit a significant increase in gut permeability. Objective The aim of this review was to determine the effect of an acute bout of exercise on gut damage and permeability outcomes in healthy populations using a meta-analysis. Methods PubMed, The Cochrane Library as well as MEDLINE, SPORTDiscus and CINHAL, via EBSCOhost were searched through February 2019. Studies were selected that evaluated urinary (ratio of disaccharide/monosaccharide excretion) or plasma markers [intestinal Fatty Acid Binding Protein (i-FABP)] of gut permeability and gut cell damage in response to a single bout of exercise. Results A total of 34 studies were included. A random-effects meta-analysis was performed, and showed a large and moderate effect size for markers of gut damage (i-FABP) (ES 0.81; 95% CI 0.63–0.98;  $n = 26$ ;  $p < 0.001$ ) and gut permeability (Disaccharide Sugar/Monosaccharide Sugar) (ES 0.70; 95% CI 0.29–1.11;  $n = 17$ ;  $p < 0.001$ ), respectively. Exercise performed in hot conditions ( $> 23^{\circ}\text{C}$ ) further increased markers of gut damage compared with thermoneutral conditions [ES 1.06 (95% CI 0.88–1.23) vs. 0.66 (95% CI 0.43–0.89);  $p < 0.001$ ]. Exercise duration did not have any significant effect on gut damage or permeability outcomes. Conclusions These findings demonstrate that a single bout of exercise increases gut damage and gut permeability in healthy participants, with gut damage being exacerbated in hot environments. Further investigation into nutritional strategies to minimise gut damage and permeability after exercise is required. PROSPERO database number (CRD42018086339). Electronic supplementary material The online version of this article (10.1007/s40279-020-01348-y) contains supplementary material, which is available to authorized users.

**Fecha** 2021

**Título corto** The Effects of Exercise on Indirect Markers of Gut Damage and Permeability

**Catálogo de biblioteca** PubMed Central

**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7806566/>

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**Volumen** 51  
**Páginas** 113-124  
**Publicación** Sports Medicine (Auckland, N.z.)  
**DOI** 10.1007/s40279-020-01348-y  
**Número** 1  
**Abrev. de revista** Sports Med  
**ISSN** 0112-1642  
**Fecha de adición** 4/11/2023 19:56:12  
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## Adjuntos

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- PubMed Central Link

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## The Possible Role of Probiotic Supplementation in Inflammation: A Narrative Review

**Tipo de elemento** Artículo de revista académica

**Autor** A. Colletti

**Autor** M. Pellizzato

**Autor** A.F. Cicero

**Resumen** The fine balance between symbiotic and potentially opportunistic and/or pathogenic microorganisms can undergo quantitative alterations, which, when associated with low intestinal biodiversity, could be responsible for the development of gut inflammation and the so-called “intestinal dysbiosis”. This condition is characterized by the disbalance of a fine synergistic mechanism involving the mucosal barrier, the intestinal neuroendocrine system, and the immune system that results in an acute inflammatory response induced by different causes, including viral or bacterial infections of the digestive tract. More frequently, however, dysbiosis is induced slowly and subtly by subliminal causal factors, resulting in a chronic condition related to different diseases affecting the digestive tract and other organs and apparatuses. Studies on animal models, together with studies on humans, highlight the significant role of the gut microbiota and microbiome in the occurrence of inflammatory conditions such as metabolic syndrome and cardiovascular diseases (CVDs); neurodegenerative, urologic, skin, liver, and kidney pathologies; and premature aging. The blood translocation of bacterial fragments has been found to be one of the processes linked to gut dysbiosis and responsible for the possible occurrence of “metabolic endotoxemia” and systemic inflammation, associated with an increased risk of oxidative stress and related diseases. In this context, supplementation with different probiotic strains has been shown to restore gut eubiosis, especially if

administered in long-term treatments. The aim of this review is to describe the anti-inflammatory effects of specific probiotic strains observed in clinical trials and the respective indications, highlighting the differences in efficacy depending on strain, formulation, time and duration of treatment, and dosage used. © 2023 by the authors.

Fecha	2023
Idioma	English
Título corto	The Possible Role of Probiotic Supplementation in Inflammation
Archivo	Scopus
Catálogo de biblioteca	Scopus
Volumen	11
Publicación	Microorganisms
DOI	10.3390/microorganisms11092160
Número	9
ISSN	2076-2607
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Etiquetas:

aging, cardiovascular disease, gut microbiota, inflammation, oxidative stress, probiotics, urinary tract infections

Adjuntos

- Snapshot
- Texto completo

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The role of I-FABP as a biomarker of intestinal barrier dysfunction driven by gut microbiota changes in obesity

Tipo de elemento	Artículo de revista académica
Autor	Eva Lau
Autor	Cláudia Marques
Autor	Diogo Pestana
Autor	Mariana Santoalha
Autor	Davide Carvalho
Autor	Paula Freitas
Autor	Conceição Calhau
Resumen	Background Intestinal fatty-acid binding protein (I-FABP) is expressed in epithelial cells of the mucosal layer of the small intestine tissue. When intestinal mucosal damage occurs, I-FABP is released into the circulation

and its plasma concentration increases. In the context of obesity, the gut barrier integrity can be disrupted by dietary fat while intestinal permeability increases. Objective To investigate whether intestinal fatty acid binding protein (I-FABP) is a suitable plasma marker of intestinal injury and inflammation in obesity. Methods Twelve male Wistar rats were randomly divided into two groups of six animals each: standard (St) and high-fat (HF) diet fed groups for 12 weeks. Results HF fed animals developed obesity, insulin resistance and seemed to present increased plasma levels of proinflammatory cytokines (MCP-1 and IL1 $\beta$ ). The gut microbiota composition of these animals was also altered, with lower number of copies of Bacteroidetes, Prevotella spp. and Lactobacillus spp., in comparison with those from St diet group. Fecal lipopolysaccharide (LPS) concentrations tended to be increased in HF fed animals. Intestinal expression of TLR4 seemed to be also increased in HF fed animals suggesting that HF diet-induced dysbiosis may be behind the systemic inflammation observed. However, in contrast to other intestinal inflammatory diseases, plasma I-FABP levels were decreased in HF fed rats whereas I-FABP expression in jejunum tended to be increased. Conclusions HF diet-induced obesity is characterized by dysbiosis, insulin resistance and systemic inflammation. In this context, plasmatic I-FABP should not be used as a marker of the intestinal barrier dysfunction and the low-grade chronic inflammatory status.

**Fecha** 2016-4-30

**Catálogo de biblioteca** PubMed Central

**URL** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4851788/>

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**Adicional** PMID: 27134637 PMCID: PMC4851788

**Volumen** 13

**Páginas** 31

**Publicación** Nutrition & Metabolism

**DOI** 10.1186/s12986-016-0089-7

**Abrev. de revista** Nutr Metab (Lond)

**ISSN** 1743-7075

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