УДК 796.332

Inoubli M.

ORCID 0000-0002-0019-1232

PhD (State Doctor), Associate Professor,
Institute of Physical Education and Sport, University of Manouba
(Tunis, Tunisia) E-mail moktarmanai@yahoo.fr

Guerova S.

PhD, Associate Professor, High Institute
of youth Animation and Culture of Bir EL bey. University of Tunis
(Tunis, Tunisia) E-mail snej@yahoo.fr

Inoubli L.

Msc – Researcher and PE teacher, Leedsbeckett university
(England, UK) E-mail: l.inoubli@yahoo.fr

Ben Said N.

ORCID 0000-0002-0712-1249
PhD, Associate Professor,
College of Sport Sciences & Physical Activity,
King Saud University
(Riyadh, Saudi Arabia) E-mail: bensaeed@mail.ru

MOTOR ACTIVITIES OF SOCCERS IN MATCH HELD AT DIFFERENT TEMPERATURE CONDITION

Motor activities and some football skills reported to young players during varied heat of the weather are ***subject*** *of actual researches.*

The ***aim*** *of this study is to find out the changes of specific parameter performances during different levels: low (LT):12-16℃ and hot (HT):32-36℃ of temperatures.*

Methodology*: Two young categories playing in Tunisian football championship (their ages were 15-16 years: n= 11, height, 165.7± 1.65 cm, weight, 62.4 ± 2.17 kg, sport stage 7±0.8 years, and 17-18 years: n= 10, height, 169±2.82 cm, weight, 63.7±2.25 kg, stage 9±1.2 years) were observed during the matches (n=8) in (LT) and (n=7) in (HT), using GPS monitor along with their movements with and without the ball. All observed selected players participated in full matches (90 min).*

There were *significant changes in the performances of the studied variables of 15-16 years old in high speed, which decreased from 383 m in (LT) to 285 m in (HT), at p<0.05. The increased speed, decrease from 944 m to 719 m, P<0.05. The Mean of précised passes (n= 13.5 in (LT) to n= 7.4 in (HT), p<0.05, and the Mean of non précised (from n=5.2 to n=10.8). In contrast the low intensity of the course and the course with the ball respectively changed positively (from 2054 m to 2299 m, and from 144 m to 179 m, <0.05). So the performances were better during (HT), The older category provides the same changes of performances either in motor activities and in some technique skills.*

In order of these ***findings*** *we appreciate that exercises provided by the physical coaches should be in intensive form of charge during (LT) and with moderate intensity during the (HT) level similarly for the two categories.*

Key words*: Motor activities, youth soccer, temperatures.*

Introduction. Though heat problem has an effect on the health and on the physical performance of soccer players, it has a great importance from the researchers in the past and the present. So, it still actual in the run of the years. Soccer sport is played on the areas exposed to the heat. The training process and competitions are practiced under different heats, most of them are inappropriate, and may reflect on the athletes to increase pregnancy physical and functional performance. Players can improve low functional efficiency and low level of performance, and they are even subject to thermal injuries.

DOI: 10.5281/zenodo.7424732.

Among these research interests, some are interested on acclimation resulting from training and competition [2–3–19]. Others are included in the care of adjusting the safety aspects during physical performance in the heat [10]. Also some researchers have focused on the study of the physiological changes caused by physical exertion under high temperature such as [1–8–12–14–15–16]. Some other researchers are interested in studying the yield of the physical movements during the games and influenced by warm air, [3–7]. We have found through research that the completion of this effort of the physical condition during the high temperature affects particularly the control device in the body warmly cardiovascular in addition to the respiratory tract. In the case of the performance of the physical effort for a long time distance running, etc.), this would have negatively affect the athletes, when the air temperature rises to 25-27℃. The performance of the physical efforts during short periods, the impact of the heat happens when she turns higher level s 28-30℃ degrees and above. High temperature may lead to severe deficiency of the functionality when exercises are in high intensity. The functionality efficiency of the muscles and even to the inability to continue to develop the sports performance, and the decrease rises a percentage of 15%-20%, [5]. With regard to the effect of temperature on functional status of the football players. When it rises between over 30℃. It may increase the cost of energy and for different skills performed by the players by 15-20%. The maximal oxygen consumption can be also reduced by 5%, and the high running course at the anaerobic threshold of 25%. Many researchers have studied the influence of the temperature on different ages during training and competition. They concluded that there is a need of specific methodology and methods to develop the ability specific to the players during hyperthermia [4]. They also concluded that the energy spent on the completion of physical exertion in hot temperature to be much higher in children than adults [6].

Research methodology. This investigation was conducted during the sports season 2019-2020 with the Tunisian first league on a sample of football players juvenile as a minor category, age 15–16 years (n=11, height 165.7± 1.65 cm, weight 62.4± kg, sport stage 7±0.8 year), and juniors as a major category, 17–18 years (n=10, height 169 ± 2.82 cm, weight 64 ±2.25 kg, sport stage 9±1.2 years). they were registered during the low (LT) n=8 matches, and during the (HT) temperatures n=7 matches for each category. They were the number of matches when the observed players participated from the beginning to the end (90 min). The GPS monitor registered all movements of each player. All subjects included in the study were healthy and voluntary gave their consent for participation.

Search tools. The researchers used the field observation Global Positioning System (GPS) monitor which treat the movements of the corresponding players during the first and the second half of the match. the distances travelled by the players during the game at different speeds in addition to the size and effectiveness of passes with the football players through observed matches for a total of each category, from we it was the follow up in each category through the matches in conditions of relatively (LT) 12–16℃. in addition to the games were held in conditions characterized by (HT) 32–36℃.

Search organize. Researchers identify indicators that should be pursued (sum of the distance traveled by the player at different speeds ranging from running at low course to the highest speed, and the appointment of the players who were selected to determine their movements during the game. The researchers prepared the GPS apparatus which is with high accuracy observe the movements of the players.

Data analysis. All data were expressed as means ± standard-deviation and all analyses were performed using SPSS 18.0 (statistical Package for social sciences, Chicago, IL, USA). The significance level was 0.05. Descriptive statistics were obtained for analyses of the performances of the two categories to explore the differences between the collected data during different temperatures using t-test.

Results and discussions. Through the data presented in the tables 1,2 which include the averages for the sum of the distances covered by the two football categories at varied speed during the matches, we note that the average of these covered distances in (HT), and the increased velocity without ball decreased during the games specifically in the second half, which fits with findings of [17] Performances in the (HT) compared to that was recorded in the matches, that took place in the Temperature relatively lower decreased.

The distances covered by the two categories respectively were in high speed and increased velocity, which decreased gradually during the second half when they play during (HT) 32–36℃, they are from 383±3.9 m to 285± 9.63 m, TS = 37.4 in minor category, and from 499±19.5 to 359±10.8 m, TS=30.7 in juniors respectively), with a significance at $p< 0.05$. As previously stated, peak velocity and physical performance are related during the match play [13], There is also a significant decrease from (944±18.5 m during (LT) to 719±11 m, TS=52.9 and from 1282±20.64 to 830±14.05 m, TS=29.3 respectively).

According to [11, 18], the distances covered by players in high speed during the games are between 10 m and 30 m. In contrast when compared the running movements at low course and the course with the ball, they were significant, and the differences are (2054±33.06 m to 2299±10.90 m, TS=6.4, and from 2434±32.9 to 2820±14.47, TS=26.3 respectively), the course with the ball increases slightly. The sums of the covered distances are respectively (3525 m in (LT), and 3482 m in (HT) in the minor category, while they were 4459 m in (LT) and 4257 m in (HT) with the juniors (17-18 years).

Table 1

Distances covered by the football players during low (LT) and high (HT) temperatures (15-16years)

Temper. °C.	LT (12–16°C)		HT (32–36°C)		Statis. Signif.		
Variables	X_1(m)±SD	SEM	X_2(m)±SD	SEM	X_1–X_2 (m)	P-value	TS
High spe. run.	383±7.9	2.1	285±9.63	2.57	98	0.001	37.4**
Incr. speed	944±18.5	4.93	719±11.46	3.18	225	0.001	52.9**
Low speed	2054±33.0	8.81	2299±10.9	2.90	-45	0.001	-6.4**
Course.With ball	144±13.5	3.6	179±10.5	2.8	-5	0.13	1.33
Total of run	3525		3482				

** *significant at* P<0.05

Table 2

Distances covered by the football players during low (LT) and high (HT) temperatures (17-18 years)

Temper. °C.	LT (12–16°C)		HT (32–36°C)		Statis. Signif.		
Variables	X_1(m)±SD	SEM	X_2(m)±SD	SEM	X_1–X_2 (m)	P-value	TS
High spe. run.	499 ±19.5	5.40	359 ±10.8	3.9	139.8	0.001	30.7**
Incr. speed	1282±20.6	5.7	830±14.05	3.88	350	0.001	29.3**
Low speed	2434±32.9	9.5	2820±14.47	4.17	86.0	0.001	26.3**
Course.With ball	244±8.3	2.39	248±19.06	5.5	-4.0	0.23	1.2
Total of run	4459		4257				

** *significant at* P<0.05

The data presented in Table 3, shows the parameters related to the precisions of the short and long passes over the matches during the changes of the heat. We registered throw the GPS monitor the effective passes executed with accuracy, (PA) and the others without accuracy (NAP). According to these skills performances, we observe some alterations in the cited techniques during (LT) and (HT). The decrease of the accuracy, and the increase of the inaccurate passes probably due to both changes of temperatures and of other factors, which are certainly psychological and physical.

Table 3

Passes made by players 15-16 years during the matches in high (HT) and low (LT) temperatures

Temperature	LT (12–16°C)	HT 32–36°C	Diff	P-value	T-Student
Variables	X_1 (n)	X_2 (n)	X_1–X_2 (n)		
Accurate (AP)	13.5	7.4	6.1	0.0001	3.05**
Inaccurate (NAP)	5.2	10.8	5.6	0.0012	2.9**
Total (n)	18.7	18.2	11.7		

***significant at* p<0.05

Fig. 1, 2, demonstrates the variability of the performances with the changes of the weather temperature. Passes (P) over the games during the changes of the weather heat. The performances provided by (15 – 16 years) were registered throw the GPS monitor the effective passes executed with accuracy (AP) and the others without accuracy (NAP). According to these skill performances, we observe some alterations in the cited techniques during (LT) and (HT). The decrease of the accuracy (n=13.5 p to n=7.4 p, and the increase of the inaccurate (P), from n=5.2 p to n=10.8 p, probably due to both changes of temperatures and of other factors, which are certainly psychological and physical.

Table 3 shows the parameters related to the precisions of the short and long distances.

The data presented in Table 4, shows the parameters of the junior team related to the precisions of the short and long passes (P) over the games during the changes of the heat. The registered performances were related to the effective passes executed with accuracy (AP), and the others without accuracy (NAP).

According to these performances, we observe some alterations in the cited techniques during (LT) and (HT) temperatures. The decrease of the accuracy (AP) (n=11 p) to (n=7 p) and the increase of the inaccurate (NAP), from (n=4 p) to (n=9 p) probably due to both changes of temperatures, and to other factors, which are psychological and physical. as well as the minor category.

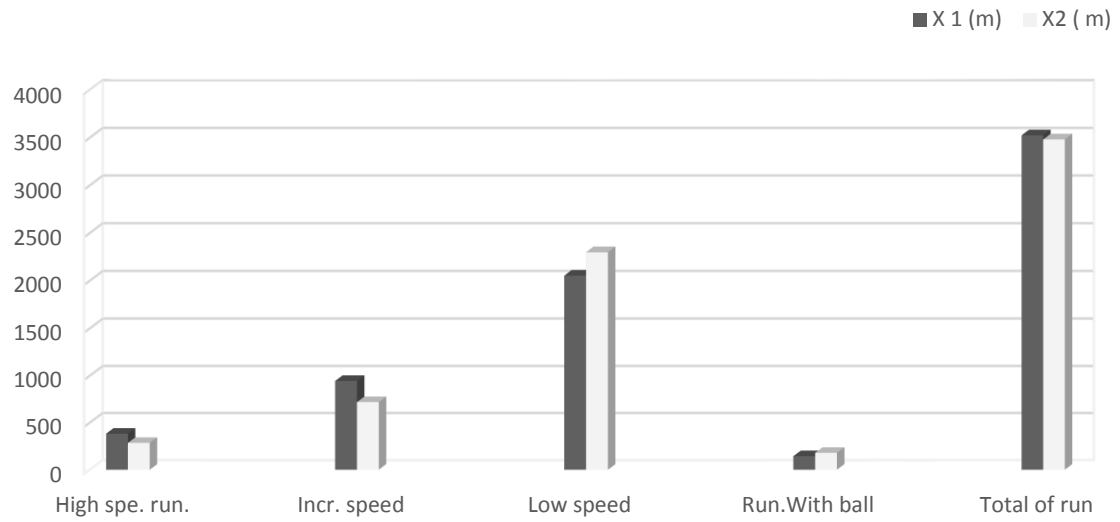

Fig.1. Distances covered by the football players (15-16 years) during low (X_1) and high (X_2) of weather temperature.

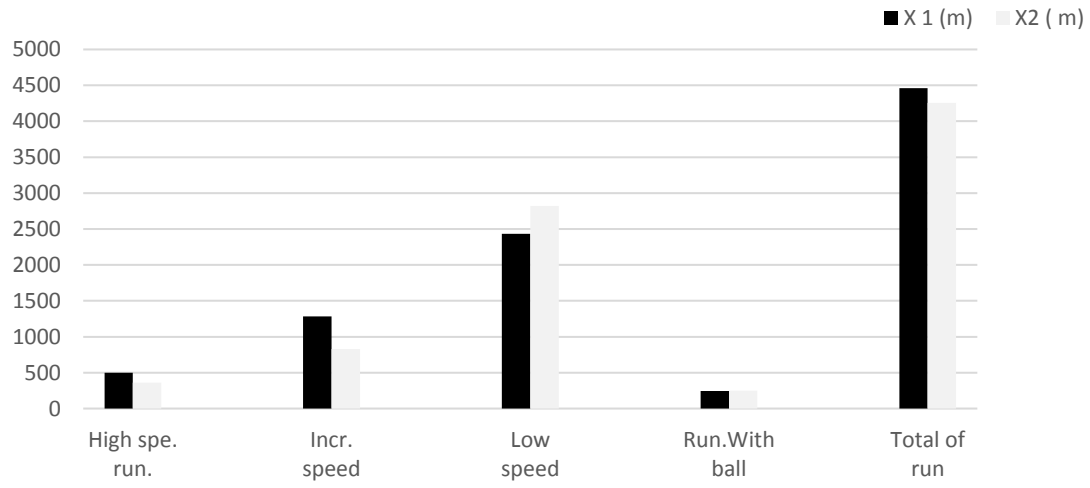

Figure 2. Distances covered by the football players (17-18years) during low (X_1) and high (X_2) of weather temperature.

Table 4

Passes made by players 17-18 years during the matches in high and low temperatures

Temperature	low	High	diff	P-val	T –Student
Variables	x_1 (n)	x_2 (n)	x_1-x_2 (n)		
Accurate (AP)	11	7	4	0.0015	2.21**
Inaccurate(NAP)	4	9	-5	0.0011	2.58**
Total (n)	15	16			

***Significant at* p<0.05

Conclusions. Independently of the normal psychological and physical changes, the young soccer players have some varied performances during match play. Apparently most influences come from the changes of the heat of the weather. The specific changes were seen in high speed running, and in increased velocity of run, both of them decreased in performances during (HT). In contrast, low course and course with the ball increased in performances during hot weather compared to the low, both in minors 15-16 years old, and in juniors 17-18 years old. The fatigue during (HT) weather may have an impact on the technique skills, and the short and long passes decrease in their precisions.

Based on the importance of the physical and the technique skills in football, soccer coaches may adequate their training routine when they have sensitive variations of the weather from (LT) to (HT).

Acknowledgement. The authors acknowledge the technique director and the board of the club for their encouragement to accomplish this study during the season.

References

1. Armgrimsson, S. A. (2003). Relation of heart rate 2% VO2peak during sub-maximal exercise in the heat, J.Appl. Physiol, 82(6) pp. 2028-2035.
2. Babkin, A., & Dubrovsky, V. (2003). Physical adaptation and acclimatization of Sportsman to a hot climate and methods of their correction. *Theory and practice of football*. No3.
3. Ben Said, N., Galamazov, S., & Tsherva, B. (2005). The specific ability of the football players during hot weather: a short program for to its development in the youths through the study of the influenced factors. *Prince Faisal award for the sport scientific researches.*
4. Dang, kuok Bao (1998). Hygienic estimation of training process of young footballers in conditions of hot and moist Climate of Vietnam with using of means of local cooling. Phd dissertation, RGAFK, Moscow.
5. Deren, T. M., Coris, Eric E., Casa, Douglas J., De Martini, Juli K., Bain, Anthny R., Wals, Steve M., & Jay, Ollie. (2014). Maximum heat loss potential is lower in football linemen during NCAA summer training camp due to lower self-generated air flow. *Journal of Str. And Cond. Research:* doi:10.1519/JSC.000000000000427.
6. Hazzaa, H. (1997). Physiology of physical condition at youth and juniors: the physiologic basics and the acclimation for training. Hilal Edition, Riyadh.
7. Inoubli, M., Ben Said, N., Guerova, S., & Gharbi, A. (2013). Effect of training programs under condition of hyperthermia on speed resistance and kick accuracy indexes in football players. *Bulletin of the T.H. Shevchenko National Pedagogical University. The Series: Pedagogic sciences. Physical education and sport.* 2, Vol. 107. Chernihiv. P. 82-85.
8. Jose, G. A. (2000). Stroke volume during exercise: interaction of environment. *Am. J. Physiol. Heart Circ. Physiol.*, 278:H321-330.
9. Luhtanen, P., Belinskij, A., Hayrinen, M., Vattinen, T. (2001). A comparative tournament analysis between Euro 1996 and 2000 in soccer. *Int. Jour. Of Performance Analysis in sport,* 1(1). 74-82.
10. Margo, M., Juan, M.A., Bergeron, M.F., Dvorak, J., Miller, S., Migliorini, S., Gurcharan, Sing D. (2012). Br. J Sports Med. 46 (11):800-804.
11. Michele, R.Di., Di Renzo, A.M., Ammazalorso, S., Merni, F. (2009). Comparison of physiological responses to an incremental running test on treadmill, natural grass, and synthetic turf in young soccer players. *J Str.Cond research.* 23. pp. 939-945.
12. Nielsen, B & Nybo, L. (2003). Celebral changes during exercise in the heat. *Sports Med.* 33: pp. 1-11.
13. Philippaerts, R.M., Vaeyens, R., Janssen, M., Van Renterghhem, B., Matthys, D., Craen, R. (2006). The relationship between peak heigh velocity and physical performance in youth soccer players. *J. Sports Sci.* 24. pp. 221-230.
14. Roy, L.P.G., Jentjen. (2002). Heat stress increases muscle glycogen use but reduces the oxidation of ingested carbohydrates during exercises. *Appl. Physiol.* 92: 1562-1572.
15. Saat, M, (2002). Effects of exercises in the heat on thermoregulation of Japanese and Malaysian. *J. Physiol. Anthropol. appl. human Sci.* 24:267-275.
16. Sigurbjorn, A. (2003). Relation of heart rate percent oxygen peak during sub-maximal exercise in the heat. *Appl. Physiol.* 94:1162-1168.
17. Stroyer, J., Hansen, L., & Klausen, K. (2004). Physiological profile and activity pattern of young soccer players during the match play. *Med. Sci. Sports Exerc.* 36. pp.168-174
18. Valquer, W., Barros, T.L., Sant Anna, M. (1998). High intensity motion pattern analyses of Brazilian elite soccer players. *IV world congress of national analysis of sport FCDEF-up Porto*. p. 80.
19. Wenger, C. B. (2001). Human adaptation to hot environments. In text books of military medicine: Medical aspects of harsh environments (Edited by K.B. Pandolf & R.E. Burr). pp. 55-86.

Іноублі М.

ORCID 0000-0002-0019-1232

Доктор філософії (Державний доктор наук), доцент,
Інститут фізичної культури і спорту, Університет Мануби.
(Туніс, Туніс) E-mail moktarmanai@yahoo.fr

Гуерова С.

Доктор філософії, доцент,
Вищий Інститут молодіжної анімації і культури Бір Ель Бея,
Університет Тунісу
(Туніс, Туніс) E-mail snej@yahoo.fr

Іноублі Л.

Науковий співробітник-дослідник і вчитель фізичної культури,
Університет Лідсбекета
(Англія, Сполучене Королівство) E-mail l.inoubli@yahoo.fr

Бен Саїд Н.

ORCID 0000-0002-0712-1249

Доктор філософії, доцент,
Коледж спортивної науки і фізичної активності,
Університет Короля Сауда
(Ріад, Саудівська Аравія) E-mail bensaeed@mail.ru

РУХОВА АКТИВНІСТЬ ФУТБОЛІСТІВ У МАТЧІ ЗА РІЗНИХ ТЕМПЕРАТУРНИХ УМОВ

Рухова активність і деякі футбольні навички, що виявляються у юних гравців за різних температурних погодних умов, є предметом актуальних досліджень.

***Мета** цього дослідження полягає в тому, щоб з'ясувати зміни конкретних показників параметрів під час температур різних рівнів: низьких (LT): 12-16 ℃ і високих (HT): 32-36 ℃.*

***Методологія:** дві юнацькі категорії, що грають у чемпіонаті Тунісу з футболу (їхній вік 15-16 років: n=11, зріст 165,7±1,65 см, вага 62,4±2,17 кг, спортивний стаж 7±0,8 років і 17-18 років: n=10, зріст 169±2,82 см, вага 63,7±2,25 кг, спортивний стаж 9±1,2 років) спостерігали під час матчів (n=8) у (LT) та (n=7) у (HT), використовуючи GPS-монітор разом з їхніми рухами з м'ячем і без нього. Усі обрані гравці, які спостерігалися, брали участь у повних матчах (90 хв). Були суттєві зміни в показниках досліджуваних змінних у футболістів 15-16 років у високій швидкості, яка знизилася з 383 м (LT) до 285 м (HT), при p<0,05. Збільшення швидкості, зниження від 944 м до 719 м, P<0,05. Середнє значення уточнених проходить (n=13,5 дюймів (LT) до n=7,4 дюймів (HT), p<0,05, а середнє значення неуточнених (від n=5,2 до n=10,8). На противагу низькій інтенсивності дистанція та дистанція з м'ячем відповідно змінилися у позитивну сторону (від 2054 м до 2299 м та від 144 м до 179 м, <0,05). Отже, показники були кращими під час (HT), старша категорія забезпечує ті самі зміни показників у руховій діяльності*

*У зв'язку з цими **висновками** ми розуміємо, що вправи, які виконуються фізичними тренерами, мають бути інтенсивними під час (LT) і з помірною інтенсивністю під час (HT) рівня, аналогічно для двох категорій.*

***Ключові слова:** рухова активність, дитячо-юнацький футбол, температура.*

Стаття надійшла до редакції 12.12.2021 р.

*Рецензент – доктор педагогічних наук, доцент **Г. І. Жа́ра***