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MONITORING OF TRAINING AND COMPETITION LOADS IN WOMEN'S SOCCER: A CASE STUDY

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Abstract. The monitoring of loads is investigated to diagnose the recovery and optimisation of athletes. The aim was to evaluate tools for monitoring training and competition loads to know the states of field players in women's soccer. 23 participants aged 22±3 years from the 1st Catalan Regional Division (Group A) were observed during the 2018-2019 season. The five types of microcycle (ME) were chosen. Microsoft Excel software was used to record the information and determine the external and internal load, injury risk and define recovery and optimisation times and the SPSS program for statistical analysis. The results show an Average Specificity (EM) of a targeted-special character together with a lower Load Balance (LB) in the Maintenance Microcycle (MM): 0.32p; and in the Competitive Microcycle (CM) with physical-technical-tactical balance: 0.86p. Preparatory Microcycle (PM) obtained a Monotony Index (MI) of 6.54p; the Targeted Transformation Microcycle (MTD) of 8.55p and Special Transformation Microcycle (STM) of 5.89p. The highest relative fatigue percentage (%FR) was 85% for MTD and 32% for MC. The highest RPE was for MC = 8.88p; MTD = 8.04p and MTE = 7.02p. Sleep quality and stress were high in the MC and muscle damage and cumulative fatigue in the MP and MTD. Recovery is reflected in all ME after 48h in the CMJ. These calculations are accepted as effective tools to indicate the evolution of load dynamics as long as they can be contextualised.

Keywords: load monitoring, structured training, complexity science, women's soccer.

MONITORIZACIÓN DE LAS CARGAS DE ENTRENAMIENTO Y COMPETICIÓN EN EL FÚTBOL FEMENINO: CASO PRÁCTICO

Resumen. La monitorización de las cargas es investigada para diagnosticar la recuperación y optimización de los deportistas. El objetivo del estudio es evaluar herramientas de monitorización de las cargas de entrenamiento y competición para conocer los estados de las jugadoras de campo en el fútbol femenino. 23 participantes de 22±3 años de la 1ª División Regional Catalana (Grupo A) fueron observadas durante la temporada 2018-2019. Se escogió los cinco tipos de microciclo (ME). Se utilizó el programa de Microsoft Excel para registrar la información y determinar la carga externa e interna, riesgo de lesión y definir los tiempos de recuperación y optimización y el programa SPSS para el análisis estadístico. Los resultados muestran una Especificidad Media (EM) de carácter dirigido-especial junto a un Load Balance (LB) más bajo en el Microciclo de Mantenimiento (MM): 0,32p; y en el Microciclo Competitivo (MC) con equilibrio físico-técnico-táctico: 0,86p. Microciclo Preparatorio (MP) obtuvo un Índice de Monotonía (IM) de 6,54p; el Microciclo de Transformación Dirigido (MTD) de 8,55p y Microciclo de Transformación Especial (MTE) de 5,89p. El porcentaje de fatiga relativa (%FR) más alta fue 85% para el MTD y 32% para el MC. El RPE mayor fue para MC = 8,88p; MTD = 8,04p y MTE = 7,02p. La calidad del sueño y estrés fueron altos en el MC y el daño muscular y fatiga acumulada en los MP y MTD. Se refleja una recuperación en todos los ME tras 48h en el CMJ. Se acepta estos cálculos como herramientas eficaces para indicar la evolución de las dinámicas de la carga siempre y cuando puedan ser contextualizados.

Palabras clave: monitorización de la carga, entrenamiento estructurado, ciencias de la complejidad, fútbol femenino

MONITORING OF TRAINING AND COMPETITION LOADS IN WOMEN'S SOCCER: A CASE STUDY

Abstract. The monitoring of loads is investigated to diagnose the recovery and optimisation of athletes. The aim was to evaluate tools for monitoring training and competition loads to know the states of field players in women's soccer. 23 participants aged 22±3 years from the 1st Catalan Regional Division (Group A) were observed during the 2018-2019 season. The five types of microcycle (ME) were chosen. Microsoft Excel software was used to record the information and determine the external and internal load, injury risk and define recovery and optimisation times and the SPSS program for statistical analysis. The results show an Average Specificity (EM) of a targeted-special character together with a lower Load Balance (LB) in the Maintenance Microcycle (MM): 0.32p; and in the Competitive Microcycle (CM) with physical-technical-tactical balance: 0.86p. Preparatory Microcycle (PM) obtained a Monotony Index (MI) of 6.54p; the Targeted Transformation Microcycle (MTD) of 8.55p and Special Transformation Microcycle (STM) of 5.89p. The highest relative fatigue percentage (%FR) was 85% for MTD and 32% for MC. The highest RPE was for MC = 8.88p; MTD = 8.04p and MTE = 7.02p. Sleep quality and stress were high in the MC and muscle damage and cumulative fatigue in the MP and MTD. Recovery is reflected in all ME after 48h in the CMJ. These calculations are accepted as effective tools to indicate the evolution of load dynamics as long as they can be contextualised.

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Introduction

The planning of any sport discipline has been and is the transcendental focus for coaches and any sport professional. It always seeks to optimize the level of athletes without the presence of possible injuries that interrupt this evolution.

In the case of team sports and, in essence, those that interact in a shared space (DIEC), traditional planning has been designed, long in time, which opened a wide range of issues as its organization and distribution in time distanced considerably from the requirements of much tighter schedules with weekly repeated competitions (Martín et al., 2013; Seirul-lo, 2000, 2002, 2017; Roca, 2008). These schedules based on mechanistic and behaviorist theories prioritized reversible and repeated linear relationships applicable to all athletes, where quantity was the base of the pyramid to subsequently adjust to quality (Seirul-lo, 2017); in this way, the competition was the focus of attention and the athlete took second place.

New planning proposals emerged over the years based on Cartesian views of sciences such as biology and human sciences along with other sciences derived from mathematics, physics, and chemistry as would be the case of the Theory of Dynamic Systems, Systems Theory, Complex Thinking, or Deep Ecology (Arjol, 2012, cited by Martin, 2019; Seirul-lo, 2017). The sample of this is the Structured Training used in this study by Professor Seirul-lo, which exemplified these theories towards DIECs where the "whole" is more than the sum of the parts (stated by the German philosopher Christian von Eherengields) as their inter- and intra-system relationships, must be taken into account (Torrents, 2005).

The monitoring of training loads aims to control these non-linear relationships, coming from chaos theory, in order to classify team members according to their states, reducing the probability of injury, and increasing the time of participation in competition resulting in greater episodes of supercompensation (Impellizzeri et al., 2019, cited by Suarez et al., 2020; Gonzalez, 2020; Gabbett, 2016).

Both injury risk and supercompensation are defined in the Theory of Dynamic Systems as negative or positive feedbacks, respectively. The former refers to the persistence of conditioning factors that prevent change and, conversely, the latter refers to the system adjusting to changes in internal and external conditioning factors (Torrents, 2005). Its measurement is described by Siff and Verchoshansky (2000), cited by Torrents (2005), as the search for sporting excellence as the availability of players is proportional to the success of the team (Suarez et al., 2020). These same authors state a ratio of two injuries per player during the season in professional teams, which can expect a total of 50 injuries in that competitive period. Therefore, proper management of training loads will result in the persistence of players in competition in a balanced way (Gabbett, 2016).

Traditionally it has been interpreted high loads with increased risk of injury, but Gabbett (2016) describes the 'Paradox of injury prevention in training' where those athletes accustomed to training with high doses in loads have less risk of stopping their activity by the appearance of these injuries and vice versa. This is not due, according to their statements, by training per se but by an inadequate program characterized by excessive and rapid changes, and this is reinforced by more recent studies such as that of Suarez et al. The importance of monitoring and control of training and match loads will be convenient to avoid the presence of negative feedbacks and ensure optimization processes. Gabbett (2016) justifies its use up to twice a day and for periods of weeks and months.

To identify these feedback loops, we allude to the measurement of internal load, physiological and psychological organism response, and external load, parameters designed by coaches and physical trainers (González, 2020) under the Preferential Simulation Situations (SSP), that is, tasks created under the theoretical bases of the TSD and similarity to the internal logic of the sport itself, in this case women's soccer, (Camenforte et al., 2021; Pons et al., 2020; Seirul-lo, 2017) as tools for monitoring loads.

Thus, the aim of the study is to evaluate tools for monitoring training and competition loads in order to know the condition of field players in women's soccer.

Method

Participants

The study group was the first women's team of a regional club composed of 23 players, four of whom were eliminated from the study because they were injured throughout the competition. The inclusion criteria consisted of being part of the team from the start date of the preseason and not having suffered a previous injury that caused the loss of soccer practice for more than 4 weeks (Fuller et al., 2006, cited by Suarez et al., 2020). Those players who had an absence equal to or greater than that period were discarded from the study.

The average age was 22±3 years (17-30 years). The league in which the matches were played belonged to the 1st Catalan Regional Division (Group A) during the 2018-2019 season. It is characterized as a heterogeneous team as there are players who come from the 2nd National Women's Division with participation in training sessions of the first teams of the Iberdrola League, First Spanish National Women's League, and others who are starting their soccer careers. This team was characterized as a team with predominance in the technical-tactical structures and, on the contrary, a deficiency in the conditional. The competition and, therefore, the teams that make it up were analyzed and classified in the opposite way to our team: dominance of the conditional before the other structures.

Study design

A descriptive and cross-sectional design and study of the planning of the 2018-2019 season of the women's first team of a Catalan regional club was carried out. The training and competition loads of the 41 existing microcycles with 33 matches played (29 official and 4 friendly) were recorded. Both training sessions and matches were played on artificial turf.

Procedure

The difficulty of the matches was classified by numbering from 1 to 10 in order to frame the type of microcycle with its corresponding characteristics, according to the week in which they were played.

Each week consisted of three training days (Tuesday, Thursday, and Friday) plus a match at the weekend (mainly on Sunday). The spatial layout of the training sessions varied depending on the day as they had to share the sports facilities with other teams. The sessions corresponding to Tuesday half of the 11-a-side soccer field was used, Thursday was carried out in the 7-a-side soccer field, and on Friday the first half of the training was in 4-a-side soccer, and later in the 11-a-side soccer half. All the sessions were started at 21:00 until 22:30, duration of 1 h 30 min of which the first 30' were not available because they were used by other teams.

For the training load analysis, five different type microcycles were chosen (preparatory = MP, targeted transformation = MTD, special transformation = MTE, competitive = MC, and maintenance = MM) and randomized in time throughout the entire 2018-2019 season, in order to illustrate the morphological and contextual varieties of each moment.

The MP located in the first week of the three that correspond to the preseason, intended to follow the proposed indications in which the Concentrated Volume of Specific Load prevails the first days while the Technical-Tactical Volume and Intensity are increasing, reaching their highest levels on Friday (Solé, 2006; Arjol, 2012; Seirul-lo, 2017; Roca, 2008). The preseason gathered three microcycles with friendly competitions. The coaching staff proposed strategies to condition themselves to the needs of a correct dynamic of loads so the training time amounted to 2 h.

The MTD is located in the last week of the post season, where there was a loss of fitness (Bompa, 2003), but at the same time new content was introduced for the following season.

The rest of the microcycles were distributed during the competitive period. In the case of the MTE, week 9, it was focused on a high volume to seek optimization in the next two weeks because the matches were played with the top rivals. This type of microcycle is not frequent in this competitive phase, but it was used as a strategy to counteract the high intensity that was given since the beginning of the preseason. The MM and MC located in the second round, No. 23 and No. 28 respectively. The MC was considered the most important match of the whole season because it depended, to a large extent, the goal of promotion.

As for the subjective internal load, the Wellness Test was used, considered one of the most important monitoring tools by "The UEFA Elite Club Injury Study" as it is considered a reliable, economical, and easy to apply method (McCall et al., 2016; Heidari et al., 2019; and Saw et al., 2015; Barça Innovation Hub Team, 2019), where the quality of sleep, muscle pain, fatigue, and stress are scored from 1 (minimum) to 7 (maximum). All players at breakfast sent a message via mobile device to the technical staff indicating their status in each of the defined parameters. The RPE test was recorded at the end of the sessions with individual annotation.

Statistical analysis

The Microsoft Excel program was used to analyze the data by means of various formulas. The total estimated and performed volume (in minutes), character of the proposed and perceived effort (RPE or CR10 adapted from Foster & Lehmann, 1998; where 0 is recovery and 10 is maximum effort), and total intensity according to the level of specificity that each task entailed were recorded. Specificity levels were scored as follows: general = 0.5-0.65; directed = 0.66-0.75; special = 0.76-0.85; competitive = 0.86-0.99, and divided = 1.

The calculation of the workload measured in Solé Load Units (2002) and Average Specificity (AS) was carried out based on the total sum of the Specificity Index of each task divided by the number of tasks performed in that session. As a result, other indirect parameters were estimated to give conjecture to what was established in accordance with reality: Monotony Index (MI), Load balance (LB), and Relative fatigue measured in percentage (%RF).

MI (equation 1) is an indicator of the daily variability of training that is closely related to the onset and appearance of symptoms of overtraining (Foster, & Lehmann, 1998).

$$\text{Monotony Index (MI)} = \frac{\text{Average weekly load}}{\text{Standard deviation}} \qquad \text{(Eq. 1)}$$

Secondly, the LB of the ME, the result of the division between external load (mean of the total volume of the ME by the mean of the CR10) and internal load (mean of the total volume of the ME by the mean of the level of specificity of the ME), identifies the predominance of the type of stress that the microcycle generates on the players (physical or technical-tactical stress). On the other hand, the %RF indirectly tested the level of fatigue of the players during the designed microcycle. It was determined following equation 2.

$$\text{RF (\%)} = \frac{\text{Weekly load x Monotony index}}{\text{Maximum load of the season}} \text{ x } 100 \qquad \text{(Eq. 2)}$$

The execution of the countermovement jump (CMJ) was also performed before and after the session (30' after finishing), and after 48 h in order to observe the recovery capacity of the athlete for being a predictor at a neuromuscular level (Jiménez et al., 2018 & De Hoyo et al., 2016). The MyJump2® APP was used as a monitoring method. The total mean (sum of the parts and standard deviation) was calculated for the subjective internal load.

With this data, we sought to identify the correlation between the theoretical and the experienced in order to execute the relevant modifications that would guide the established objective. It should be clarified that the results section will only show the data record after the conclusion of the training sessions.

The effect of the different work methods was studied by analysis of variance (ANOVA) followed by separation of measures using the Turkey method when necessary. Previously, it was checked that the hypotheses of normality and homoscedasticity of the data were fulfilled. This analysis was carried out using SPSS 6.0 (SPSS, Inc., Chicago, USA).

Results

The data analysis did not identify (Figure 1) an increase in AS per training day in relation to intensity. The level of specificity was similar during the week with the exception of the match day, Sundays, with the maximum demands. A tendency towards the prevalence of targeted and special tasks was detected, as no significant differences were found.

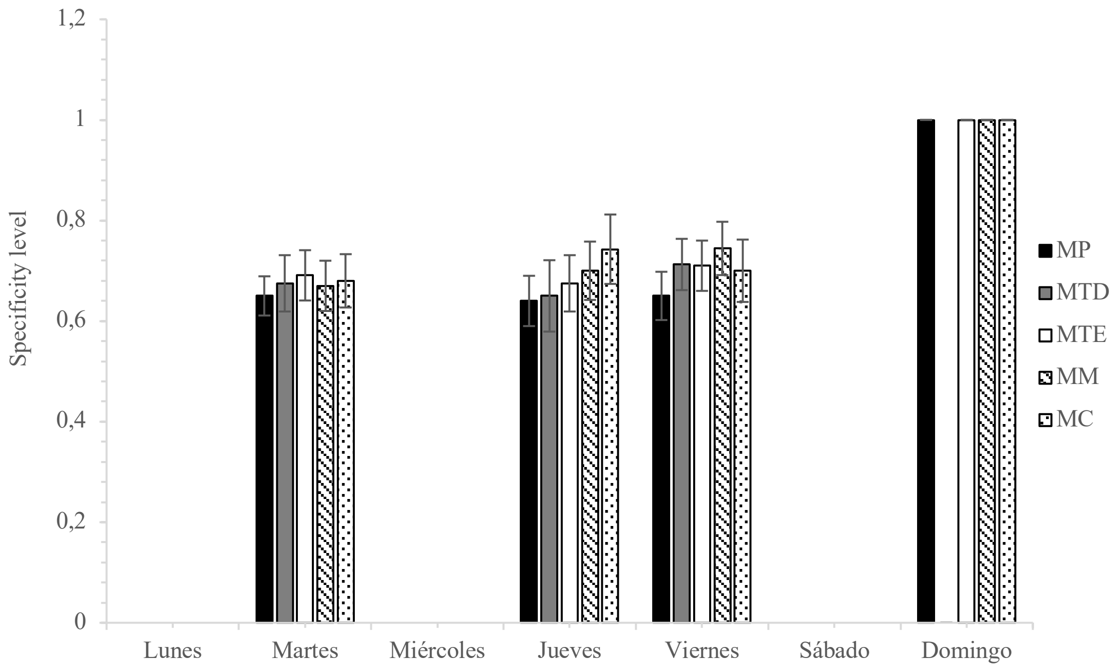

Figure 1. Mean Specificity (mean ± SEM) per day and microcycle.

Note: Average Specificity (AS), Preparatory Microcycle 1(MP), Directed Transformation Microcycle (MTD), Special Transformation Microcycle (MTE), Maintenance Microcycle (MM), and Competition Microcycle (MC).

The MI identified (Figure 2) a clear tendency to reduce the risk of overtraining symptoms appearing during the competition period and in the most relevant microcycles, as was the case of the MC. On the contrary, at the end of the post-season, this index was exponentially increased; a fact that happened in the MTD.

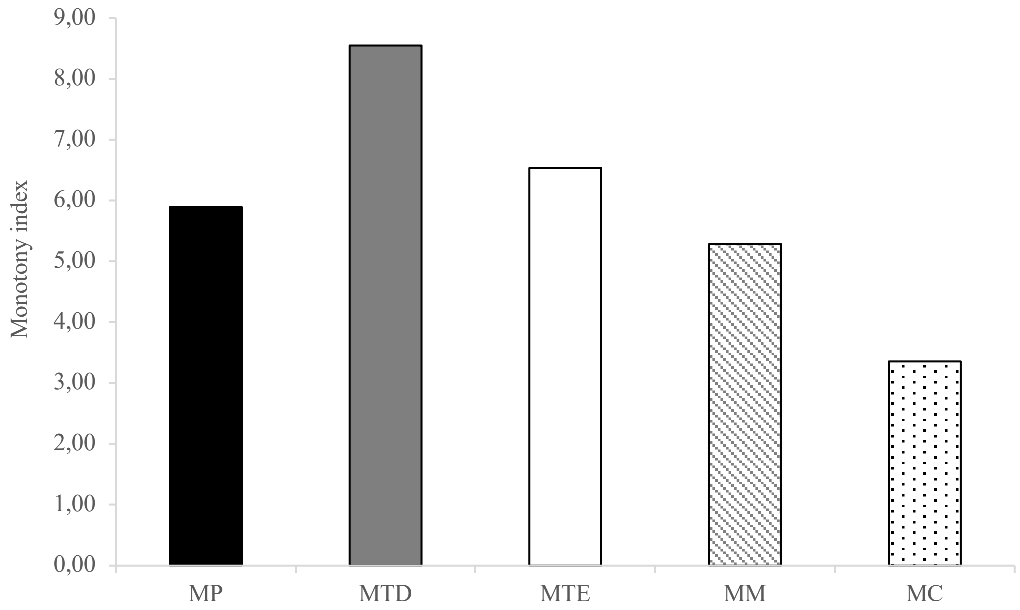

Figure 2. Monotony Index (MI) of each microcycle.

Note: MP = Preparatory Microcycle; MTD = Directed Transformation Microcycle; MTE = Special Transformation Microcycle; MM = Maintenance Microcycle; MC = Competition Microcycle.

The LB (Figure 3) presented the type of stress that the designed and executed tasks caused on the players, where all the microcycles were around the balance between physical and technical-tactical stress but with a greater inclination towards the physical component, especially in the MM with a score of 0.32 and, on the contrary, the MC with a more balanced scale towards these two types of elements.

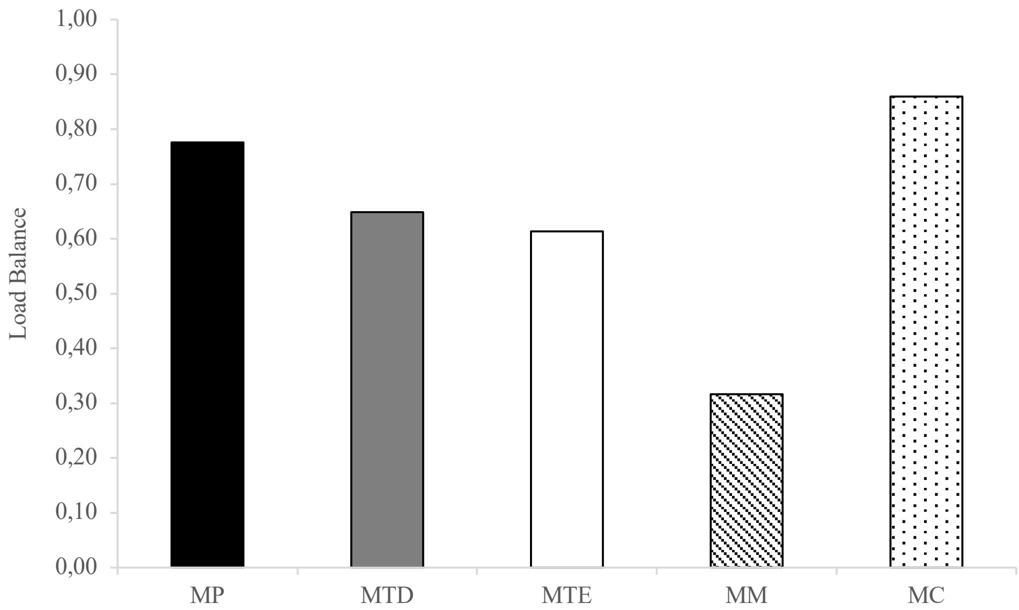

Figure 3. Weekly Load Balance (LB) in each microcycle.

Note: MP = Preparatory Microcycle; MTD = Directed Transformation Microcycle; MTE = Special Transformation Microcycle; MM = Maintenance Microcycle; MC = Competition Microcycle.

The %RF (Figure 4) marked the probability of fatigue of the players before the designed microcycle showing a clear propensity to decrease before the weeks located in the season and more demanding, facilitating a predisposition on behalf of the players. As an example is the MC of 32% score. The MTD acquires a higher percentage, 85%, because it is located in the last week of the post season in which a playful-competitive component of high specificity with transfer to the next season was acquired.

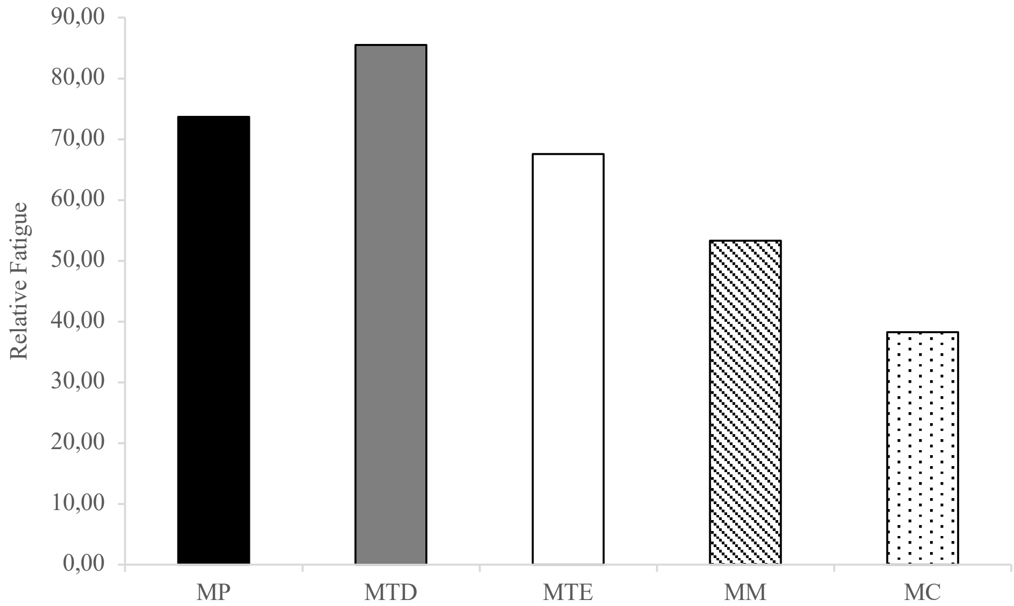

Figure 4. Percentage of relative fatigue (%RF) of each microcycle.

Note: PM = Preparatory Microcycle; MTD = Directed Transformation Microcycle; MTE = Special Transformation Microcycle; MM = Maintenance Microcycle; MC = Competition Microcycle.

The results found by means of the CMJ jump test (table 1) indicated changes in the performance of the players. In addition, no recovery is seen after 48 h in all microcycles.

Table 1

Mean and Standard Error of the mean (SEM) of the countermovement jump (CMJ) in centimeters of each selected microcycle before and after, and after 48 h of the training session and match.

	CMJ (cm)				
	MP	MTD	MTE	MM	MC
Before	20,67 (±0.46) b A	24,48 (±0.57) b B	24,66 (±0.56) b B	25,63 (±0.61) b B	25,98 (±0.56) b B
After 30'	18,56 (±0.46) to A	19,65 (±0.57) to A	22,98 (±0.56) to B	23,08 (±0.61) to B	23,35 (±0.56) to B
After 48 h	18,39 (±0.46) to A	18,86 (±0.57) to A	22,02 (±0.56) to B	22,19 (±0.61) to B	22,81 (±0.56) to B

Note: PM = Preparatory Microcycle; MTD = Directed Transformation Microcycle; MTE = Special Transformation Microcycle; MM = Maintenance Microcycle; MC = Competition Microcycle.
^{z} different lowercase letters indicate significant differences (P<0.05) according to Tukey's test by columns; different uppercase letters indicate significant differences (P<0.05) according to Tukey's test by rows.

In the subjective internal load of the players (table 2), two microcycles stand out above the others that are the MTD, CR10 of 8.04 points, for its spatial location previously mentioned carrying the accumulated fatigue of the whole season, and MC for being the most relevant of the whole competitive period, 8.88 points on the Borg scale.

Table 2

Mean and Standard Error of the Mean (SEM) of the internal load of the players in the Wellness Test (1-7p) and in the Borg Effort Perception Test (CR10; 0-10p).

	Wellness Test				RPE or CR10
	Sleep quality	Perceived muscle damage	Fatigue level	Amount of stress	
MP	1,03 (±0,02) a	6,01 (±0,07) c	5,88 (±0,07) d	2,16 (±0,08) a	6,69 (±0,18) a
MTD	3,04 (±0,07) c	6,86 (±0,03) d	6,15 (±0,06) d	5,24 (±0,09) c	8,04 (±0,14) b
MTE	2,54 (±0,06) b	5,87 (±0,07) c	2,89 (±0,09) a	3,45 (±0,1) b	7,02 (±0,13) a
MM	2,68 (±0,06) b	4,39 (±0,09) b	5,47 (±0,09) c	3,15(±0,08) b	6,94 (±0,11) a
MC	6,78 (±0,03) d	4,46 (±0,1) a	3,85 (±0,1) b	6,94 (±0,02) d	8,88 (±0,07) c

Note: MP = Preparatory Microcycle; MTD = Directed Transformation Microcycle; MTE = Special Transformation Microcycle; MM = Maintenance Microcycle; MC = Competition Microcycle.
^{z} different lowercase letters indicate significant differences (P<0.05) according to Tukey's test by columns.

Discussion

The aim of this study was to evaluate tools for monitoring training and competition loads in order to know the condition of field players in women's soccer.

The tests exposed for both external load (MI, AS, %RF), internal load (CMJ, Wellness Test, CR10), and their relationship (LB) have been selected for their capacity for adaptability and continuous modification to the ME because as indicated by Seirul-lo (2000, 2002, 2017) should not be periodized more than three microcycles followed by the large number of factors involved during the process, and this is reinforced by other authors such as Arjol (2012), which are based on the theories of the sciences of complexity. However, there are other types of tests and technologies that detail more precisely the demands of the players as would be the GPS that are so fashionable nowadays (Martín, 2019).

The results of the research indicate an AS with predominance in the tasks of spatial-directed character as no significant differences were found (P>0.05), so that the most dominant element after analyzing the competition is the conditional by all teams, where the repeated sprints and sprinting bouts have a great participation. Studies such as those of Datson et al. (2017), Castellano et al. (2011), and Gabbett et al. (2008), thus reinforce them. In addition, Haro & Cerón (2019) mentioning different authors and their studies on women's soccer enhance the importance of promoting this ability and, specifically, strength and speed, both argued also in men's soccer. Alcazar (2021) proposes training through complex training as an alternative to promote neuromuscular optimization by the post-activation potentiation effect and so is argued by other scientists in their research (Ebben, 1998; Carter & Greenwood, 2014; Freitas et al., 2017). The increase of this type of neuromuscular work in soccer that has been occurring in recent years exalts the importance of a good control of the training loads elaborated because its deficit is accompanied by a rise in the rate of injury risk (Nassis et al., 2019). Gabbett et al. (2008), propose, in turn, reduced games as effective methods of performance optimization, and this is supported by other more recent works such as Fradua et al. (2013), and Márquez & Suárez (2014). The calculation of the indexes exposed in the various figures will be a continuous and moving alternative to reduce this risk of injury (Clemente et al., 2021), and so it is reflected in the LB where conditional stress tends to predominate agreeing with the above; so the intentions in the periodization of training by the technical staff resemble reality.

In the research by Márquez & Suárez (2014), they analyze a semi-professional player who competes in the Spanish Second National League under the Sevilla FC SAD using a GPS device. Both the characteristics of the player and the training and matches are similar to the observational team (18 years old, 3 sessions/week plus match). They state an increase in intensity at the end of the week caused by intensive tasks with a high number of sprints but dissipating from the demands of the match. Furthermore, they state that the external load on Friday does manifest stimuli close to those of competition. This correlates with the description of the type of task to be developed by the EE (Seirul-lo, 2017; Camenforte et al., 2021). In our case, this rise is not appreciated, a fact that makes them dissipate even more of the demands of the match and, therefore, a correct dynamic of training loads according to the specificity of the tasks has not been managed.

The MP gave similar results to the other microcycles as the total training volume was 2 h, and the effective time was quite close to this amount. This was used as a tool to try to get the responses of the adaptive process characteristic of the preseason since it was formed by a block of three weeks with important competitions. This fact correlates with the arguments of Calleja et al. (2020), on the increase of important competitions in the pre-season periods that are tighter and with a "need to win" character as they enhance. Following their expositions when citing Folgado et al. (2014) and Rabelo et al. (2016), they claim that competing with high level teams makes the demands of time-movement also be raised causing a pressure to players and technical staff to accelerate the conditioning processes by skipping steps and increasing the atypical training loads in this period. Consequently, to such factors, there will be an accentuation on the injury rate as observed in MI, where a prolongation and abrupt change of intense loads can lead to symptoms of overtraining (Foster & Lehmann, 1998; Gabbett, 2016). However, high and constant loads at the beginning of the new season will be necessary to create the relevant adaptations and set the basis for the course of the season (Arjol, 2012), so that the technical staff must be very aware of these oscillations (feedback loops that, according to the theoretical bases of the sciences of complexity, will be in a continuous process of exchange network between the system and the environment, Torrents, 2005).

As the ME acquired a more competitive nature with tasks of a high level of specificity, the MI decreased avoiding such risks as the work times: rest times were favorable to the latter (Seirul-lo, 2017). These rests were almost null in the MTD as it was located in the last week of the post season manifesting a playful-competitive nature with focus on the following season knowing that the holiday period was starting and so it is demonstrated in the %RF in which there is a higher score in said ME. However, during the competitive period, this percentage was decreasing, reaching its lowest value in the MC because the objective was the optimization of the players before the most demanding matches and, therefore, the adjuvant tasks, recovery methods, rest times, etc., were the scenarios that allowed to achieve these results (Seirul-lo, 2017).

Following the %RF exposures, the players showed an RPE in the MTD of 8.04p due to the accumulated load both in that ME and the whole competition season. The MC had an average of 8.88p being the highest figure extracted due to the external factors that characterized it. The MP obtained the lowest rating as the load imposed should be the basis for the oscillations of the load dynamics of the competitive phase (Seirul-lo, 2000, 2002, 2017). As a consequence of the increase of volume in relation to intensity, the MTE reached an average of 7.02p. Thanks to the contributions of Foster & Lehmann (1998), this data can be linked to the heart rate of the athletes and this is corroborated by studies such as that of Halson, (2014) and a large number of professionals from different sports disciplines.

It is worth noting the arguments of Ponce et al. (2021), which in their test denoted how depending on the design and orientation of the tasks, these could cause more fatigue and mental load on the players. In addition, the motivation factor also played an important role. In both cases, a modification in the RPE was detected, and this is supported by other studies cited by them. Camenforte et al. (2021) present a glossary in which they interrelate the SSP together with the level of specificity and the internal logic of soccer as tools for their evaluation, influencing the theoretical parameters on which this study and Structured Training are based.

Technicians at Liverpool John Moores University (Thorpe et al., 2015, 2016 and 2017; Barça Innovation Hub Team, 2019) have observed that Wellness Test results are more sensitive to fluctuations in daily training loads compared to other more objective tools such as those with submaximal heart rate detection, recovery, and variability, and that perceived fatigue is closely linked to total distance run at high intensity. The quality of sleep and the amount of stress are higher in the MTD and MC, the former because of their location and accumulation of fatigue for the whole period, and the latter because of the environmental factors that precede it, even though there are significant differences ($P<0.05$) between them. The highest values of muscle damage and fatigue level are in the MP characterized by sessions of large volumes and located in the first ME and the MTD for what has already been expressed. Significant differences ($P<0.05$) are found in muscle damage between these two ME but not in the level of fatigue. A dissonance is manifested in the MTE because the perceived muscle damage amounts to 5.87p over 7p in comparison to the rest of the values with a low score, and with a CR10 also high, 7.02p, which here the focus of attention should prevail and observe the weeks that precede it to reveal possible risks of injury because the MI is also high in comparison to the other ME. On the other hand, the MM has a correct dynamic.

The method used to interrelate the arguments presented so far is the LB by means of the internal and external load of the week. There is a clear trend towards physical dominance across the MEs. Malone et al. (2016) suggest in their pioneering research in reporting associations between measures of weekly training loads alongside injury risk in elite soccer that the ratio of acute chronic load should be between 1-1.25 in both the pre-season and seasonal period and so is reinforced by various Rugby league studies, 0.85-1.35, cited by these same authors. Only the MC would resemble these values, 0.86p. However, it is important to note that these are calculated using the external and internal load and not on the chronic acute, but it may be a predictor of the risk associated with a predominance downward in the results during the passage of weeks. These same authors claim a lower risk when training loads are similar or with a progressive increase compared to peak loads, and Gabbett (2016) also corroborates this. In addition, the greatest dangers are found during the preseason but that in turn will be diminished if in this period a base of intermittent aerobic capacity is favored that should be enhanced in the previous postseason or vacation time.

To conclude, Datson et al. (2017) suggest that the proportion of explosive sprinting is higher in women's soccer than in men's soccer and also that these occur between 5 m and 10 m corresponding to 76-95% respectively. In agreement with this, Alcazar (2021) suggests that the large increase in neuromuscular component tasks is not being properly monitored and therefore causing injuries. Based on studies such as De Hoyo et al. (2016) & Jimenez et al. (2018), the Bosco CMJ jump test was proposed as a marker of recovery after session and match reflecting accumulated fatigue and muscle damage. All the results after 48 h are similar to the data after the end of the training sessions and matches alluding to the biological processes of recovery although no significant differences are found (P>0.05). It is important to point out that comparing the different heights there is a great variability between ME and it is due to the learning and improvement of the CMJ by the players. This can be seen in the row "before" where the significant difference is classified in two distinguishing the pre-season and in-season MEs. However, according to the temporal location of the ME, both in the MTD and MTE, the values are lower due to the accumulation of fatigue as it has been exposed.

Conclusions

The present study aimed to evaluate tools for monitoring training and competition loads in order to know the condition of field players in women's soccer.

It is affirmed that this type of calculation is a good indicator of the evolution of the training load and predictor of a good or not recovery and optimization of the performance of each of the players as long as it can be contextualized by other variables and investigations that give conjecture and consistency to the calculated values (Ponce et al., 2021; Buchheit, 2017 mentioned by Suarez et al., 2020) because in certain microcycles the acute loads presented are quite unusual; it would be the case of the MP, MTD, and MTE, where the risk of injury is increased.

A limitation of this study and the development of future research is to assess the chronic load and its relationship with the acute load throughout this period to detect possible exposures to unforeseen load peaks; in addition to weekly changes that identify sudden changes in its trend (Gabbett, 2016; Clemente et al., 2021). Currently, the use of

GPS is providing high quality information in the process of individualization of the SSP that allows the creation of a Dynamic Competitive Profile (Chena, 2021; Martín, 2019), but this technology is not available for all teams due to its economic cost.

When comparing training loads versus competition loads, the latter are always higher than the former, so we must make a reflection as coaches, physical trainers, and sports professionals in general to identify what are the mistakes we make for such an unbalanced balance.

Another reflection arises when we focus on the theoretical bases of the sciences of complexity in which this study and all those mentioned above are adjusted, as these state the constant intra and interrelationship that the dynamic system, athlete, suffers before what it is exposed to, variables and qualitative fluctuations that we intend to understand and determine under quantitative parameters. Possibly we are falling into the same mistake that was made when planning DIEC with individual sports. We need new research focuses.

Likewise, no comparative studies similar to this one have been found in the male gender.

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