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Anthropometric and physical characteristics in league 1 soccer players on the ranking of teams in Cameroon

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ABSTRACT

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The present work aims at comparing anthropometric and physical characteristics in elite 1 Cameroonian soccer players according to the ranking of their team during the 2017-2018 season. Ninety one soccer players of three elite 1 teams of Cameroon football championship, including 30 of the top of the ranking [Coton Sport of Garoua (T1)], 30 of the middle of the ranking [APEJES of Mfou (T2)], and 31 of the bottom of the ranking [Aigle Royal of Menoua (T3)] participated in the study. Anthropometric characteristics [height, sitting height, weight, cormic index (CI), body mass index (BMI)] and physical performance [short-distance sprinting time, flexibilities, lower limb strength, maximum aerobic speed (MAS), maximum oxygen consumption (VO_2max)] were determined. No difference was found in height, sitting height, weight, and BMI between the three teams. According to the CI, the number of brachicorms is significantly high in T1 ($p<0.05$). Performances in sprint, vertical jump and the predicted VO_2max were significantly higher in T1 compared to T2 and T3 ($p<0.05$). In contrast, T3 players were more flexible compared to T2 and T1 players ($p<0.05$). The top ranking team (T1) of elite 1 football championship of the 2017-2018 season had older, bigger, heavier, faster, enduring and more powerful players than those of the middle (T2) and the bottom ranking teams (T3). Therefore, we suggested these parameters to partially justify the differences in teams of different ranks in the elite football championship.

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Introduction

Football is one of the most worldwide popular sports (Swapan et al., 2010). In competitive sports such as football, performance is closely linked to the efficient combination of a number of factors: technique, tactics, psychology (motivation) and high-level of training. Apart from talent, football quality and performance depend largely on the anthropometric and physical profiles of players. These parameters are very important for high level football players during selection and competition. The wide application of anthropometric analysis in sports science research was conducted to provide further insights in the relationship between key morphological variables and sports performance (Bell et al., 2000). The physiological demands of soccer require players to be competitive in several aspects of fitness, like aerobic and anaerobic capacity, muscle strength, flexibility and agility (Rebelo et al., 2013; Reilly and Gilbourne, 2003). These characteristics are not the same for all players and can vary according to division of players, team and position on the field (Reilly and Gilbourne, 2003; Bangsbo, 1994; Metaxas et al., 2006). Many researchers had hypothesized that practicing athletes might be expected to exhibit structural and specific functional characteristics favorable for their specific sport (Popovic et al., 2014). Since each sport has its own specific demands, each athlete should have specific anthropometrical characteristics and body composition figures for his or her own sports discipline (Norton et al., 2000), that is why the anthropometric characteristics and body composition of athletes were examined more.

For Milanese et al. (2015), soccer training is mainly based on the production of metabolic heat, mostly due to the fact that the average work intensity during a soccer match is usually about 75-90% of maximum heart rate and 70-85% of VO2max (Rexhepi and Brestovci, 2010).

Soccer in particular needs the optimal combination of the 4 qualities (technical, tactical, physical and mental). Indeed, many experts in the field, such as soccer conditioning coaches and scientists believe that the success of this sport can be associated with anthropometric characteristics and body compositions of players.

Williams and Franks (1998) revealed the psychological, perceptual, technical, anthropometric, body composition and physiological factors to be highly developed to reach an elite performance level. Consequently, it is important to understand the determinant of success in soccer such as the body composition and the anthropometric characteristics of players required in specific positions.

For a long time, anthropometric characteristics and body composition of players are very important in the achievement of high level performance. The influence of age was revealed during the comparison between junior and senior categories (Rienzi et al., 2000). A significant correlation between body mass, muscle mass and work rate profile were established (Tønnessen et al., 2013). Many studies demonstrated anthropometric and body composition to be as important as physical and physiological characteristics determinant to performance in soccer (Reilly et al., 2000). Previous investigations evaluated the relationship between ideal anthropometric and physical profiles of professional footballers and their standard playing positions in most part of the European and American continent Rienzi et al., 2000; Reilly et al., 2000; Slimani and Nikolaidis, 2017). Differences were noticed in age, body weight, body mass index, height and muscle mass between elite players of different playing positions. From this finding, players of particular sizes and shapes are suitable for demands of the various playing positions (Bangsbo et al., 1995; Bloomfield et al., 2005). They proved that goalkeepers were the tallest and heaviest while midfielders were the lightest and shortest. In fact, midfielders run the highest distance on the field. A good number of studies showed physical and physiological qualities to be determinant to performance in football (Orhan et al., 2013).

Although the importance of anthropometric and physical characteristics are recognized in the selection and detection of talent as well as the training of the players in the European countries, there is a lack of precise and accurate published information for these parameters in Cameroonian soccer players. In Cameroon, the elite 1 championship is professional and had 18 teams during the 2017-2018 sports season. At the end of the season 2017-2018, the ranking revealed the results at follows: 1st Coton sport (T1) of Garoua with 69 points, 9th APEJES (T2) of Mfou with 45 points, 17th Aigle Royal (T3) of Menoua with 32 points. T1 has been in the top of the standings for 15 years since the 1997 sports season in the local championship with consecutive wins of 3, 4

and 6 years out of the 15. However, the performances of the Cameroonian first team in the finals of African competitions are very poor. On the local level, we would find out if there is a correlation between the physical and anthropometric parameters of the players and if players are better than those observed in the other African or European championships. The purpose of the study was to determine the anthropometric and physical characteristics of footballers of the elite 1 championship of Cameroon, taking into consideration their ranking, which testifies the good performance of a football team. We hypothesized that teams which have better anthropometric and physical characteristics are those that are on the top of the ranking.

Methods

Participants

Ninety one (91) soccer players, including 30 players [4 goalkeepers (GK), 07 central defenders (CD), 3 lateral defenders (LD), 6 midfielders (MF), and 10 forwards (FW)] from T1 (25.3±2.9 yrs), 30 players (4 GK, 05 CD, 04 LD, 6 MF, and 11 FW from T2 (21.3±2.7 yrs), and 31 players (5 GK, 5 CD, 4 LD, 8 MF, and 9 FW from T3 (23.4±2.2yrs), agreed to participate in the study. During the 2017-2018 season, T1 was ranking 1st, T2 was the 9th position and T3 was at the bottom (17th) of 18 teams. Participants attended more than 5 training sessions of 90 minutes per week and competed to the elite 1 professional football championship of Cameroon. The testing procedures were performed at the end of the preparation period of the 2017-2018 seasons. Participants presenting no injury or illness during the data collection and free from subjective symptoms that could interfere with their performances participated in this study. They were instructed to consume a meal of their choice, similar to that they used before matches, 2-3 hrs prior to each testing session. The assessment procedure, benefits and potential risks were explained to the participants before filling the consent form and starting the test. The study was approved by the ethical clearance N° 2018/04/997/CE/CNERSH/SP of the National Research Ethics Board for Human Health of the Republic of Cameroon and was conducted in accordance with the Helsinki Declaration as amended in Fortaleza, in October 2013.

Measures

Anthropometric parameters

These parameters measured were: body mass, standing height, sitting height and body composition (body fat percentage). These parameters were performed by high-skilled, trained and experienced technicians. The body mass was measured to the nearest 0.1kg using an electronic scale Tanita BC-601 (Tokyo, Japan) with the participant wearing minimal sport clothing. The standing height and the sitting height were measured in centimeters (cm) with a calibrated stick. Body Mass Index (BMI) was determined by calculating the body mass index using the Quetelet formula [BMI = Weight (Kg)/(Height)^2(m)] and the Cormic Index was determined by Laren and Pigearias formula [CI = sitting height (m) x 100]. This Cormic Index permits us to classify players according to their bust size in three groups: brachicorms (CI < 51); metricorms (51 ≤ CI ≤ 53 and macrocorms (CI > 53).

Physical parameters

The physical fitness tests were conducted on the field in the same day and consisted of a vertical jump, aerobic test, sprint tests and flexibility. Each player was submitted to a 10-15 minute standardized warm-up, before completing different tests separated by 2 minutes of resting period. Participants were encouraged to give maximum efforts during the tests.

Vertical jump

The Sargent Test was used as the vertical jump test to evaluate the power of the lower limbs of the players. To realize this test, the participant stood in profile toward the wall, keeping the feet flat on the floor, reached up as high as possible with one hand and marks the wall with the tips of the fingers using a chalk. This point marked served as the first reference and is known as the standing reach point. Then from a squatting position and away from the wall, the participant jumped vertically as high as possible and marked another point (jump point) on the wall with a chalk. The difference in height (vertical jump) between both points was meas-

ured to the nearest centimeters (cm) using a calibrated stick. The average and peak of power values of the lower limbs were calculated using the following Harman et al. (1991) formulas: Peak of power = 61.9 x Y + 36 x P +1822**.** Average power = 21.2 x Y+23 x P-1393 with Y= score vertical jump, and P = weight.

Sprint tests (10, 20, 30, 40m)

Sprint tests were used to assess players' speed. Each player was allowed three attempts, with a 2-min rest in between. The best result of the three attempts was registered for further analysis.

Flexibility of the trunk was measured in centimeters using a calibrated stick. The player sat on the ground, legs apart and well stretched, the trunk straight, leaning against the wall. The arms placed between the legs and the palms on the ground (the position of the middle fingers of both hands constituted the point of departure). The examiner made sure that the fingers are at the same level and that a point was marked at the top of the fingers. The player then leaned forward slowly, sliding his hands to the ground to reach a second point far ahead without bending his legs. This point was that of arrival with the middle fingers of both hands always at the same level and without jerky movements. The distance between the two points (departure and arrival) was measured and constituted the degree of flexibility of the trunk of the subject.

Aerobic test (VO_{2max} protocol)

Luc Leger test was used to determine the aerobic maximal speed and maximal oxygen consumption. This test was used to evaluate the cardiovascular endurance capacity of each participant thereby estimating the maximum oxygen consumption (VO_2max) expressed in milliliter per kilogram per minutes ($ml^{-1}kg^{-1}min^{-1}$). The test involved continuous running between two lines 20 m apart. The participant stood behind the starting line and began running when instructed by the recording at a speed of 8 km/h. The participant continued his run between the two lines and made a turn-around at the signal of the recorded beeps. A signal indicated an increase in speed every minute (level) by 0.5 km/h and the participant waited until the beep sounded before continuing his

run. The participant accelerated slightly every 2 minutes. When he could not keep up, the examiner decided that he had reached his maximum aerobic speed (MAS).

Statistical analysis

Quantitative variables were expressed as mean ± standard deviation. The statistics program XLSTAT 2015.6.01.25740 was used for statistical analysis. Analysis of the variance (ANOVA) was performed for the comparison of anthropometric and physical parameters between players of three teams. Duncan Post Hoc test was carried out to determine significant difference. Significance was set at $p<0.05$.

Results

$$$$$$Table 1 near here$$$$$$$

Age and anthropometric characteristics of three teams are summarized in Table 1. T1 players were significantly ($p<0.05$) older than those of T3 and T2. According to the high, T2 players are significantly taller than those of T1 ($p<0.001$) and T3 ($p<0.05$). T3 players are significantly taller than those of T1 ($p<0.05$). There is no significant difference in their weight but among T1, T2, and T3 the difference is significant ($p<0.05$) according to the height and BMI. However, sitting height, BMI and cormic index of T3 players were higher ($p<0.05$) than those of T1 and T2. Then, those of T2 players were higher ($p<0.05$) than those of T1.

$$$$$Table 2 near here$$$$$$

The comparison of age, height, sitting height, CI, weight, or BMI in T1, T2, and T3 players according to their playing position is presented in Table 2. T1 players were older than T3 and T2 players at all playing positions except T2 in ED position. The $T1_{GK}$ were taller than the $T2_{GK}$ and $T3_{GK}$. Even $T1_{CD}$, $T1_{MF}$ and $T1_{FW}$ were older than those of T2 and T3. However, the $T2_{CD}$ and $T1_{CD}$ sizes were similar and superior from those of $T3_{CD}$. In the MF position, T3 players standing-height was significantly different ($p<0.05$) to those of T2 and T1. Then $T2_{FW}$ standing height was higher than those of $T1_{FW}$ and $T3_{FW}$. $T1_{ED}$ were short compared to $T2_{ED}$ and $T3_{ED}$.The sitting height and cormic index (CI) of the T3 were higher than those of the T1 players at all playing positions

(GK, CD, ED, MF, FW). $T3_{GK}$ showed greater weight than those of $T2_{GK}$ and $T1_{GK}$. The weight of CD and MF were similar in T3, T2, and T1 players. However, $T2_{ED}$ were heavier than $T1_{ED}$ and $T3_{ED}$ players. Then the $T1_{FW}$ were heavier than $T3_{FW}$ players. BMI was similar among the players of the three teams (T1, T2, and T3) for CD, ED, and MF, and FW. Only $T3_{GK}$ had a higher BMI than the $T1_{GK}$.

$$$$$Table 3 near here$$$$$$

Table 3 shows the numbers of brachycorms, metricorms, and macrocorms in GK, CD, ED, MF, and FW of T3, T2, and T1 players. T1 and T2 had more brachycorms players (27 and 25) compared to T3 (16 players). The number of metricorms (13 players) and brachycorms (16 players) were comparable in T3 players. However, the number of metricorms were very small in T2 (5 players) and T1 (2 players). For the three teams, the number of macrocorm players were ≤ 2 players. Overall, the number of brachycorm players were significally high in T2 ($p<0.05$) at all positions except in CD where metricorm players number is significantly high ($p<0.05$) in T3team than in T1 and T2.

$$$$$Table 4 near here$$$$$$

Physical performances are supplied in Table 4. T1 players were faster than T3 at 20m speed test and faster than T3 and T2 players in all other distances of the speed test. T3 were more flexible than T1 and T2 players. However, T1 had better maximum aerobic speeds, maximum oxygen consumption, and vertical jump height than T2 and T3 players. The peak power of T2 is significally higher ($p<0.05$) ($p<0.05$) than T1.

$$$$$Table 5 near here$$$$$$

Table 5 summarized physical response of players of the three teams according to their playing position. T1 players were faster than T2 and T3 at distances 10, 20, 30 and 40m at GK, CD and ED positions. At MF position, T1 players are significally faster only at 20 and 30m speed. At FW position, T1 players are significantly ($p<0.05$) the fastest at 10, 30 and 40m speed test. According to the vertical jump T2 players performances were significantly higher at GK, CD, ED and FW compared to T2 and T3 players. On the other hand, $T1_{MF}$ players had best vertical jump performance than $T3_{MF}$ and $T2_{MF}$. The lower limb powers (peak and average) of the

T1players during the vertical trigger were lower than those of the T2 players in GK,CD, MF and FW but higher than those of the T3 players in GK, CD, MF and FW. The power (peak and average) of $T1_{MF}$ was significantly high than those of $T2_{MF}$ and $T3_{MF}$. T3 and T1 players were more flexible than T2 players in GK, CD, ED, and MF. Then, $T1_{GK}$ were more flexible than $T3_{GK.}$ However, $T3_{FW}$ were more flexible than $T2_{FW}$. The maximum aerobic speed and maximum oxygen consumption were greater in T1 than those of T2 and T3 players at all playing positions.

Discussion

The main objective of the present study was to compare three teams with different ranks (1^{st}, 9^{th}, and 17^{th} on 18) in elite 1 championship of Cameroon according to the anthropometric profile and physical performance of players. From the results, there were some significant differences between the three teams and the players playing positions, with the first team having the best qualities among the three. In fact, top ranked football players were more aged, taller, weighted, faster, flexible, enduring, and powerful. The number of brachycorms players were more important than those of metricorms and macrocorms players in the three teams with higher value in T1 players compared to those of T2 and T3.

T1 players were older than those of T3 and T2 (Table1). Tonnessen et al. (2013), revealed that age does not have a significant influence on performance, especially the VO_2max of professional soccer players. The influence of age was revealed only when it comes to the comparison in junior and senior categories.

The comparison of BMI data from the three teams showed no significant difference both at the general level and at different gaming compartments. All teams had a BMI of approximatively 23 Kg/m^2. However, high-level athletes are known to have a very specific BMI, especially since sports practice is as much about developing muscle mass as decreasing body fat. T1 players were taller than those of the T3 but the difference was not significant. However, T3 players had higher ($p<0.05$) sitting height than those of T1 and T2 (Table 1). The average of standing height in T1 players (179.3±6.7cm) was higher than in T3 and T2 players. These values were lower compared to the average size of Spanish professional league soccer players (1.8±0.1 m). It should be

noted that the Spanish championship is among the four major European championships, the one with the smallest average size of players. (Bangsbo and Krustrup, 1995). It was significantly lower compared to the average values of European professional footballers (181.1±5.8 cm) (Owen al., 2012), as well as the young footballers of France ("espoirs" category) (181.5±6.0 m) (Rebelo et al., 2013; Reilly et al., 2000). T1 players were certainly the tallest among the three Cameroonian teams, but on the continental front, their average size was small.

There was no significant difference in weight according to the playing position in the three teams (Table 2). In the T1 team, the goalkeepers were the tallest, followed by the CD, the MF and FW. In this team the ED were the smallest in size. The data of T1 players were similar to those of Alpay (2016), who revealed significant difference in the height of players according to their playing positions. These authors showed the goalkeepers to be tallest followed by the defenders, forwards, and midfielders. These authors justified their results by the fact that goalkeepers, defenders and forwards competed more for aerial balls during matches than midfielders. Also, the morphology of the MF was in adequacy with the long runs during the matches. Then, the team that dominates the air duel can also dominate in different compartment of the game.

In the T1, T2, and T3, the results do not show a variation in height according to the game posts (Table 2) as shown by Bloomfield et al. (2005). These authors found within the English championship, the GK (1.9±0.0) to be tallest followed by CD (1.8±0.1) and FW (1.8±0.1). MF players were the shortest (1.8±0.1). Although the anthropometric parameters of T1 players were better than those of T3 and T2, it were still very weak compared to those of the players of the major European leagues. In light of these different data, we noticed that the professional teams were characterized by the physical anthropometric differences among players. Hencken and White (2006) studied the anthropometric characteristics of a team in the England first league championship and did not observe any difference according to the position held. They concluded that this could potentially be a disadvantage since it is impossible to make an extra athletic impact when necessary. In addition, this would lead to a lack of richness in the game options. The lack of variations in anthropometric characteristics according to the game position does not give to these teams the opportunity to enrich their gaming options because they

are unable to make an additional impact. This could partially explain their different positions in the classification at the end of the Cameroon football season or the African champions league.

The Cormic index permitted to become aware of the proportion of body (Table 3). T1 players were brachicorms. This anthropometric parameter is good because footballers really need a long bust and long legs for the synchronization of their movements and runs (Chamari et al., 2005). However, the T3 team although having a high percentage of metricorms in their workforce, the types of bust adapted to the practice of collective sports including football, did not showed better results compared to T1. The morphotype of T1players corresponded to that of athletes practicing an endurance discipline. This will allow this team to have good athletic qualities and thus to dominate the other teams in this regard. Athletic potential being important in the practice of high level of football, the T1 team with a majority of brachicorms players will be athletically superior to T2 and T3 teams. This leads us to say that the morphological type has a great influence on the performances in football. But the comparison of morphological types according to the different playing positions revealed no significant difference.

The 30m sprint test has often been used by researchers to assess maximum velocity of soccer players. Furthermore, in this study we also assessed 10, 20 and 40 m speed in football players. Performance mean values of T1 players were significantly different ($p<0.05$) for 10, 20, 30, and 40m from those of T3 and T2. The superiority of T1 players in speed and to be first on different duels over different distances gave to their team the ability to dominate their opponents in the matches. With this opportunity, it was quite logical to this team to play the leading role in the Cameroon league 1 professional championship.

According to their playing position (Table 5), the results of the present study partially disagreed with those of Marques et al, (2016), who reported no significant differences in the 10 m test. Forwards were significantly faster over 20 and 30m when compared with external and central defenders, and central defenders were significantly slower over 30m than the central midfielders. Other studies testified forwards and defenders were faster than other positions (Haugen et al., 2013; Sporis et al., 2009). Brahim et al. (2016) in their study observed midfielders with the best performance on the 20m sprint time. Also, they observed that forwards were faster

than defenders and midfielders at the 30m sprint test. Additionally, the study found that forwards had the shortest 30m sprint duration and were significantly faster than defenders, and goalkeepers were slowest (Gil et al., 2007). Due to less number of studies, we could not also elaborate on the 40 m test. The differences between the results could be result to the fact that the players of different teams were submitted to the various training program.

Flexibility has a high correlation with power, endurance and speed (Mohammad et al., 2013). Performing movements with optimal flexibility causes physical activities to be efficient and successful (Mohammad et al., 2013). Thus a good range of motion in a particular joint allows an athlete to carry out specific sports skills with minimal pressure to tissues around the joints thereby reducing the risk of injuries. The average range of trunk flexibility of T3 players (67.6±9.38) was higher ($p<0.05$) compared to those of T1 and T2. However, mean values of trunk flexibility of T1 and T2 were highest in goalkeepers (69.7±0.88 and 60.0±5.00) than players of other field positions. Thus, goalkeepers and central defenders had more flexible trunks when compared with external defenders and forwards. This agrees partially with these results when recording the trunk flexibility of Indian national club footballers (Swapan et al., 2010). Goalkeepers and defenders had great trunk flexibilities when compared with midfielders. Oberg et al. (1994), in their study tested the muscle strength in knee extension, knee flexion and flexibility in the lower extremity of one hundred and eighty (180) soccer players and reported the goalkeepers to be more flexible than the other players in hip flexion ($p<0.001$), knee flexion, and ankle dorsiflexion. Vertical jump is commonly used to measure the explosive power of the lower limbs. The mean vertical jump of T1 and T2 was found to be higher than the one of T3. T3 players were less powerful in the lower limbs than those in T1 and T2. These results agreed with those of Swapan et al. (2010), which found no statistical difference in jump height of 13 to 15 years and 12 to 19 years soccer players as well as male Indian footballers although goalkeepers exhibited the best performance of all positional groups. Stolen et al. (2005) reported that at the professional level, goalkeepers had the highest jump height and midfielders had the lowest compared with forwards and defenders. However, our results did not conform to the study of Mehdi et al. (2016), which shows a positional difference in jump height between goalkeepers, defenders, midfielders and

forwards. The results of Marques et al. (2016) reported that external defenders had the lowest vertical jump height compared to the player of other positions.

Aerobic performance represented by aerobic maximal speed and VO_2max is regarded as an important physiological parameter for optimal performance. Elite soccer players have been reported to achieve values in the range of 55-70 ml.kg^{-1}min^{-1} [13]. The present study recorded a VO_2max average of 52.0±2.5 ml.kg^{-1}min^{-1}; 42.4±2.7 ml.kg^{-1}min^{-1} and 57.0±3.2 ml.kg^{-1}.min^{-1}, for T3, T2 and T1 respectively (Table 4). The average VO_2max value of T1 players was significantly higher ($p<0.05$) than those of T3 and T2. According to their playing position the result shows that the performance of T1 players was significantly higher ($p>0.05$) than those of the other teams at both the AMS and VO_2max levels. But in T1, goalkeepers had significant lower maximal oxygen consumption (53.8±2.2 ml.kg^{-1}min^{-1}) compared to the rest of the groups. Similar results have been published in the study of Tasmektepligil et al. (2016). Furthermore, our results of T1 players showed that forwards and midfield players had significant aerobic power than those of other positions. In its review, Reilly (1976) reported that among English Premier League players, midfield players had significant higher VO_2max than those of other positions while goalkeepers had the lowest values and FW had intermediate values. Moreover, recent studies on a professional senior match showed that midfielders covered a great distance than the other positional groups (Krustrup et al. 2006; Rampinini et al., 2007). However, the results of the present study indicated the variation of the maximum oxygen uptake capacity with specific field position in our three teams. Consequently, in T1 team, forwards and midfielders (Table 5) were more enduring than defenders and goalkeepers but in T3, defenders (CD and ED) were more enduring. With the highest value of VO_2max which was 57.0 ± 3.2ml.kg^{-1}min^{-1}, T1 presented the best value of the three teams but this value is significantly low compared to the threshold of around 60 ml^{-1}kg^{-1}min which is the minimum required to compete at an elite level (Reilly et al., 2000). In Tunisia for example, the mean value according to Chamari et al. (2005) was 61.1 ml.kg^{-1}min^{-1}.

Conclusion

During the 2017-2018 season in elite 1 Cameroonian football championship, T1 players as compared to

T3 players were significantly older, bigger, heavier, faster, more enduring and more powerful in the legs. According to the team T2 that occupied the middle of the ranking, several anthropometric and physical parameters were comparable to that of T1. Therefore, these parameters may at least partially justify the differences in performance and the final ranking of the 2017-2018 season between these three teams, and suggested the positive effects of a best anthropometric and physical profile of players at high level football. The physiological relevance of this study permitted to conclude that a team with poor anthropometric and physical characteristics could not win many matches.

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Table 1: Comparison of age and anthropometrics characteristics of Cameroon league 1 teams

	T3	T2	T1
Age (yrs)	23.4±2.2[a]	21.3±2.7	25.3±2.9[bc]
Height (cm)	178.5±5.2	179.4±4.8[a]	179.3±6.7 [b]
sitting height (cm)	90.8±2.7[ab]	88.3±3.2[c]	87.0±4.7
Weigth (kg)	75.9±5.8	76.1±5.3	75.9±6.9
Cornic index	50.9±0.8[ab]	49.2±1.6[c]	48.6±1.9
Body Mass Index	23.8±1.1[ab]	23.6±1.0	23.6±1.2

Coton sport of Garoua (T1), APEJES of Mfou (T2), and Aigle Royal of Menoua (T3); [a]=difference between T3 and T2, [b]=difference between T3 and T1 and, and [c]=difference between T2 and T1.

Table2: Comparison of anthropometrics parameters of T1, T2, and T3 according to their playing position

Teams	Age (yrs)	height (cm)	Sh (cm)	CI	Weight (kg)	BMI (kg/m^2)
$T3_{GK}$	24.0±2.0[a]	181.8±2.6[a]	92.4±1.3[ab]	50.8±0.7[ab]	83.6±4.0[ab]	25.3±1.0[b]
$T2_{GK}$	23.2±3.3	179.5±4.7	87.5±3	48.7±1.5	79.3±4.3	24.6±0.9
$T1_{GK}$	24.7±1.7[bc]	186.0±6.5[bc]	91.0±4.0[c]	48.9±1.1	80.0±6.7	23.1±0.3
$T3_{CD}$	25.0±2.0[a]	182.0±4.8	91.8±1.9[ab]	50.4±0.9[ab]	79.7±6.1	24.0±1.2
$T2_{CD}$	22.0±2.8	184.0±4.4[a]	88.6±2.8	48.1±1.4	81.6± 9.3	24.0 ±1.5
$T1_{CD}$	25.7±3.1[bc]	184.0±4.5[b]	89.1±3.3	48.4±1.2	81.0±6.9	23.9±1.4
$T3_{ED}$	23.0±0.5	176.5±3.2[b]	91.0±2.0[ab]	51.5±1.2[ab]	71.7±2.8	23.0±1.1
$T2_{ED}$	24.0±2.5[a]	179.0±3.5[ac]	87.7±4.7	49.0±2.4	77.4±2.9[ac]	24.1±1.1
$T1_{ED}$	24.0±2.0[b]	172.3±2.8	86.0±2.0	49.9±0.3	70.4±1.5	23.7±0.4
$T3_{MF}$	24.0±3.2[a]	179.4±4.5	91.4±2.6[ab]	50.9±0.8[ab]	75.7±4.6	23.5±0.8
$T2_{MF}$	20.1±2.9	178.8±5.5	88.1±3.5	49.3±1.7c	74.8±4.1	23.4 ±0.6
$T1_{MF}$	27.2±2.1[bc]	178.7±4.4	86.2±4.5	48.2±1.43	74.6±5.1	23.3±0.7
$T3_{FW}$	22.0±1.3[a]	174.8±5.9	88.9±3.6[b]	50.8±0.9[ab]	71.5±5.5	23.4±1.1
$T2_{FW}$	20.0±1.3	178.0±4.6[ac]	88.6±2.8[c]	49.8±1.4[c]	72.9±4.9	22.9 ±0.5
$T1_{FW}$	24.5±3.1[bc]	175.7±7.7	84.8±6.6	48.3±3.4	73.1±7.5[b]	23.7±1.8

T3 (Aigle Royal of Menoua), T2 (APEJES of Mfou), T1 (Coton sport of Garoua), GK (goalkeepers), CD (central defenders), ED (external defenders), MF (midfielders), FW (fowards). Sh (sitting height), BMI (Body Mass Index), CI (Cormic Index). [a]= significant difference between T3 and T2, [b]= significant difference between T3 and T1 and,[c]= significant difference between T2 and T1.

Table 3: Classification of proportions of bust T1, T2, and T3 players according to the playing position

	T3			T2			T1		
	Bra	Met	Mac	Bra	Met	Mac	Bra	Met	Mac
GK	3	2^{ab}	0	4^{ac}	0	0	3	1^{c}	0
CD	4	1	0	5^{a}	0	0	7^{bc}	0	0
ED	2	1^{ab}	1^{b}	3^{a}	0	1^{c}	3^{b}	0	0
MF	3	4^{ab}	1^{ab}	5^{a}	1^{c}	0	6^{bc}	0	0
FW	4	5^{ab}	0	8^{a}	4^{c}	0	8^{b}	1	1^{bc}
total	16	13^{ab}	2^{ab}	25^{a}	5^{c}	1	27^{bc}	2	1

T3 (Aigle Royal of Menoua), T2 (APEJES of Mfou), T1 (Coton sport of Garoua), GK (goalkeepers), CD (central defenders), ED (external defenders), MF (midfielders), FW (fowards). Bra (Brachycorms), Met (Metricorms), and Mac (Macrocorms). ^{a}*= difference between T3 and T2;* ^{b}*= difference between T3 and T1;* ^{c}*= difference between T2 and T1.*

Table 4: Comparison of physical parameters of three Cameroon league 1 teams

		T3	T2	T1
Speed (s)	**10m**	1.6±0.1	1.6±0.1	$1.5±0.1^{bc}$
	20m	2.9±0.1	$2.8±0.1^{a}$	$2.8±0.1^{b}$
	30m	4.1±0.2	4.1±0.2	$4.0±0.2^{bc}$
	40m	5.4±0.2	5.4±0.2	$5.2±0.2^{bc}$
Flexibility (cm)		$67.6±9.4^{ab}$	57.0±7.6	$60.9±6.4^{c}$
MAS ($m.s^{-1}$)		12.9±0.4	12.9±0.5	$16.2±0.9^{bc}$
VO_2max ($ml.kg^{-1}min^{-1}$)		52.0±2.5	$52.4±2.7^{a}$	$57.0±3.2^{bc}$
Vertical jump (cm)		49.9±5.2	$55.2±7.2^{a}$	$54.2±7.0^{bc}$
Power (W)	**Peak**	7663.5±411.5	$7893.8±563.7^{ac}$	$7865.1±482.9^{b}$
	Average	1448.6±185.2	$1501.3±249.2^{a}$	$1501.4±213.5^{bc}$

T3 (Aigle Royal of Menoua), T2 (APEJES of Mfou), T1 (Coton sport of Garoua). ^{a}*= difference between T3 and T2;* ^{b}*= difference between T3 and T1;* ^{c}*= difference between T2 and T1. MAS: maximum aerobic speed.*

Table 5: Comparison of velocities, flexibility, vertical jump, and aerobic variables of T3, T2, and T1, according to their playing position

	Teams	GK	CD	ED	MF	FW
10m ES (s)	T3	$1.6±0.1^{a}$	$1.4±0.2^{a}$	1.7±0.1	$1.5±0.2^{a}$	1.6±0.1

	T2	1.7±0.1	1.6±0.2	1.6±0.0[a]	1.6±0.1	1.6±0.1
	T1	1.5±0.0 [c]	1.5±0.0[c]	1.5±0.0 [c]	1.6±0.1	1.5±0.1 [c]
	T3	2.9±0.1[a]	2.9±0.1	2.9±0.1	2.9±0.1	2.8±0.1
20 m EV (s)	T2	3.0±0.1	2.8±0.2[a]	2.9±0.1[a]	2.8±0.1[a]	2.8±0.1
	T1	2.8±0.1 [c]	2.7±0.1 [c]	2.8±0.0 [c]	2.8±0.1	2.8±0.1
	T3	4.2±0.10[a]	4.2±0.2	5.4±0.1	4.1±0.2 [a]	4.1±0.2
30 m SS (s)	T2	4.4±0.3	4.1±0.1[a]	5.4±0.2	4.3±0.1	4.0±0.1[a]
	T1	4.0±0.3 [c]	4.0±0.1 [c]	5.2±0.2 [c]	4.1±0.1[c]	3.9±0.2 [c]
	T3	5.4±0.2[a]	5.5±0.3	5.4±0.1	5.3±0.2 [a]	5.4±0.2
40m AS (s)	T2	5.5±0.3	5.4±0.2[a]	5.4±0.2	5.4±0.1	5.3±0.1[a]
	T1	5.1±0.1 [c]	5.1±0.2 [c]	5.2±0.2 [c]	5.4±0.2	5.2±0.2 [c]
	T3	67.0±12.0[a]	67.6±8.1[a]	71.2± 15.8[a]	65.6±8.2[a]	64.5±7.5[a]
Flexibility (cm)	T2	60.0±5.0	60.2±6.0	54.0±2.6	45.5±8.0	59.8±6.3[c]
	T1	69.7±0.9 [c]	67.1±5.3[c]	61.0±2.7[c]	59.6±3.3[c]	53.7±5.9
	T3	48.4 ±1.5	47.2±3.4	52.5±3.2	47.5±6.1[a]	52.2 ±7.6
Vertical jump (cm)	T2	60.0±5.0[ac]	60.2±2.6[ac]	54.0± 6.0[ac]	45.5±8.0	59.8±6.3[ac]
	T1	59.0±12.7	54.1±6.2	47.5±0.7	50.6 ±6.2 [c]	56.4±5.3
	T3	7790±238	7577±313	7613±221	7451±468[a]	7588±587
Peak power (W)	T2	8345±243[ac]	8441±328[ac]	7911±458[ac]	7297±627	8103±545[ac]
	T1	8308±780	8047±517	7261± 76	7604±396 [c]	7899±275[c]
	T3	1556±125	1442±169	1370 ±87	1356±201[a]	1359±255
Average power (W)	T2	1704±75[ac]	1762±212[ac]	1534±185[ac]	1294±261	1553±236[ac]
	T1	1698±314	1618±235	1235±37	1397±154 [c]	1483±132
MAS	T3	12.3±0.3	13.3±0.2	13.2±0.2	12.8±0.5	12.9±0.3
	T2	12.1±0.2	13.5±0.2	13.0±0.8	12.9± 0.4	13.1±0.3[a]
	T1	15.3±0.6 [c]	16.2±0.8 [c]	16.3±0.7 [c]	16.5±0.7 [c]	16.4±1.1 [c]
VO_2max	T3	48.3±2.1	54.1±1.3	53.8±1.3[a]	51.6±2.8	52.1±1.7
	T2	47.3±1.1	55.4±1.4[a]	52.5±4.6	52.0±2.4[a]	53.4±2.1[a]
	T1	53.8±2.2 [c]	57.1±3.1 [c]	57.1±2.7 [c]	58.0±2.7 [c]	57.6±4.1 [c]

T3 (Aigle Royal of Menoua), T2 (APEJES of Mfou), T1 (Coton sport of Garoua), GK (goalkeepers), CD (central defenders), ED (external defenders), MF (midfielders), FW (fowards), [a]= difference between T3 and T2, and [c]= difference between T2 and T1. ES: explosive start; EV: explosivity vivacity; SS: simple speed; AS: aerobic speed