ORIGINAL ARTICLE

Correlation of the caloric contribution of macronutrients and the corporal composition in baseball players

Luciano Mesa Sánchez. *University of Camagüey "Ignacio Agramonte Loynaz". Cuba.*
Reidel Cordoves Peinado . *Francisco Morazán National Pedagogical University. Honduras. National Autonomous University of Honduras. Honduras.*
Beymer Aguilera Ramírez. *University of Camagüey "Ignacio Agramonte Loynaz". Cuba.*
Digna Azucena Aguilera. *National Autonomous University of Honduras. Honduras.*
Antonio José Juárez López. *National Autonomous University of Honduras. Honduras.*
Rusbelin Larios Nuñez. *National Autonomous University of Honduras. Honduras.*
Raúl Antonio Gaitán Amador. *National Autonomous University of Honduras. Honduras.*

ABSTRACT

Objective: To determine the correlation between the kilocalories provided by macro-nutrients and the body composition of baseball players from the Camagüey team participating in the National Series 63. Methodology: A field study was conducted using a quantitative, descriptive, and longitudinal approach. Analytical-synthetic, inductive-deductive, and measurement methods were employed, following protocols established by the National Institute of Sports Medicine. Results: No significant differences were found in the caloric contribution of macronutrients across different player positions. A strong correlation between body composition and macronutrients was observed only in catchers, specifically regarding fats and carbohydrates. Discussion: Out-fielders maintained stable body composition, indicating metabolic balance between energy intake and expenditure, which supported an appropriate health status for their athletic activities. Their body fat percentages aligned with recommendations from the Division of Sports Science and Technology of the United States Olympic Committee. Conclusions: Nutritional strategies did not account for positional differences in game-play. The correlation between macronutrient intake and body composition varied across different assessment periods, indicating a lack of consistency in dietary management.

Keywords: Sport medicine, Body composition, Nutrients, Caloric contributions, Metabolic balance.

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Corresponding author. *Francisco Morazán National Pedagogical University. Honduras.*
E-mail: reidel.cordoves@unah.edu.hn
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INTRODUCTION

The proportion between the different components of the body is referred to as body composition (Ponce-Garcia et al., 2025). The scientific community agrees that for research purposes, it is essentially expressed as the distribution of fat-free mass and fat mass within the organism (de Almeida-Neto et al., 2021; Ponce-Garcia et al., 2025).

Fat-free mass is a variable comprising muscle tissue, bones, internal organs, and water; whereas fat mass, as the name indicates, is that which is composed of the body's fats (Ponce-Garcia et al., 2025).

Body composition is considered a relevant variable when assessing the influence of training on the organism, as it allows for the analysis of the effectiveness of the systems used (Figueiredo et al., 2020). The study of body composition makes it possible to determine the proportion of fat and muscle in a person's body. This knowledge enables coaches to plan athletes' nutrient intake in such a way that it is carried out appropriately based on their individual needs, thereby increasing muscle mass (Sanga Dwi et al., 2024). Therefore, the study of body composition is considered a necessary indicator during the assessment of an individual's nutritional status (Hernández et al., 2024) and is regarded as a fundamental indicator for evaluating health and physical performance (Meshtel et al., 2024), particularly in the context of sports, where it directly influences physical development and performance (Hector & Phillips, 2018).

Achieving adequate physical development for each sporting discipline and specific preparation phase is a complex task that demands multiple areas of expertise to aid in making correct decisions. Achieving the objectives of physical development requires knowledge of the energy demands of each athlete's organism. Therefore, it is necessary to systematically evaluate body composition as a component of physical development, in addition to assessing the intake of macronutrients that guarantee the energy required to perform sporting activities. All this allows for the adjustment of training programs to individual needs and the demands of the sport (Ramírez-Campillo et al., 2022).

Achieving adequate nutrition for athletes demands the application of scientific knowledge from the field to maintain a proper state of health during competition. This is achieved by providing foods that supply macronutrients in the necessary quantities based on the physiological demands of the specific sport being practiced (Sanga Dwi et al., 2024).

Sports specialists agree on the need to maintain an adequate diet that guarantees sufficient amounts of carbohydrates, as they constitute the primary source of energy during competitions. Furthermore, the consumption of foods that provide necessary amounts of fats is essential, as they represent a reserve energy source utilized once carbohydrates are depleted during endurance exercises. Likewise, consuming adequate proportions of proteins is necessary to guarantee muscular development, as they constitute an important factor in reconstruction processes during training. In this regard, the diet must be sufficient in protein quantities, as it also enhances adaptation to training loads, recovery, and tissue repair (Di Corcia et al., 2022).

Evidence demonstrates the importance the scientific community has placed on research into body composition and nutrition separately, as well as by relating the results of the former through inferences about diet and nutrition. In this respect, Narváez et al. (2022) conducted a study concluding that body composition conditions performance.

For their part, Yaguachi-Alarcón et al. (2025), while investigating the relationship between diet and caloric intake in law enforcement officers, reached a conclusion valid for sports activity by stating that the calories consumed must correspond to the physical activity performed. Adhering to this principle allows for the individualization of physical activity based on nutritional requirements, providing the organism with necessary nutrients through an appropriate dietary strategy, which favours the development of physical capacities (Rebelo et al., 2025).

In team sports involving cooperation and opposition, research related to body composition has been carried out, determining that a relationship exists with performance, as well as with the specific sport practiced (Corredor-Serrano et al., 2023).

In this sense, Hermosilla-Palma et al. (2024) state that a correlation exists between muscle mass and strength, as well as between decreased fat and adequate bone mineralization with the development of strength in young soccer players.

Similarly, it is also proposed that in soccer players, body composition is related to the player's position on the field, with goalkeepers and central defenders obtaining the highest values (Tereso et al., 2024).

In sports practice, an increase in body weight was observed at the expense of increased muscle mass (Figueiredo et al., 2020; Henriksson et al., 2020; Ortega et al., 2023). In this regard, research has been conducted correlating muscle mass and physical development, showing a strong correlation (Horta-Gim et al., 2025).

Regarding body composition, the investigations by Rahma et al. (2024) were also found; these make significant contributions to the topic. However, scientific evidence found in baseball is not extensive. In this regard, Barajas-Ramón et al. (2015) conducted studies on body composition in female athletes; Zamora-Mota et al. (2022) developed a study on nutrition in the prevention of sports injuries in baseball pitchers; while Mesa et al. (2024) addressed the impact of training on body composition.

The scientific evidence reveals the role macronutrients play in the morphological development of athletes, favouring osteo-muscular development, to mention just one example. However, although research contributions indicate that macronutrients are related to the morphological development of athletes, in Camagüey there are limited studies linking macronutrients to the body composition behaviour of baseball players participating in the national series.

In this sense, evidence pointing to the study of body composition has been found; however, establishing the relationship between the kilocaloric contribution of macronutrients and the body composition of baseball players participating in the national series has not been found.

Given the importance of adequate body composition development and the proper intake of macronutrients—which provide the organism with the energy necessary to achieve functional physical performances according to the competitive demands of the sport in question—during the sports preparation process and competition, it is essential to understand the relationship between body composition and macronutrients.

The results of this study could contribute to the improvement of training programs for baseball players during competition, aiming to maintain performances adequate to the demands of each competitive moment or segment of the competitive season, in addition to adopting strategies related to macronutrient intake during competition.

In accordance with the above, the main objective of the present study is to determine the correlation between the kilocalories provided by macronutrients and the body composition of players from the Camagüey baseball team participating in the 63rd National Series.

MATERIALS AND METHODS

Research design

The research presented for consideration is a field study, conducted quantitatively with descriptive characteristics and a longitudinal scope. The inquiry process was carried out using theoretical-level methods, including analytical-synthetic and inductive-deductive approaches. These methods enabled the decomposition of the problem as it manifests in concrete practice and reality, subsequently developing a solution through abstract thought and implementing it within the research framework. At the empirical level, measurement was employed to determine body composition values through protocols that ensure the integrity of the athletes under study. Furthermore, documentation analysis was used to verify the grams of different food types, which allowed for the determination of the quantity of macronutrients ingested by the sub-jects in each meal ration. The process was conducted in compliance with protocols established by the Cuban Ministry of Public Health and, specifically, the National Institute of Sports Medicine. The research was carried out from March to May 2024, spanning the 12 weeks from the start to the end of the second third of the competition (50 games).

Participants

The study involved the 40 baseball athletes constituting the population of the team participating in the 63rd National Baseball Series. A non-probabilistic, intentional sampling method was used to select 19 field players, representing 47.5% of the total. The sample type is one of convenience. The inclusion criteria were players who performed in various field positions (catchers, infielders, and outfielders) and had systematic participation during the competition. The exclusion criteria were set to omit pitchers and players who had sporadic participation during the evaluated period (two sub-series). The average age of the participants was (26.4 ± 5.5 years). All participants received comprehensive information regarding the objectives, risks, importance, and procedures to be used and provided informed consent.

Variables

The anthropometric variables necessary to determine the players' body composition were studied. These were: percentage of fat (% Fat), kilograms of active body mass (kg ABM), and the active substance index (AKS). Furthermore, the proportions of food constituting the rations provided to the players during the analysis period were studied to determine the quantity in grams of the macronutrients: Proteins (P), Lipids (Lip), and Carbohydrates (Car).

Procedures and measurement instruments

The process of monitoring the players' body composition indicators was conduct-ed at three time points during the competition: first, at the start of the tournament (March 8th); second, upon the conclusion of game 25 (April 11th), termed for this study as the end of the first third of the competition (End 1st Third); and third, upon the conclusion of game 50 (May 18th), termed the end of the second third of the com-petition (End 2nd Third).

At each of these time points, measurements of the anthropometric variables enabling the determination of body composition were taken, following the standardized and validated methodological procedures established by the International Society for the Advancement of Kinanthropometry. (Esparza *et. al,* 2021)
The values for the variables were determined as follows: height, using a portable Seca 213 stadiometer (60-200 cm; precision 1mm); body weight, using a Terraillon Fitness Coach Premium scale (0-160 kg; precision 100 grams); skinfold measurements (triceps, subscapular, suprailiac, front thigh, abdominal, medial calf) were taken using a Slim Guide calliper (0-75 mm; precision 0.5 mm). The measurement procedure was preceded by verification of the calibration standards for each instrument.

Each skinfold measurement was taken after locating and marking its specific site to avoid bias in the results. Specifically: the triceps was measured at the mid-acromiale-radiale point on the posterior aspect of the arm; the subscapular, at the inferior angle of the scapula, two centimetres from the subscapulare point; the suprailiac, using the iliospinale landmark to the anterior axillary line and the iliocristale line. The abdominal skinfold was measured five centimetres from the omphalion; the front thigh skinfold was determined at the midpoint between the inguinal point and the patellare point; finally, the medial calf skinfold was located on the most medial area of the calf at the level of its maximum perimeter. All skinfolds were measured on the right side of the subjects' bodies.

The skinfold measurements allowed for the determination of body composition component proportions using the methodological procedure established by the Cuban National Institute of Sports Medicine. Mathematically, the equations by Withers et al. were used, as they are the standard reference for these studies in Cuban athletes for determining body composition (Carvajar, 2021).

Measurements were performed by anthropometry specialists from the Camagüey Center of Sports Medicine; one specialist performed the measurements while the other assisted by recording the data. Both possess proven expertise supported by over 16 years of experience in anthropometry and are certified by the National Institute of Sports Medicine. Necessary conditions for determining the value of each anthropo-metric variable were guaranteed. Upon completion of each measurement session, an approval form was signed by the ethics committee of the Institute of Sports Medicine.

Measurements were conducted in a designated room at the Provincial Center of Sports Medicine, allowing for compliance with established technical and hygienic requirements. Measurements were always performed on the first day of the week (Mon-day). Before starting the measurement procedure, each player was instructed on the necessary details to ensure correct execution. Visual inspection and clinical manoeuvres were performed to detect any alterations that could bias the results. Measurements were taken in the morning, after a minimum of eight hours since the last meal (before breakfast), and after voiding the bladder and bowels.

Regarding macronutrients, the procedure used was document analysis, reviewing daily reports issued by the sports medicine specialist (team physician) on the control of the gram quantities constituting the food rations from the first day of the competition until the end of the second third. This allowed for the determination of the quantity in grams of carbohydrates, proteins, and lipids comprising the food ration provided to each player. From this data, the caloric contribution was determined by multiplying the quantity in grams by the kilocalorie contribution of each macronutrient: lipids = gLip * 9 kcal, proteins = gP * 4 kcal, and carbohydrates = gCar * 4 kcal. This procedure complied with the standards established by the Institute of Sports Medicine.

Statistical analysis
For the statistical procedure, players were grouped by their playing positions into three areas: catchers, infielders, and outfielders. Data collected from the anthropometric measurements to determine body composition values were processed in a spreadsheet using Microsoft Excel, standardized by the Cuban National Institute of Sports Medicine. Data analysis was performed using SPSS software (IBM Corporation, USA) version 26.0 for MAC. Normality of the data was analysed using the Shapiro-Wilk test. Descriptive statistics were used to represent the results as mean and standard deviation for both body composition and macronutrients.

Inferential statistics were used to determine if there were significant differences between body composition indicators at the different competition time points. As the data were normally distributed (α = .111), a paired Student's t-test was applied, with a significance level of α < .05.

Subsequently, inferential statistics were applied using the correlation coefficient to determine whether a correlation existed between body composition and the kilocalories provided by macronutrients at each of the studied time points. The correlation levels were established according to Gómez (2020) no correlation (.0), minimal (.0 – .2), low (.2 – .4), moderate (.4 – .6), good (.6 – .8), very good (.8 – .99), and perfect (1.00).

The assumed statistical hypotheses state that:
- H_0 (Null Hypothesis): There is a correlation between the components of body composition and the kilocalories provided by macronutrients at the two studied time points.
- H_1 (Alternative Hypothesis): There is no correlation between the components of body composition and the kilocalories provided by macronutrients at the two studied time points.

RESULTS

Table 1 presents the mean body composition results for players performing as catchers in baseball games, along with comparisons across different measured time points. Regarding body fat percentage (% Fat), the mean values were 16.2% at baseline and 14.37% by the end of the second third of the season.

Table 1. Body composition and caloric intake from macronutrients in catchers.

Body composition	**Baseline**	**End 1st third**	**End 2nd third**	**BL vs E1T (*p*-value)**	**BL vs E2T (*p*-value)**	**E1T vs E2T (*p*-value)**
% Fat	16.2	14.90	14.37	.1	.07	.1
kg ABM	83.00	82.70	83.30	.4	.3	.09
AKS	1.39	1.39	1.38	.3	.3	.4
Protein (P)	809.99	809.99	847.3	-	.1	.1
Lipids (Lip)	1388.01	1388.01	1539.3	-	.05	.05
Carbohydrates (Car)	2572.46	2572.46	2795.8	-	.03	.03
Total calories (T. Cal)	**4770.45**	**4770.45**	**5182.5**	**-**	**.007**	**.007**

Note: BL = Baseline; E1T = End of the First Third; E2T = End of the Second Third. p-values result from paired t-tests. A dash (-) indicates no statistical test was performed due to identical values.

The mean active body mass (kg ABM) was 83.00 kg at baseline, 82.70 kg at the end of the first third, and 83.30 kg at the end of the second third. The active substance index (AKS) showed mean values of 1.39 at both baseline and the end of the first third, decreasing slightly to 1.38 by the end of the second third.

As shown in Table 1, the caloric intake from macronutrients remained consistent between baseline and the end of the first third, with proteins (809.99 kcal), lipids (1388.01 kcal), and carbohydrates (2572.46 kcal) displaying identical values. In contrast, all macronutrient caloric values increased by the end of the second third of the competitive period.

Table 2 presents the correlation results between body composition components and macronutrient intake for catchers at the end of the first and second thirds of the competition.

Table 2. Correlation between body composition and macronutrient intake in catchers.

Comparison	1st third of the competition				2nd third of the competition			
	P	Lip	Car	T. Cal	P	Lip	Car	T. Cal
Fat percentage vs. Macronutrient Kcal	.0	.2	.9	.2	.3	1.00	.1	.5
Active Body Mass (kg ABM) vs. Kcal	-.7	-.5	1.00	-.5	-.5	.7	-.7	-.4
Active Substance Index (AKS) vs. Kcal	-.2	.0	.9	.1	.3	1.00	.0	.4

Note: Protein (P); Lipids (Lip); Carbohydrates (Car); Total Kilocalories (T. Cal).

At the end of the first third, no correlation was observed between fat percentage (%) and kilocalories from proteins (P). A minimal direct correlation was found between fat percentage and lipids (Lip), while a very strong direct correlation was observed between fat percentage and carbohydrates (Car). The correlation with total kilocalories (T. Cal) was minimal.

By the end of the second third, a low direct correlation was found between fat percentage and proteins (P). The correlation with lipids (Lip) was perfect and direct, whereas with carbohydrates (Car), it was minimal. Total, kilocalories (T. Cal) showed a moderate direct correlation with fat percentage during this period.

Regarding active body mass (ABM), Table 2 shows that at the end of the first third, its correlation with proteins (P) was moderate and inverse. With lipids (Lip), the correlation was strong and direct, while with carbohydrates (Car), it was strong and inverse. The correlation with total kilocalories (T. Cal) was moderate and inverse. At the end of the second third, the correlation with proteins remained moderate and in-verse, with lipids it was strong and direct, and with carbohydrates, it was strong but inverse. The correlation with total kilocalories was low and inverse.

Concerning the active substance index (AKS), at the end of the first third, a minimal inverse correlation was observed with proteins, while no correlation was found with lipids. However, a very strong direct correlation was detected with carbohydrates (Car), and a minimal correlation with total kilocalories. In the second third, the correlation with proteins was low and direct, with lipids it was perfect, and with carbohydrates, no correlation was observed. Additionally, a moderate direct correlation was found with total kilocalories.

Table 3 presents the body composition results of the infield players. The data indicate that the mean values for body fat percentage ranged between 12.0% and 12.4%. Meanwhile, the mean values for active body mass (kg ABM) ranged from 66.7 kg to 68.2 kg. Regarding the active substance index (AKS), the mean values fell within the range of 1.26 to 1.29.

Table 4 shows that for infield players during the first third of the competition, a moderate direct correlation was observed between fat percentage and protein intake (P), as well as with lipids (Lip) ($r = 0.6$). The relationship with carbohydrates (Car) was low and direct, while the correlation with total kilocalories (T. Cal) was moderate and direct.

Table 3. Body composition and caloric intake from macronutrients in infield players.

Body composition	Baseline	End 1st third	End 2nd third	BL vs E1T (*p*-value)	BL vs E2T (*p*-value)	E1T vs E2T (*p*-value)
% Fat	12.4	12.0	12.1	.04	.10	.36
kg ABM	66.7	67.4	68.2	.03	.10	.24
AKS	1.26	1.28	1.29	.05	.09	.37
Protein (P)	809.99	809.99	847.3	-	.1	.1
Lipids (Lip)	1388.01	1388.01	1539.3	-	.05	.05
Carbohydrates (Car)	2572.46	2572.46	2795.8	-	.03	.03
Total calories (T. Cal)	**4770.45**	**4770.45**	**5182.5**	**-**	**.007**	**.007**

Note: BL = Baseline; E1T = End of the First Third; E2T = End of the Second Third. p-values result from paired t-tests. A dash (-) indicates no statistical test was performed due to identical values.

Table 4. Comparison between body composition and macronutrient intake in infield players.

Comparison	1st third of the competition				2nd third of the competition			
	P	Lip	Car	T. Cal	P	Lip	Car	T. Cal
Fat percentage vs. Macronutrient Kcal	.5	.6	.4	.5	.5	.5	.5	.5
Active Body Mass (kg ABM) vs. Kcal	-.8	-.8	.3	-.8	-.8	-.5	-.8	-.8
Active Substance Index (AKS) vs. Kcal	-.2	-.2	.2	-.2	-.3	-.4	-.2	-.3

Note: Protein (P); Lipids (Lip); Carbohydrates (Car); Total Kilocalories (T. Cal).

Regarding the correlation between active body mass (ABM) and kilocalories during the first third, a strong inverse correlation was found with proteins (P) and lipids (Lip). The correlation with carbohydrates (Car) was low, while the correlation with total kilocalories (T. Cal) was strong and inverse. In the second third, fat percentage showed moderate direct correlations with proteins, lipids, carbohydrates, and total kilocalories.

For active body mass (ABM) in the second third, the correlation was strong and inverse with proteins, carbohydrates, and total kilocalories, while it was moderate and inverse with lipids.

Regarding the active substance index (AKS) during the first third, minimal correlations were observed with all macronutrients. These correlations were inverse for proteins and lipids but direct for carbohydrates. In the second third, the correlations remained low for all macronutrients.

Table 5. Body composition and caloric intake from macronutrients in outfield players.

Body composition	Baseline	End 1st third	End 2nd third	BL vs E1T (*p*-value)	BL vs E2T (*p*-value)	E1T vs E2T (*p*-value)
% Fat	10.3	10.0	10.5	.18	.34	.04
kg ABM	73.2	73.2	73.5	.46	.36	.29
AKS	1.30	1.30	1.30	.50	.47	.42
Protein (P)	809.99	809.99	847.3	-	.1	.1
Lipids (Lip)	1388.01	1388.01	1539.3	-	.05	.05
Carbohydrates (Car)	2572.46	2572.46	2795.8	-	.03	.03
Total calories (T. Cal)	**4770.45**	**4770.45**	**5182.5**	**-**	**.007**	**.007**

Note: BL = Baseline; E1T = End of the First Third; E2T = End of the Second Third. p-values result from paired t-tests. A dash (-) indicates no statistical test was performed due to identical values.

Table 5 presents the body composition results of the outfield players. As shown, the mean body fat percentage was 10.3% at the beginning of the competition and 10.5% at the end. Analysis of active body mass (kg ABM) indicates that it remained stable at 73.0 kg across all measured time points. Similarly, the active substance index (AKS) maintained a consistent mean value of 1.30 throughout the three measurement periods, with no significant differences observed.

Table 6 presents the correlation analysis between body composition and macronutrient intake for outfield players. The results indicate that during the first third of the competition, fat percentage showed a low inverse correlation with protein (P), lipids (Lip), and total kilocalories (T. Cal), while demonstrating a low direct correlation with carbohydrates (Car). In the second third, the correlation remained low and inverse for proteins, carbohydrates, and total kilocalories, while no significant correlation was observed with lipids.

Regarding active body mass (ABM), moderate direct correlations were observed with proteins, lipids, and total kilocalories during the first third, while a minimal inverse correlation was found with carbohydrates. In the second third, correlations with proteins, carbohydrates, and total kilocalories were moderate, while lipids showed a minimal correlation.

Finally, the active substance index (AKS) exhibited a low correlation with proteins, a moderate correlation with lipids and total kilocalories, and a minimal correlation with carbohydrates during the first third. In the second third, correlations were low for all macronutrients.

Table 6. Comparison between body composition and macronutrient intake in outfield players.

Comparison	1st third of the competition				2nd third of the competition			
	P	Lip	Car	T. Cal	P	Lip	Car	T. Cal
Fat percentage vs. Macronutrient Kcal	-.3	-.3	.3	-.3	-.3	.0	-.3	-.3
Active Body Mass (kg ABM) vs. Kcal	.6	.6	-.2	.6	.5	.2	.5	.5
Active Substance Index (AKS) vs. Kcal	.4	.5	.1	.5	.4	.3	.4	.4

Note: Protein (P); Lipids (Lip); Carbohydrates (Car); Total Kilocalories (T. Cal).

DISCUSSION

The present study aimed to determine the correlation between the kilocalories provided by macronutrients and the body composition components of players from the Camagüey baseball team participating in the National Series. As previously stated, research directly correlating these specific variables in baseball players within this competition is scarce, which underscores the relevance of this investigation.

Catchers (Table 1) exhibited a decrease in fat percentage over the course of the competition that was not statistically significant according to the Student's t-test values. This aligns with findings by Wang et al. (2024), who reported no significant differences in body composition in the adolescent and adult population of China. This decrease could be related to the metabolic demands of their defensive role, compounded by games lasting two to three hours in the afternoon under direct sunlight. This result reinforces the thesis that the factors affecting body composition and physical condition are multifactorial, necessitating the individualization of both training and nutritional strategies (Tauda et al., 2025).

The initial fat percentage results for catchers at the start of the competitive season differ from those obtained for players in this position during the 62nd National Series, who showed a fat percentage of 11.83% (Mesa et al., 2024). However, our findings are more similar to those reported by Sanga Dwi et al. (2024), where the mean fat percentage was 16.9%.

A comparison of the fat percentage results for catchers (Table 1), infielders (Table 3), and outfielders (Table 5) shows that catchers maintained higher fat levels than players in other positions. This supports the view that body composition development differs among athletes based on their playing position (Ceballos-Gurrola et al., 2020). Consequently, it is crucial to consider positional demands when creating nutritional strategies to ensure adequate energy availability during competition (Vázquez-Bautista et al., 2025).

We concur with Haq et al. (2025) that a reduction in fat percentage suggests that kilocaloric intake from macronutrients exceeded energy expenditure during competition for infielders and outfielders; however, this balance was not achieved for catchers.

The Active Body Mass (kg ABM) showed fluctuations from the beginning to the end of the second third, but no net increase in lean mass was observed. This indicates that individualized nutrient consumption needs were not fully met. We agree that if the specific needs of each catcher—based on game participation and individual characteristics—are considered, macronutrient intake can be optimized to support increases in muscle mass (Sanga Dwi et al., 2024). This approach allows for a synergy between the physical demands of the position and the athlete's individual profile, optimizing both preparation and in-game performance (Warneke et al., 2024).

The results of the Active Substance Index (AKS) showed that during the study period, infielders were the only group that managed to increase their results (Table 3), albeit not significantly. This suggests their macronutrient intake was more closely aligned with their needs, promoting muscular development, as macronutrients are essential for muscle growth (Sanga Dwi et al., 2024).

The assessment of the correlation between macronutrients and body composition for catchers (Table 2) reveals that the correlation between fat percentage and the kilocalories provided by proteins was not strong; therefore, changes in fat mass were not directly tied to protein intake.

However, a strong direct correlation was found with lipids, indicating that an increase in kilocaloric intake from lipids corresponded with an increase in fat percentage, or vice versa. This result suggests that the quantity of lipids consumed was sufficient to be utilized as an energy source during the competitive activities of these players (Di Corcia et al., 2022), who perform significant strength-endurance work.

A direct correlation was also noted between the total kilocalories provided by macronutrients and fat percentage, indicating these variables move in the same direction. This is a critical aspect that must be considered in nutritional planning.

Notably (Table 2), the correlation between the active body mass of catchers and protein intake was inverse, meaning that as one increased, the other decreased. While muscular development is known to be strongly related to adequate protein consumption (Sanga Dwi et al., 2024), the moderate strength of this inverse relationship suggests other factors were at play.

As shown in Table 1, there was a non-significant increase in caloric intake from proteins in the second third. In contrast, the intake of lipids, carbohydrates, and total calories increased significantly.

In general, catchers exhibited strong correlations in the first third between body composition components and kilocalories from carbohydrates. In the second third, a strong correlation was found with lipids. Strong correlations were not consistently found between body composition components and total kilocalories from macronutrients, indicating that changes in body composition are not solely dependent on changes in macronutrient intake.

Infielders (Table 4) showed a direct correlation between fat percentage and macronutrients at both measured intervals. This means changes in fat percentage were responsive to changes in macronutrient intake, as nutrients are incorporated into the body and reflected in its composition (Ghiglione & López, 2022).

Infielders displayed an inverse correlation between active body mass (ABM) and lipids in both thirds. This indicates that as the values of this macronutrient increased, active body mass decreased, and vice versa. This association was moderate to strong. Therefore, it is necessary to systematically assess the needs for this macronutrient to regulate its intake to achieve physical development goals, adjusting nutritional loads to individual needs and the demands of the sport (Ramírez-Campillo et al., 2022).

It is noteworthy that active body mass (Table 4) had a low correlation with proteins, despite their known role in muscle tissue reconstruction. This necessitates a review of whether the nutritional provision was appropriate to determine if special dietary guidelines are needed (Di Corcia et al., 2022; Sanga Dwi et al., 2024).

Outfielders (Table 5) maintained stable values in their body composition components throughout the competitive period. This result indicates that macronutrient consumption maintained a metabolic balance with the energy expended during competition, which allowed for the maintenance of body composition and an adequate state of health for their athletic activity (Yaguachi-Alarcón et al., 2025).

The fat percentage of outfielders (Table 5) falls within the range suggested by the Division of Sports Science and Technology of the United States Olympic Committee, which states that for non-professional athletes, 11% adipose tissue is generally appropriate (Collins et al., 2021).

Outfielders (Table 6) showed a low correlation between fat percentage and macronutrients throughout the competition, with a direct relationship only with carbohydrates in the first third and with lipids in the second. This indicates that variations in body composition were not highly responsive to changes in macronutrient intake, and vice versa. Therefore, we agree that based on this result, the nutritional strategy should be refined to better target athletic performance conditions (Rebelo et al., 2025).

For active body mass (Table 6), the correlation in the first third was direct and moderate with proteins, lipids, and total calories, showing that as these macronutrients increased or decreased, ABM values followed suit. However, the correlation with carbohydrates was minimal and inverse. In the second third, proteins, carbohydrates, and total calories showed a moderate and direct correlation.

Regarding the Active Substance Index (AKS), the correlation was direct and moderate with lipids and total calories in the first third; while in the second, the correlation was low and direct in all cases.

It is observed across the tables (1, 3, and 5) that during the competition, players received a similar energy contribution from macronutrients, meaning that their specific positional demands were not a primary factor in establishing the macronutrient consumption strategy. This individualization is essential for optimizing preparation during competition and enhancing recovery post-game.

As observed, the strength and direction of the correlation between macronutrients and body composition components were not constant across different time points because the kilocaloric intake was not constant, indicating that dietary provision lacked stability.

CONCLUSIONS

The results of the body composition components under study differ among the various playing positions, with catchers exhibiting the highest values for fat percentage, active body mass, and active substance index. It is significant to highlight that among the positions studied, catcher is the one with the highest energy demands.

The caloric intake from macronutrients showed no differences among players of different positions, leading to the conclusion that the implemented nutritional strategy did not take this aspect into account. A significant increase was observed between the first and second thirds for lipids, carbohydrates, and total calories.

The studied players only achieved strong correlations between body composition components and carbohydrates and lipids in the case of catchers. This pattern was not observed in the other positions. The classification of the correlation between macronutrients and body composition components was not consistent across different time points due to non-constant kilocalorie intake, indicating that the dietary provision lacked stability.

The results underscore the importance of monitoring and evaluating both macronutrient quantities and body composition to serve as indicators for designing strategies to maintain players' optimal health status during competition. Based on these findings, coaches should adopt relevant strategies to individualize caloric intake during the competitive season.

AUTHOR CONTRIBUTIONS

Conceptualization, L., and R.; methodology, L., and R., validation, L., B; formal analysis, R., and D. A; investigation, L., R. data curation, D .A. and A. J. All authors participated in the review and approval of the final manuscript, as well as in ensuring the integrity and accuracy of the content presented.

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