

Systematic review of the anthropometric profile of female futsal players 2010-2020

Rossana Gómez-Campos (1,2), Ruben Vidal-Espinoza (3), Fredy Muñoz-Muñoz (1), Fernando Alvear Vasquez (4), Margot Rivera Portugal (5), Luis Urzua Alul (6), Jorge Mendez-Cornejo (1), Marco Cossio Bolaños (1,2)

(1) Universidad Católica del Maule, Talca, Chile; (2) Faculty of Education, Psychology and Sport Sciences, University of Huelva, Huelva, Spain; (3) Universidad Católica Silva Henríquez, Santiago, Chile; (4) Universidad Autónoma de Chile, Talca, Chile; (5) Universidad Nacional San Agustín de Arequipa, Arequipa, Perú; (6) Escuela de Kinesiología, Facultad de Salud, Universidad Santo Tomás, Chile.

This article is distributed under the terms of the Creative Commons Attribution Noncommercial License (CC BY-NC 4.0) which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited.

Abstract

The objective was to summarize the scientific literature on the anthropometric characteristics of female futsal players. A systematic review documentary study was carried out. SCOPUS, PUBMED and SCIELO databases were used to search for information on primary studies related to the anthropometric profile of women's indoor soccer (elite and non-elite). The keywords used were: futsal, female, anthropometry. The range of years for the search was from 2010 to 2020. To analyze anthropometric differences, two groups were formed: group A: elite and group B: non-elite. 31 primary studies were identified, 22 (71%) in Scopus, 5 (16.1%) in PUBMED and 4 (12.9%) in SCIELO. Three publication languages were considered (English, Spanish and Portuguese) and 6 countries were identified (Brazil, Spain, Iran, Turkey, Venezuela and Italy). Players in the elite group evidenced higher weight, height, and BMI relative to their non-elite counterparts. Discrepancy in anthropometric characteristics between elite and non-elite players was verified. These results suggest that in order to participate in competitions at the highest level in women's futsal, they should have greater weight, height and BMI than their non-elite counterparts.

Key Words: Futsal; women; anthropometry; professionals; non-professionals.

Eur J Transl Myol 33 (1) 10986, 2023 doi: 10.4081/ejtm.2023.10986

Futsal is described as a sport modality that involves high intensity exercises, in which the physical demands come from aerobic and anaerobic pathways.¹ This modality is characterized by presenting several changes of direction with intermittent dynamics, with emphasis on the ability to make decisions in a short time and creativity to solve motor actions during competitions.² Since its creation in Uruguay around 1930, this version of futsal has gained worldwide popularity during the last decades and the number of registered players in recent years has been increasing in many countries.³ It is estimated for example that more than 1 million men and women are officially registered to play futsal.⁴ There are even more than 12 million players from all continents who are registered in more than 100 countries worldwide.⁵ Since its origin in South America it has spread in Europe, and especially in the last decade it has become popular in Asian countries such as Iran, Japan

and Kuwait.⁶ In general, the literature in the last 7 years has shown that sporting excellence and the pursuit of high performance have been the fruits of research that has been gradually developing, especially in female athletes.⁷⁻¹³ For investigating the physical and anthropometric profile of futsal athletes is relevant, since it can serve to characterize the body dimensions of elite and non-elite athletes.¹⁴ Furthermore, knowledge of body composition and physical condition are essential for the proper development of sports performance.¹⁵ In fact, although it is not clear the differences between elite and non-elite athletes, elite athletes play at a higher level within a sport (division I) in relation to non-elite (level II, professional versus amateur).¹⁶ Therefore, systematizing this information to know the differences between both groups of athletes can be of great interest, both for sports selection, as well as to describe the anthropometric characteristics and to monitor the control of the effectiveness of a sports training program.¹⁷ In this

context, to our knowledge, no systematic review studies have been identified in Spanish language that have investigated the anthropometric profile of elite and non-elite female players worldwide. Therefore, this study raises the question: Will there be discrepancies in the anthropometric profile of female futsal players categorized as elite and non-elite? For which, this systematic review aimed to summarize the scientific literature on anthropometric characteristics of elite and non-elite female futsal players from 2010 to 2020 in three databases (PUBMED, Scopus and Scielo).

Materials and Methods

Type of study

A systematic review study on the anthropometric profile of women's futsal was conducted. To ensure the process of organization and systematized information we relied on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.¹⁸

Techniques and instruments

The observation technique was used to systematize the types of study and the anthropometric variables used to characterize the anthropometric profile of elite-professional and non-professional female futsal. The instrument where the information was recorded was an index card, where the indicators of each of the studies analyzed were recorded.

Eligibility criteria

To achieve the relevance of this systematic review, the original articles included the following keywords 1) futsal; 2) women; 3) anthropometry; 4) elite and non-elite. Boolean "and" and "or" were used. Subsequently such words were grouped into two or three sets of words, and a new search was performed, such as, for example, futsal and women; futsal and anthropometry. Matching and combination strategies were also used to search for research, whose terms were searched in the study titles, abstract and keywords of the manuscripts. In addition, a manual search was performed for articles that were not in the databases searched, e.g., studies cited by other manuscripts. Due to differences in terminology and writing style, a list of synonyms for the terms of interest was used to identify all relevant articles. The search for information considered articles published in the period 2010-2020, including original studies published in English, Spanish and Portuguese that have been carried out internationally. Studies that included systematic reviews, bibliographic reviews and letters to the editor were excluded from the analysis. Therefore, this process was limited to original articles (descriptive, cross-sectional, longitudinal, experimental) that investigated female futsal players. Original articles were also excluded if they met the eligibility criteria, but could not be accessed in the full version (because they were not available electronically or in hard copy or had been requested from the authors but were not sent).

Search strategy and selection of studies

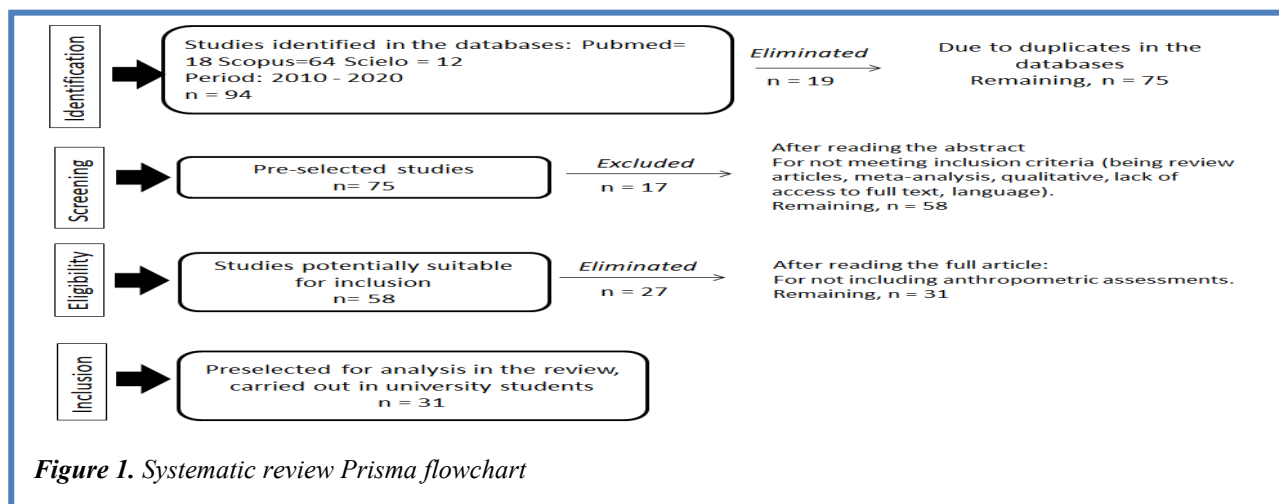
The initial search strategy identified articles describing variables of the anthropometric profile of female futsal players. An electronic search was conducted in the databases of the National Library of Medicine of the United States called PUBMED, Scopus and Scielo. The electronic search was conducted from September 2020 to December 31, 2021. Targeted searches of the most cited journals and authors and reference lists of articles ensured that all relevant articles were located. After searching the electronic databases, all identified records were uploaded through the Mendeley Desktop bibliographic manager, which allowed easy identification of duplicates and their corresponding elimination. The basis for the search strategy was considered using the components of the PICOS tool (Population, Interventions, Comparators, Outcomes, and Study design). Being P: female indoor soccer players; I: anthropometric profile; C: performance level (elite, non-elite, university, amateur, amateur); O: describe the anthropometric profile (age, weight, height, BMI, fat percentage); S: descriptive, cross-sectional, longitudinal and experimental studies.

Methodological quality

The assessment of methodological quality was performed independently by two reviewers, who analyzed the studies selected from this systematic review and resolved disagreements in the analysis by consensus. The review of the methodological quality of the experimental studies (n=9) was performed using the PEDro scale¹⁹ based on the Delphi list²⁰. This scale has 10 scoring questions, and each criterion is scored according to its presence (one point) or absence (zero points) in the study in question. In the case of studies involving non-experimental quantitative methods (descriptive, cross-sectional, longitudinal) (n=22), they were evaluated according to the review of methodological quality considering the 11 items recommended by the Agency for Healthcare Research and Quality (AHRQ). Each item has a score of "Yes", "No" or "Unclean" to judge in the systematized study. The evaluation scores ranged from 40% to 80% for the experimental studies. For the non-experimental quantitative studies they ranged from 25% to 90%.

Study Extraction and Analysis

Two reviewers checked data extraction for completeness and accuracy. Both reviewers independently reviewed full text according to eligibility criteria, screened and agreed by consensus. Any disagreement in the inclusion process was resolved with the other authors. The results were organized in chronological order and tables were created to capture the information. The following data will be extracted: authors, country, language, age (years), weight, height, BMI, % fat and performance level. For the analysis of the synthesis of the systematic review, quantitative and/or qualitative procedures were used. In the first case, the data were organized by means of



frequencies, range, percentages (%) and in the second case by means of content analysis of the indicators considered in the information recording form.

Results

Figure 1 shows the PRISMA flowchart showing the selection process of the studies developed. Ninety-four studies were identified worldwide, which were considered as possible potential studies and were loaded into the bibliographic manager, being eliminated 19 studies. Subsequently, they were reviewed and since they were not original studies and in female futsal players, 17 studies were eliminated. In the next stage, the titles and abstracts were read, considering the inclusion and exclusion criteria, and 27 articles were eliminated. In the third stage, of the 58 eligible studies, which were read in their entirety, 27 were eliminated because they did not include data on anthropometric variables. Finally, 31 articles were considered in this review. For a better systematization of the studies that evaluate the anthropometric profile, two groups were formed: elite-professional futsal female players (forming group A) and non-professional (forming group B). Group A, called elite-professional, includes elite, professional and semi-professional players, and Group B, called non-professional university futsal players, includes amateurs, young and amateur players. Table 1 shows the indicators that characterize the systematized studies according to database, language and country of publication. Thirty-one studies on female futsal players were selected. Most of the articles were published in English (n=26, 83.9%), in the Scopus database (n=22, 71%) and the country with the highest number of publications was Brazil (n=13, 41.9%).baseline levels was detected. The anthropometric variables of the elite, professional and semi-professional players (group A) are shown in Table 2. The average ages of these female futsal players range from 19.2±2.0 years to 28.5± unknown (years), body weight from 56.9±7.7kg to 70.3±9.9kg, height from 159.0±2.7cm to 174.5±10.0cm and Body Mass Index (BMI) from 20.9±1.9kg/m2 to 26.7±4.6kg/m2.

Table 3 describes the averages and deviations of the anthropometric variables of the amateur, university, youth and amateur players (group B). The age of these female futsal players varied from 15±2.0 to 24.6±6.0 years, weight, from 55.2±6, kg to 62.9±9.5kg, height from 163.2±4.0 to 166.9±4.9cm and BMI from 20.9±1.74kg/m2 to 23.5±2.7kg/m2.

Table 1. Indicators characterizing systematic studies

| Indicators | f | % |
|------------------------|----|------|
| Database | | |
| PUBMED | 5 | 16.1 |
| Scopus | 22 | 71.0 |
| Scielo | 4 | 12.9 |
| Total | 31 | 100 |
| Language | | |
| Spanish | 2 | 6.5 |
| English | 26 | 83.9 |
| Portuguese | 3 | 9.7 |
| Total | 31 | 100 |
| Country of publication | | |
| Brazil | 13 | 41.9 |
| Spain | 9 | 29.0 |
| Iran | 3 | 9.7 |
| Turkey | 4 | 12.9 |
| Venezuela | 1 | 3.2 |
| Italy | 1 | 3.2 |
| Total | 31 | 100 |

Systematic review of anthropometric profile of female futsal players

Eur J Transl Myol 33 (1) 10986, 2023 doi: 10.4081/ejtm.2023.10986

Table 2. Anthropometric characteristics of elite female futsal players (elite, professional and semi-professional).

| Performance level | Age±SD (years) | Weight±SD kg | Height±SD (cm) | BMI±SD (kg/m ²) | %Fat ±SD |
|--|-------------------|------------------------|----------------------------|--------------------------------|------------|
| Élite | | | | | |
| Rubio-Arias et al ¹² | 20.3±2.7 | 62.2 ± 4.4 | 164.1±4.2 | NS | 27.1 ±6.4 |
| Teixeira et al ²¹ | 19.2 ± 2.0 | 58.7 ± 8.0 | 161.5±4.6 | NS | 18.8 ± 4.9 |
| Queiroga et al ¹¹ | 22.0 ± 4.7 | 58.5 ± 7.3 | 161.8±6.4 | 22.3 ± 2.0 | 22.4 ± 5.1 |
| Pelissari et al ²² | 19.7 ± 3.4 | 60.3 ± 5.9 | 164±0.04 | 22.6 ± 2.6 | 20.8 ± 4.4 |
| Ferreira et al ⁹ | 22.0 ± 3.9 | 58.6 ± 7.6 | 161.8±6.5 | 22.3 ± 2.1 | 22.1 ± 5.2 |
| Rocha et al ²³ | 23.0 ± 5.0 | 58.8 ± 3.1 | NE | NS | 14.2 ± 1.7 |
| Barbero-Álvarez JC et al ²⁴ | 21.2 ± 4.0 | 58.6± 5.6 | 161.3± 5.0 | NS | 17.6± 3.4 |
| Sainz de Baranda et al ²⁵ | 22.3±4.94 | 57.7±7.03 | 166.1±4.7 | NS | NS |
| Ramos-Campo DJ et al ²⁶ | 21.1 ± 2.3 | 61.8±4.6 65.1 ± 1.6 | 163.5 ± 4.2 166.2 ± 3.1 | 26.7±4.6 26.1±5.4 | NS |
| Valladares-Rodríguez et al ²⁷ | 23.3 ± 4.5 | 70.3 ± 9.9 | 174.5±10.3 | NS | NS |
| Profesional | | | | | |
| Ayala et al ²⁸ | 26.0±4.5 | 62.9±8.1 | 168±7.0 | NS | NS |
| Cejudo et al ²⁹ | 22.4±5.3 | 59.4 ±7.5 | 166.2±4.9 | NS | NS |
| Semiprofesional | | | | | |
| Lago-Fuentes et al ³⁰ | 21.6±3.6 | 62.5 ± 3.4 | 165± 0.04 | 22.9 ± 1.6 | NS |
| Beato et al ³¹ | 27.0±5.0 | 56.9±7.7 | 165±0.09 | 20.9±1.9 | 21.5±2.9 |
| Ruiz-Pérez et al ³² | 24.1±3.9 | 61.5±6.6 | 165.0±0.04 | NS | NS |
| Queiroga et al ¹¹ | 22.00±3.9 | 57.8±9.1 | 161.8±6.5 | 22.3±2.1 | 22.2±5.2 |
| Kassiano et al ³³ | 21.8±3.9 | 57.4±4.1 | 159.0 ± 2.7 | NS | 19.0 ± 3.3 |
| <i>Legend: NS: not specified; SD: standard deviation</i> | | | | | |

Figure 2 shows the variations in the anthropometric profile of the female futsal players in both groups. Note that the player's in-group (A) reflect a greater trend in age, weight, height and BMI in relation to those in-group (B) (university, amateur, youth and amateur). In Group A, the average ages of these female futsal players range from 19.2±2.0years to 28.5±unknown (years), body

weight from 56.9±7.7kg to 70.3±9.9kg, height from 159.0±2.7cm to 174.5±10.0cm and BMI from 20.9±1.9kg/m² to 26.7±4.6kg/m². In the case of Group B, the age of these female futsal players varied from 15±2.0 to 24.6±6.0 years, weight, from 55.2±6, kg to 62.9±9.5kg, height from 163.2±4.0 to 166.9±4.9cm and BMI from 20.9±1.74kg/m² to 23.5±2.7kg/m².

Table 3. Anthropometric characteristics of non-elite female futsal players (university, amateur, youth and amateur).

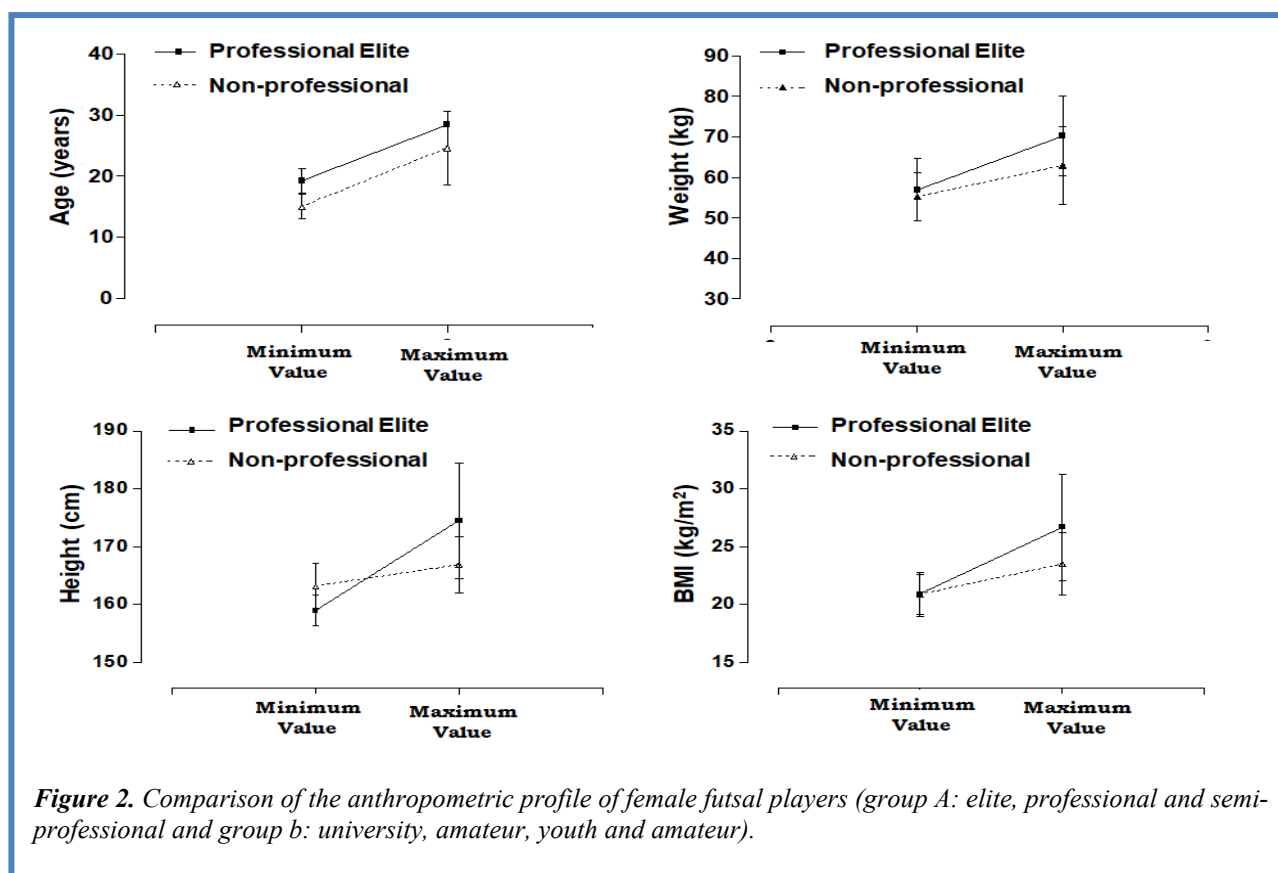
| N | Performance level | Age±SD (years) | Weight±SD (kg) | Height±SD (cm) | BMI±SD (kg/m ²) | %Fat ±SD |
|----------------------------|--------------------------------------|--------------------------|---------------------------|-----------------------------|-----------------------------|--------------------------|
| University students | | | | | | |
| 18 | Noormohammadpour et al ³⁴ | 23.2 ± 3.6 | 61.5 ± 9.9 | 164.9 ± 9.5 | 22.5 ± 2.4 | NE |
| 19 | Da Cruz et al ⁸ | 21 ± 1 | 64 ± 2.6 | 168.0 ± 2 | NS | 14.0 ± 1.5 |
| 20 | Zar et al ³⁵ | 19 a 22 | 57.5 ± 1.8 | 164.1 ± 3.4 | 21.4 ± 1.3 | NS |
| 21 | Da Silva et al ³⁶ | 19.5 ± 1.3 | 62.5 ± 8.8 59.8 ± 8.7 | 165.1 ± 5.8 161.1 ± 9.6 | 23.5 ± 2.7 22.1 ± 0.9 | 16.5 ± 1.8 15.1 ± 3.2 |
| 22 | Ünveren ³⁷ | 20.9 ± 1.9 | 61.7 ± 9.07 | 166.9 ± 4.57 | NS | NS |
| 23 | Campos et al ³⁸ | 21.2 ± 1.4 | 61.3 ± 17.6 | 163.2 ± 4.0 | NS | NS |
| 24 | Silva et al ³⁹ | NS | 58.6 ± 11.6 | 158.5 ± 6.8 | 22.3 ± 3.7 | NS |
| 25 | Karahan ⁴⁰ | 20.2 ± 2.4 20.7 ± 2.1 | 59.7 ± 7.3 54.3 ± 6.4 | 166 ± 6.2 166 ± 4.1 | NS | NS |
| Amateur players | | | | | | |
| 26 | Baches et al ⁴¹ | 18-20 | 58.2 | 161.8 | 22.2 | NS |
| 27 | Rabello et al ⁴² | 13 a 17 (15) | 62 ± 9.3 | 166 ± 0.05 | 22.0 ± 2.8 | NS |
| Young players | | | | | | |
| 28 | Atakan et al ⁴³ | 19.8 ± 1.1 | 56.2 ± 6.3 | 164.2 ± 6.5 | NS | NS |
| Not specified | | | | | | |
| 29 | Saeedy et al ⁴⁴ | 23.3 ± 3.9 | 55.2 ± 6.3 | 162.3 ± 5.9 | 20.9 ± 1.74 | NS |
| 30 | Lago-Fuentes et al ⁴⁵ | 23.7 ± 5.1 | 63.9 ± 7.5 63.9 ± 6.8 | 166.5 ± 5.9 164.8 ± 4.8 | NS | NS |
| 31 | Karavelioglu ⁴⁶ | 20.5 ± 1.7 | 61.06 ± 2.5 68.6 ± 4.6 | 166.9 ± 4.9 166.9 ± 6.10 | NS | NS |

Legend: NS: not specified.

Discussion

This study has reported 31 articles published in the SCOPUS, PUBMED and SCIELO databases from 2010 to 2020. The highest percentage of publications were in English (83.9%), followed by Portuguese (9.7%) and Spanish (6.5%). In addition, we can highlight that most of the publications are of Brazilian origin (41.9%), Spanish (29%), Turkish 12.9%, Iranian 9.7%, and Venezuelan and Italian 3.2%. Of the 31 studies analyzed, they have been categorized into two study groups, the first considered as elite female futsal players and the second non-elite group. Twenty-two studies were identified that have reported results of the anthropometric profile in the elite group and 24 studies in the non-elite group. In fact, sport-specific physiological and morphological characteristics have become a real target and at the same time are gaining interest in recent years among researchers to find the best type of morphology for each sport context.⁴⁷ Systematized studies have shown that players from the elite group generally present relatively higher average weight and height values and consequently a higher BMI than their counterparts from

the non-elite group. These discrepancies are favorable for the elite players, being higher by approximately ~7.4kg of body weight, ~7.6cm of height and ~3.2kg/m² of BMI. These results confirm that anthropometric measures are globally used in sports training monitoring as an important determinant of sports performance,⁴⁸ so that teams and selections of elite female players often reflect a better anthropometric profile than players categorized as non-elite. The structure of body composition and posture play an important role in sports performance.⁴⁹ Thus, these favorable discrepancies in weight and BMI of elite female players may be due to a higher percentage of skeletal muscle mass, favoring physical performance, as it contributes to energy production during high-intensity activities and consequently improves strength production capacity among female athletes.⁵⁰ On the other hand, excess adiposity and body fat in athletes is considered an aggravating factor, since it acts as dead weight against gravity, impairing physical performance and consequently producing sports injuries. This becomes a cause for concern,⁴⁷ among professionals working not



only at the elite-professional level, but also at the non-professional level. Therefore, anthropometric characteristics (i.e., height, body mass and body composition) are important components of physical fitness,⁵⁰ being necessary to maintain and preserve adequate levels to ensure an optimal level of physical performance. In relation to % body fat we observed that the elite group evidenced a % body fat from ~14.2 to 27.1%. However, the non-elite group in most studies did not specify the % body fat, only three studies (ranging from ~14.0 to 16.5%). These results preclude comparisons between the two groups, although, clearly the % fat observed in the original studies in this review are in the 25 to 28% range suggested as ideal for young non-athletic women.⁵¹ Notwithstanding the above, it is noted that high-level competitive players are usually subjected to ~90 minutes of duration per training session and between 6 to 9 sessions with one day of competition and rest.^{24,25} In the case of non-professional groups, they have less rigor in the systematization and periodization of training,⁵² therefore, these differences in effort and rigor in the planning and periodization of training make the female futsal players reflect anthropometric patterns typical of the modality and level of competition. Consequently, the results obtained in this study are useful to sport science professionals and specifically to those working in futsal. This information can be used to compare with other specific groups within the sport

modality, as well as to verify secular trend changes at the anthropometric level and to analyze and interpret according to the role played in the sport modality (coach, physical trainer, sports doctors, nutritionists and physiotherapists). This study was limited to anthropometric profile analyzes (weight, height, and body mass index), so future studies should broaden their information search to include physical performance and body composition variables. It is also suggested to systematize information related to training load control, as there is currently little information on this in women's futsal. This study demonstrated differences in anthropometric characteristics between elite and non-elite players. These findings suggest that to participate in elite competition in women's futsal, they would need to be of greater weight, height and body mass index than their non-elite counterparts. It should be emphasized that this is the first systematic study carried out in Spanish countries and, due to its results, can be considered a reference to be compared with future research in women's futsal.

List of acronyms

AHRQ - Agency for Healthcare Research and Quality
 BMI - body mass index
 PEDro - Physiotherapy Evidence Database
 PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Contributions of Authors

MCB, RGC: conception, design, drafting of the manuscript, analysis and interpretation of the data, critical review and final approval of the version to be published, agreement to be responsible for all aspects of the work to ensure that issues related to the accuracy or completeness of any part of the work are adequately investigated and resolved; MCB, RGC, RVE, JST, CTC: critical review of important intellectual content; and final approval of the version to be published; FM, FAV, LUZ: systematization of the studies, critical review and final approval of the version to be published.

Funding

None.

Conflict of Interest

The authors declare no competing interests.

Ethical Publication Statement

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Corresponding Author

Marco Cossio Bolaños, PhD, Av San Miguel s/n Talca, Chile.

ORCID iD: [0000-0001-7230-9996](https://orcid.org/0000-0001-7230-9996)

Email: mcossio1972@hotmail.com

E-mails and ORCID iD of co-authors

Rossana Gómez-Campos: rossaunicamp@gmail.com

ORCID: [0000-0001-6509-5707](https://orcid.org/0000-0001-6509-5707)

Ruben Vidal-Espinoza: rvidale@gmail.com

ORCID: [0000-0002-8593-5248](https://orcid.org/0000-0002-8593-5248)

Fredy Muñoz-Muñoz: freddy.munoz.pef@gmail.com

ORCID: [0000-0002-9782-422X](https://orcid.org/0000-0002-9782-422X)

Fernando Alvear-Vasquez:

fernandoalvearvasquez@gmail.com

ORCID: [0000-0002-9461-1384](https://orcid.org/0000-0002-9461-1384)

Margot Rivera Portugal: mar2608@hotmail.com

ORCID: [0000-0003-0548-2750](https://orcid.org/0000-0003-0548-2750)

Luis Urzua Alul: lurzua@hotmail.com

ORCID: [0000-0002-5792-2191](https://orcid.org/0000-0002-5792-2191)

Jorge Mendez-Cornejo: jmendez@ucm.cl

ORCID: [0000-0002-3925-170X](https://orcid.org/0000-0002-3925-170X)

References

1. Castagna C, Barbero Alvarez JC. Physiological demands of an intermittent futsal-oriented high-intensity test. *The Journal of Strength & Conditioning Research*. 2010 Sep;24(9):2322-9. doi: 10.1519/JSC.0b013e3181e347b9. PMID: 20703163.
2. Matzenbacher F, Pasquarelli BN, Rabelo FN, Stanganelli LCR. Demandas fisiológicas del futsal de competición: características físicas y fisiológicas de jugadores profesionales. *Revista Andaluza de Medicina del Deporte*. 2014;7(3):122-131.
3. Naser N, Ali A. A descriptive-comparative study of performance characteristics in futsal players of different levels. *J Sports Sci*. 2016 Sep;34(18):1707-15. doi: 10.1080/02640414.2015.1134806. Epub 2016 Jan 22. PMID: 26800448.
4. Moore R, Ramchandani G, Bullough S, Goldsmith S, Edmondson L, Berdejo-del-Fresno D. The world at their feet: a combined historical ranking of nations competing in football and futsal. *American Journal of Sports Science and Medicine*. 2018; 6: 49-59. doi: 10.12691/ajssm-6-2-3.
5. Rebelo AN, Ascensão AA, Magalhães JF, Bischoff R, Bendiksen M, Krstrup P. Elite futsal refereeing: activity profile and physiological demands. *J Strength Cond Res*. 2011; Apr;25(4):980-7. doi: 10.1519/JSC.0b013e3181a392ed. PMID: 20838257
6. Berdejo-del-Fresno D. A review about futsal. *American Journal of Sports Science and Medicine*. 2014; 2(3): 70. doi: 10.12691/ajssm-2-3-0.
7. Barcelos BB, Teixeira LP, Lara S. Análisis del equilibrio postural y fuerza muscular isocinética de rodilla en deportistas de fútbol sala femenino. *Fisioterapia e Pesquisa*. 2018;25(1):28-34. doi: 10.1590/1809-2950/16654325012018
8. Da Cruz JP, Messias LHD, Cetein RL, Rasteiro FM, Gobatto CA, Manchado-Gobatto FB. Anaerobic and Agility Parameters of Salonists in Laboratory and Field Tests. *Int J Sports Med*. 2020 Jun;41(7):450-460. doi: 10.1055/a-1088-5429. Epub 2020 May 12. Erratum in: *Int J Sports Med*. 2020 Jun 03. PMID: 32396967.
9. Ferreira SA, Nascimento MAD, Cavazzotto TG, Weber VMR, Tartaruga MP, Queiroga MR. Relative age in female futsal athletes: implications on anthropometric profile and starter status. *Revista Brasileira de Medicina do Esporte*. 2020;26(1):34-38. doi:10.1590/1517-869220202601189174.
10. Hamid MSA, Jaafar Z, Ali ASM. Incidence and characteristics of injuries during the 2010 FELDA/FAM National Futsal League in Malaysia. *PLoS One*. 2014 Apr 14;9(4):e95158. doi: 10.1371/journal.pone.0095158. PMID: 24733140; PMCID: PMC3986338.
11. Queiroga MR, Mezalira FM, de Souza WC, Weber VMR, de Moura Carvalhaes MF, Ferreira AS, da Silva DF. Perfil morfológico de atletas titulares e reservas de futsal feminino. *J Phys Educ*. 2018;29(1). doi: 0.4025/jphyseduc.v29i1.2965
12. Rubio-Arias JÁ, Ramos Campo DJ, Ruiloba Nuñez JM, Carrasco Poyatos M, Alcaraz Ramón PE, Jiménez Díaz FJ. Adhesión a la dieta mediterránea y rendimiento deportivo en un grupo de mujeres deportistas de élite de fútbol sala. *Nutr Hosp*. 2015 May 1;31(5):2276-82. Spanish. doi: 10.3305/nh.2015.31.5.8624. PMID: 25929404.

Systematic review of anthropometric profile of female futsal players

Eur J Transl Myol 33 (1) 10986, 2023 doi: 10.4081/ejtm.2023.10986

13. Sepahvand H, Jahromi GP, Sahraei H, Meftahi GH. Studying the Perceptive and Cognitive Function Under the Stress of Match in Female Futsal Players. *Asian J Sports Med.* 2017;8(4). doi: 10.5812/asjms.14315.
14. Stubbs-Gutierrez A, Medina-Porqueres I. Anthropometric characteristics and physical fitness in elite futsal male players. A systematic review. *Movement & Sport Sciences.* 2021; 114: 19-28. doi: 10.1051/sm/2020011
15. Sekulic D, Pojskic H, Zeljko I, Pehar M, Modric T, Versic S, Novak D. (2021). Physiological and Anthropometric Determinants of Performance Levels in Professional Futsal. *Front Psychol.* 2021 Jan 12;11:621763. doi: 10.3389/fpsyg.2020.621763. PMID: 33510696; PMCID: PMC7835319.
16. Lorenz DS, Reiman MP, Lehecka BJ, Naylor A. What performance characteristics determine elite versus nonelite athletes in the same sport? *Sports Health.* 2013 Nov;5(6):542-7. doi: 10.1177/1941738113479763. PMID: 24427430; PMCID: PMC3806174
17. De la Fuente FP, Páez LC, Pardo EM, Pagán RH. Perfil antropométrico, somatotipo y composición corporal de jóvenes jugadores de tenis de mesa. *RICYDE. Revista Internacional de Ciencias del Deporte.* 2007;3(7):11-23.
18. Moher D, Liberati A, Tetzlaff J, Altman DG. PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 2009 Jul 21;6(7):e1000097. doi: 10.1371/journal.pmed.1000097. Epub 2009 Jul 21. PMID: 19621072; PMCID: PMC2707599.
19. De Morton NA. The PEDro scale is a valid measure of the methodological quality of clinical trials: a demographic study. *Aust J Physiother.* 2009;55(2):129-33. doi: 10.1016/s0004-9514(09)70043-1. PMID: 19463084.
20. Verhagen AP, de Vet HC, de Bie RA, Kessels AG, Boers M, Bouter LM, Knipschild PG. The Delphi list: a criteria list for quality assessment of randomized clinical trials for conducting systematic reviews developed by Delphi consensus. *J Clin Epidemiol.* 1998 Dec;51(12):1235-41. doi: 10.1016/s0895-4356(98)00131-0. PMID: 10086815.
21. Teixeira AS, Arins FB, De Lucas RD, Carminatti LJ, Dittrich N, Nakamura FY, Guglielmo LGA. Comparative effects of two interval shuttle-run training modes on physiological and performance adaptations in female professional futsal players. *J Strength Cond Res.* 2019 May;33(5):1416-1428. doi: 10.1519/JSC.0000000000002186. PMID: 28902113.
22. Pelissari Kravchychyn AC, Fernandes da Silva D, Andrade Machado F. Relação entre estado nutricional, adiposidade corporal, percepção de autoimagem corporal e risco para transtornos alimentares em atletas de modalidades coletivas do gênero feminino. *Rev. bras. educ. fis. Esporte.* 2013 Set 27(3):459-466. doi: 10.1590/S1807-55092013000300012
23. Rocha RERD, Nunes EA, Venera GD. Selective loads periodization attenuates biochemical disturbances and enhances performance in female futsal players during competitive season. *Motriz: Revista de Educação Física.* 2015 Apr-Jun ;21(2):158-167. doi: 10.1590/S1980-65742015000200006
24. Barbero-Alvarez JC, Subiela JV, Granda-Vera J, Castagna C, Gómez M, Del Coso J. Aerobic fitness and performance in elite female futsal players. *Biol Sport.* 2015 Dec;32(4):339-344. doi: 10.5604/20831862.1189200. Epub 2015 Dec 29. PMID: 28479664; PMCID: PMC5394851
25. Sainz de Baranda P, Cejudo A, Ayala F, Santonja F. Perfil óptimo de flexibilidad del miembro inferior en jugadoras de fútbol sala / Optimal Data of Lower-Limb Muscle Flexibility in Female Futsal Players. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte.* 2015;15 (60):647-662. doi:10.15366/rimcafd2015.60.003
26. Ramos-Campo DJ, Rubio-Arias JA, Carrasco-Poyatos M, Alcaraz PE. Physical performance of elite and subelite Spanish female futsal players. *Biol Sport.* 2016 Sep;33(3):297-304. doi: 10.5604/20831862.1212633. Epub 2016 Aug 4. PMID: 27601786; PMCID: PMC4993147.
27. Valladares-Rodríguez S, Rey E, Mecías-Calvo M, Barcala-Furelos R, Bores-Cerezal AJ. Reliability and usefulness of the 30-15 intermittent fitness test in male and female professional futsal players. *J Hum Kinet.* 2017 Dec 28;60:191-198. doi: 10.1515/hukin-2017-0102. PMID: 29339999; PMCID: PMC5765799.
28. Ayala F, de Baranda PS, Croix MDS, Santonja F. Criterion-related validity of four clinical tests used to measure hamstring flexibility in professional futsal players. *Phys Ther Sport.* 2011 Nov;12(4):175-81. doi: 10.1016/j.ptsp.2011.02.005. Epub 2011 May 23. PMID: 22085711.
29. Cejudo A, de Baranda PS, Ayala F, Santonja F. Test-retest reliability of seven common clinical tests for assessing lower extremity muscle flexibility in futsal and handball players. *Phys Ther Sport.* 2015 May;16(2):107-13. doi: 10.1016/j.ptsp.2014.05.004. Epub 2014 Jun 19. PMID: 25280930.
30. Lago-Fuentes C, Pérez-Celada S, Prieto-Troncoso J, Rey E, Mecías-Calvo M. Anthropometric and conditional profile in semiprofessional futsal players: differences between sexes. A case study. *RICYDE. Revista Internacional de Ciencias del*

Systematic review of anthropometric profile of female futsal players

Eur J Transl Myol 33 (1) 10986, 2023 doi: 10.4081/ejtm.2023.10986

- Deporte. 2020;16(61): 330-341. doi: 10.5232/ricyde2020.06107.
31. Beato M, Coratella G, Schena F, Hulton AT. Evaluation of the external and internal workload in female futsal players. *Biol Sport*. 2017 Sep;34(3):227-231. doi: 10.5114/biolSport.2017.65998. Epub 2017 Feb 19. PMID: 29158614; PMCID: PMC5676317
 32. Ruiz-Pérez I, López-Valenciano A, Jiménez-Loaisa A, Elvira JL, Croix MDS, Ayala F. Injury incidence, characteristics and burden among female sub-elite futsal players: a prospective study with three-year follow-up. *PeerJ*. 2019 Nov 5;7:e7989. doi: 10.7717/peerj.7989. PMID: 31720114; PMCID: PMC6839517.
 33. Kassiano W, Jesus K, Assumpção C, Lamboglia C, Mendes A, Barbosa R, Medeiros AIA. Respostas neuromusculares e fisiológicas durante o jogo em atletas de futsal feminino. *J Phys Educ*. 2019; 30(1). doi: 10.4025/jphyseduc. v30i13061
 34. Noormohammadpour P, Rostami M, Mansournia MA, Farahbakhsh F, Shahi MHP, Kordi R. Low back pain status of female university students in relation to different sport activities. *Eur Spine J*. 2016 Apr;25(4):1196-203. doi: 10.1007/s00586-015-4034-7. Epub 2015 May 31. PMID: 26026471.
 35. Zar A, Ahmadi F, Miri M, Abedi HA, Salesi M. Cytokine pattern is affected by training intensity in women futsal players. *Immune Netw*. 2016 Apr;16(2):109-15. doi: 10.4110/in.2016.16.2.109. Epub 2016 Apr 28. PMID: 27162527; PMCID: PMC4853496.
 36. Neves da Silva VF, Aguiar SDS, Sousa CV, Sotero RDC, Filho JMS, Oliveira I, Mota MR, Simões HG, Sales MM. Effects of short-term plyometric training on physical fitness parameters in female futsal athletes. *J Phys Ther Sci*. 2017 May;29(5):783-788. doi: 10.1589/jpts.29.783. Epub 2017 May 16. PMID: 28603345; PMCID: PMC5462672.
 37. Ünveren A. Investigating women futsal and soccer players' acceleration, speed and agility features. *The Anthropologist*. 2015;21(1-2):361-365. doi: 10.1080/09720073.2015.11891825.
 38. Campos EZ, Gerosa-Neto J, Lira FS, Buonani C. Metabolic profile is not associated with body composition parameters in recreational female futsal players. *Sport Sci Health*. 2016;12(1):63-67. doi: 10.1007/s11332-015-0254-9
 39. Silva B, Menezes B, Fernandes L, Silva M. Comparative analysis of anthropometric variables of undergraduate athletes in different collective modalities. In *XXVI Brazilian Congress on Biomedical Engineering*. 2019; (pp. 163-166). Springer, Singapore. doi: 10.1007/978-981-13-2119-1_25
 40. Karahan M. The effect of skill-based maximal intensity interval training on aerobic and anaerobic performance of female futsal players. *Biology of sport*. 2012; 29(3). doi: 10.5604/20831862.1003447
 41. Jorge PB, Sprey JWC, Runco GM, Lima MV, Severino NR, Santili C. Difference in Articular Degeneration Depending on the Type of Sport. *Rev Bras Ortop (Sao Paulo)*. 2019 Sep;54(5):509-515. doi: 10.1016/j.rboe.2018.02.012. Epub 2019 Oct 29. PMID: 31736520; PMCID: PMC6855921
 42. Rabello LM, Macedo CDSG, Oliveira MRD, Fregueto JH, Camargo MZ, Lopes LD, Silva Jr RAD. Relação entre testes funcionais e plataforma de força nas medidas de equilíbrio em atletas. *Revista Brasileira de Medicina do Esporte*. 2014 May-Jun; 20(3):219-222. doi: 10.1590/1517-86922014200301720
 43. Atakan MM, Karavelioğlu MB, Harmancı H, Cook M, Bulut S. Short term creatine loading without weight gain improves sprint, agility and leg strength performance in female futsal players. *Science & Sports*. 2019;34(5):321-327. doi: 10.1016/j.scispo.2018.11.003.
 44. Saeedy M, Bijeh N, Moazzami M. The Effect of Six Weeks of High-Intensity Interval Training With Zinc Supplementation on Some Humoral Immunity Markers in Female Futsal Players. *Ann Appl Sport Sci* 2018; 6(1):11-19. doi: 10.29252/aassjournal.6.1.11
 45. Lago-Fuentes C, Rey E, Padrón-Cabo A, Sal de Rellán-Guerra A, Fragueiro-Rodríguez A, García-Núñez J. Effects of Core Strength Training Using Stable and Unstable Surfaces on Physical Fitness and Functional Performance in Professional Female Futsal Players. *J Hum Kinet*. 2018 Dec 31;65:213-224. doi: 10.2478/hukin-2018-0029. PMID: 30687433; PMCID: PMC6341965.
 46. Karavelioglu MB. Detection of the effects of sodium bicarbonate supplement on blood lactate and heart rate values of female futsal players before and after Yo-Yo/1 test. *The Anthropologist*. 2014; 18(3):745-749. doi: 10.1080/09720073.2014.11891605
 47. Stubbs-Gutierrez A, Medina-Porqueres I. Anthropometric characteristics and physical fitness in elite futsal male players. A systematic review. *Mov Sport Sci/Sci Mot*. 2021. doi: 10.1051/sm/2020011
 48. Leão C, Camões M, Clemente FM, Nikolaidis PT, Lima R, Bezerra P, Rosemann T, Knechtle B. Anthropometric Profile of Soccer Players as a Determinant of Position Specificity and Methodological Issues of Body Composition Estimation. *Int J Environ Res Public Health*. 2019 Jul 5;16(13):2386. doi: 10.3390/ijerph16132386. PMID: 31284403; PMCID: PMC6651378.
 49. Burdukiewicz A, Pietraszewska J, Stachoń A, Chromik K, Goliński D. The Anthropometric Characteristics of Futsal Players Compared with Professional Soccer Players. *Human Movement*.

Systematic review of anthropometric profile of female futsal players

Eur J Transl Myol 33 (1) 10986, 2023 doi: 10.4081/ejtm.2023.10986

2014; 15:93-99. <https://doi.org/10.2478/humo-2014-0008>

50. Vila-Suárez MH, Ferragut C, Alcaraz PE, Rodríguez Suárez N, Cruz Martínez M. Anthropometric and strength characteristics in young handball players by playing positions. *Archivos de Medicina del Deporte*. 2008;25(125):167-77.
51. Timothy G. Lohman. vii + 150 pp. Champaign, IL, USA: Human Kinetics Publishers, 1992. p. 1-5.
52. Alvarez JC, D'Ottavio S, Vera JG, Castagna C. Aerobic fitness in futsal players of different competitive level. *J Strength Cond Res*. 2009 Oct;23(7):2163-6. doi: 10.1519/JSC.0b013e3181b7f8ad. PMID: 19855347.

Disclaimer

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article or claim that may be made by its manufacturer is not guaranteed or endorsed by the publisher.

Submission: October 10, 2022

Revision received: February 22, 2023

Accepted for publication: February 22, 2023