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Original Article

ANALYSIS OF TECHNICAL-TACTICAL TRAINING TASKS OF U-16 FEMALE HANDBALL TEAMS

ANÁLISE DAS TAREFAS DE TREINAMENTO TÉCNICO-TÁTICO DE EQUIPES DE HANDEBOL FEMININO SUB-16

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ABSTRACT
The aim of the study was to analyze the technical-tactical training tasks of U-16 female handball teams. In this descriptive, quantitative and observational study, two coaches and 27 athletes from the cadet (U-16) category of two women's handball teams from the state of Santa Catarina (Brazil) were investigated. The data were collected through systematic and indirect observation (filming) of 36 training sessions, transcribed and analyzed from the Integral System for the Analysis of Training (SIATE). The data treatment was based on descriptive (frequency) and inferential statistics (hierarchical-multilevel modeling), using SPSS 23.0 software and program R. In the 336 tasks analyzed, it was observed that the sessions prioritized games and competition as means of training and tactical-technical conduct as the content type. The coaches used an undulatory model in the structuring of the tasks in the investigated microcycles, both teams prioritizing the use of training situations similar to the requirements of official handball matches.
Keywords: Tasks of training. Handball. Female sports.

RESUMO
O objetivo do estudo foi analisar as tarefas de treinamento técnico-tático de equipes femininas de handebol sub-16. Neste estudo descritivo, quantitativo e observacional, dois treinadores e 27 atletas da categoria cadete (U-16) de duas equipes de handebol feminino do estado de Santa Catarina (Brasil) foram investigados. Os dados foram coletados por meio de observação sistemática e indireta (filmagem) de 36 sessões de treinamento, transcritas e analisadas no Sistema Integral de Análise de Treinamento (SIATE). O tratamento dos dados foi baseado em estatística descritiva (frequência) e inferencial (modelagem hierárquica em vários níveis), utilizando o software SPSS 23.0 e o programa R. Nas 336 tarefas analisadas, observou-se que as sessões priorizaram jogos e competição como forma de treinamento e conduta tático-técnica como o tipo de conteúdo. Os treinadores usaram um modelo ondulador na estruturação das tarefas nos microciclos investigados, ambas as equipes priorizando o uso de situações de treinamento semelhantes às exigências das partidas oficiais de handebol
Palavras-chave: Tarefas de Treinamento. Handebol. Esporte feminino.

Introduction

In the field of Sports Pedagogy, the constitutive elements of the planning and structuring process of the technical-tactical training sessions help in the understanding of important aspects for the evolution of the pedagogical practice of the various sports. The structure of sports training sessions comprises an embracing and creative process, in which the coach sets performance targets and seeks to understand more clearly the paths that his team needs to follow[1]. The analysis of this process, based on the recognition of pedagogical and organizational variables that guide the construction of the training sessions and that directly influence the process of sports training, becomes fundamental to understand this broad and complex scenario.

The process of sports training involves different characteristics that can make the team recognized by a game model and a defined tactical pattern. Among them, the organization, structuring, and distribution of the contents have gained prominence in the training analysis scenario, since the correctly planned activities provide different levels in the competitive performance of the athletes[2]. The pedagogical variables are characterized by investigating the

all training process for the situations and actions that may occur during a game, while the organizational variables allow controlling certain situations related to the organizational context of the sessions and tasks[3].

In general, sports training should provide techinical-tactical situations in which athletes can learn and develop the necessary skills of each sport[4], using more dynamic teaching methods and appropriate to the reality of the athletes, thus enabling an individual and collective tactical development. These characteristics become fundamental in the training process since they can directly influence the team's decision making and performance[5].

Another aspect that influences satisfactorily is the organization and planning of the sports season through the macro, meso, and microcycles. In this specific study, it was decided to analyze the training tasks from the microcycles (weeks of training), this allowed for the number of weeks that the team developed the training during the year to be documented[3]. The microcycles are justified by the configuration of the training in which the organizations are planned and structured and the course of the training actions, by the sequential identification of the tasks of the sessions and by being easily adaptable from the circumstances of the moment the tasks are performed. Thus, microcycles can be defined by characterizing the intense or reduced actions and the order of application of training contents and methods[6].

In the literature consulted, several studies have investigated the structuring of sports training, both in the Brazilian context in sports such as futsal[7-8], volleyball[9-10], grass hockey[11] and handball[12], as well as in the international scenario in volleyball sports[13] and basketball[4, 14,15,16,17]. In general, the initial studies on this subject verified that the technical-tactical training was developed, primarily, through analytical exercises (traditional teaching approaches), which fragmented technical-tactical skills and offered little approximation with sports practice difficult to learn the game by athletes. On the other side, investigations conducted in the last five years have revealed that the tasks of sports training have been based on more active methods, based on the strengthening of the decision-making capacity from the experience of games. With regard to handball, specifically, the results elucidated a shorter amount of time for tactical actions with athletes and a high amount of time in tasks that involved greater technical specificity, which disconnects from various aspects of the sport.

Despite the growing number of publications on the structuring of sports training, there is still a certain gap in research on this theme in handball in Brazilian reality[12]. In the sporting scene, handball is characterized as a very dynamic and intense team sport and its practice environment provides a number of embarrassing situations for athletes, who need to make fast and effective decisions to succeed in the matches. In this sense, the structuring of the teaching-learning-training process of this sports should integrate the physical, technical, tactical and emotional components, as well as emphasize decision making (knowing what to do), motor behavior (being able to perform) and emotional control (being confident to perform) so that athletes are able to act appropriately in different situations that occur in the game[18].

Thus, in recognizing the importance of structuring the tasks of technical-tactical training for the successful sports development of handball athletes, the present study aims to analyze the technical-tactical training tasks of U-16 female handball teams, considering the temporal distribution, by training microcycle, pedagogical variables type of content and means of training.

Methods

This study is characterized as descriptive, quantitative and observational[19], which described and categorized the tasks performed during handball training sessions. In addition to providing the analysis and codification of the main events and the temporal record of the

analyzed facts, observational studies are particularly indicated for the contextualized interpretation of sports activities, as they are faced with real situations of practice[20].

Participants

Two coaches and 27 athletes from the cadet category (U-16) of two women's handball teams from the state of Santa Catarina (Brazil) were investigated and, at the time of data collection, were preparing for the main competition in the state for athletes until 16 years. The selection of these teams occurred in an intentional way because they have achieved significant results in recent years in this competition (2014, 2015 and 2016), with one team being three-time champion (team A) and another runner-up in two opportunities (team B).

Procedures

Initially, personal contact was made with the representatives of the teams for the presentation of the research and the request for authorization for its realization. Subsequently, the study was approved by the Human Research Ethics Committee of the State University of Santa Catarina (order 1,617,786 /2016 – CAAE 56995916.0.0000.0118). The coaches and parents or guardians signed the Informed Consent Term, while the athletes signed the Term of Assent.

Information collection took place between July and December 2016, through systematic observation (filming) of a typical training week (microcycle) of each team in each month, totaling 36 training sessions (18 of each team), being five microcycles of team A and six microcycles of team B. Because team B trained only three times a week (average of 4h30min per week), a microcycle was filmed more than training in relation to team A, which trained four times a week (mean of 8:10 a week).

Instruments

For the analysis and transcription of the training tasks, the Integral System for the Analysis of the Traineeship Tasks - SIATE [3] was used. SIATE is a broad and complete system for analyzing the development of tasks in training sessions, enabling the collection of information in eight different categories: contextual data; coach data; session data; pedagogical variables; organizational variables; external load variables; internal and physiological load variables; and kinematic variables[3], thus highlighting the composition of the task and observing its dynamics

In the present study, the following variables and categories were analyzed:

- Session data: microcycle (characterized by training sessions that are developed within a week);
- Pedagogical variables: type of content - technical-tactical gestures (technical game actions) and tactical-technical conduct (tactical game actions); means of training - exercises (comprise a task of a technical-tactical nature, which aims to work a specific game action during the training process), games (comprise a tactical task, as it simulates the environment that the formal game provides) and competition (aiming to simulate the environment and championship games);
- Organizational variable: training time (athletes' effective motor practice time).

Data analysis

A total of 65 training hours were analyzed, with 41h of team A and 24h of team B, of which 57 hours were used (34h of team A and 23h of team B, according to duration and frequency of the technical-tactical tasks developed by the teams) of the technical-tactical training sessions along the investigated microcycles, totaling 336 tasks (205 of team A and 131 of team B). The statistical treatment of the data of the observations was based on the use of

resources of descriptive statistics (relative frequency, mean and standard deviation) and inferential (hierarchical/multilevel modeling), with the aid of software SPSS 23.0 and R [21]. The level of significance adopted in the inferential analyzes was 5%.

Data were converted from minutes (standard SIATE measure) into percentages to enable the use of the relative frequency. In the analysis of the time averages were adopted a hierarchical/multilevel approach, since it allows flexibility in the consideration of data with hierarchical structures, it allows to consider and to model different covariances, as well as to consider the variability in different levels. In particular, hierarchical/multilevel modeling allows for more precise estimates when repeated measures are involved and when homogeneity of variance is not established, as was verified at the initial inspection[22]. In addition, hierarchical/multilevel modeling presents as an alternative to the limitations widely recognized in the literature of traditional approaches, considering a single level of variation, based on estimates by the least squares method[23, 24].

Regarding the averages, the data distribution of each variable was inspected, initially, through the analysis of 'mustache charts'. To examine the differences over time (variation by microcycle) in the useful task time, separately for the training means (exercises coded as 0; games coded as 1; competition coded as 2), types of content (technical-tactical gestures) coded as 0; tactical-technical conducts coded as 1) and game phases (attack coded as 0, defense coded as 1; mixed coded as 2), the intercept, slope coefficient for time (microcycle) and coefficients to control variation by team (team A coded 0; team B coded 1). Additionally, terms of interaction between microcycle and team were explored to test the variation by team over the microcycles, on average, the interaction term between microcycle and, separately, means of training, types of content and game stage; and terms of interaction between the team and, separately, means of training, types of content and stage of the game. The validation of hierarchical / multilevel models was carried out through the analysis of a residual graph versus predicted values for each model. The models were obtained using the maximum restricted likelihood method, using the 'nlme' package, in the statistical language R.

Results

Figure 1 shows the temporal distribution (relative frequencies) of the content-type variable during the technical-tactical training microcycles employed by the A and B team coaches. The data revealed that team A allocated more training time for the tasks tactical-technical conduct than for technical-tactical gestures, especially in microcycles 1 (76.80%) and 4 (72.37%). On the other hand, the coach provided a ripple of the type of content developed in the training sessions, since the technical-tactical gestures were more worked on the last microcycle observed (64.99%). The results of team B showed that most of the training time was devoted to the tactical-technical conducts, with emphasis on the last microcycle (79.07%), which preceded the target competition of the year. However, it can be seen that in microcycle 4 there was a ripple of the type of content prioritized by the coach since technical-tactical gestures (67.85%) were more worked in this period.

Figure 1. Time distribution (relative frequencies) of the training sessions of the teams in the microcycles, considering the type of content

Note: M = Microcycles
Source: The Authors

Table 1 shows the temporal distribution of the type of content developed by the coaches along the technical-tactical training microcycles. Team A presented the highest mean in microcycle 5 (46.68) for technical-tactical gestures, while tactical- technical conducts are highlighted in microcycle 1 (81.13). Team B revealed the highest average working time in technical-tactical gestures on microcycle 4 (37.90), while tactical-technical conducts were highlighted in microcycle 1 (38.97).

Table 1. Time distribution (means and standard deviations in minutes) of the training sessions of the teams in the microcycles, considering the type of content

Team	Type of Content	M1	M2	M3	M4	M5	M6
A	Gestures	24.51 (19.24)	32.73 (16.43)	26.00 (14.21)	19.57 (25.69)	46.68 (27.14)	
	Conducts	81.13* (12.52)	57.20* (28.64)	58.53 (27.00)	51.25 (26.56)	30.00 (37.35)	
B	Gestures	19.46 (14.37)	21.17 (4.89)	25.22 (19.24)	37.90 (35.10)	30.11 (7.93)	14.70 (19.53)
	Conducts	38.97 (13.40)	35.62 (15.27)	13.10 (18.36)	17.96 (25.40)	32.46 (28.58)	16.69 (25.52)

Note: *Significant difference (p = 0.03)
Source: The Authors

From the multilevel analysis, we identified statistically significant differences between the averages of the content of the tactical-technical conducts. Specifically, the statistical difference (p=0.03*) is found because the training time of this variable decreases during the microcycles of team A, while it remains constant in the microcycles of team B.

The temporal distribution (relative frequencies) of the variable training means, during the microcycles of teams A and B (Figure 2), presents an undulatory profile. Specifically, it is observed that in team A, the main focus of microcycle 1 is competition (62.71%), games are prioritized in intermediate microcycles (M2 - 52.50%, M4 - 50.05%) and exercises are emphasized in the microcycle 5 (65.49%). In the training of team B, it is identified that the exercises were prioritized (M1, M3, M4, M5), with microcycle 4 being highlighted (86.66%), while games were more worked on microcycle 2 (52.54%), and competition on microcycle 6 (63.08%).

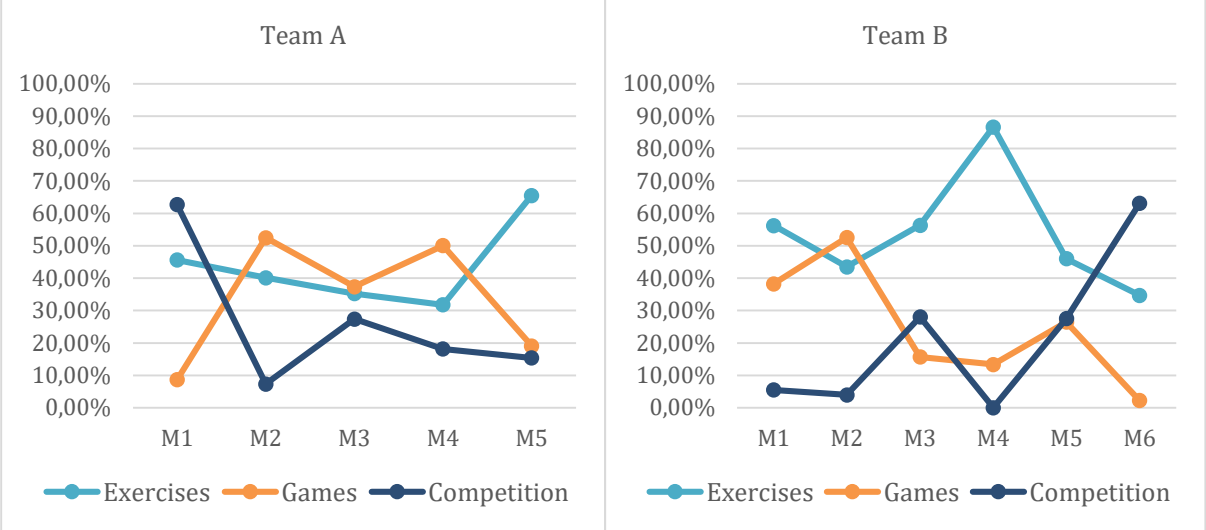

Figure 2. Time distribution (relative frequencies) of the training sessions of the teams in the microcycles, considering the means of training

Note: M = Microcycles
Source: The Authors

Table 2. Time distribution (means and standard deviations in minutes) of the training sessions of the teams in the microcycles, considering the means of training

Team	Means	M1	M2	M3	M4	M5	M6
A	Exercises	32.52 (17.58)	38.38 (16.49)	31.57 (15.88)	23.88 (29.01)	56.94 (37.53)	
	Games	9.86 (7.64)	50.40 (24.53)	36.71 (21.48)	37.60 (14.43)	16.62 (28.78)	
	Competition	71.27 (19.66)	7.03 (12.17)	24.54 (24.36)	13.64 (12.25)	13.38 (11.74)	
B	Exercises	39.65 (7.04)	29.47 (4.46)	30.71 (15.97)	54.94 (12.62)	33.06 (8.00)	26.46 (22.57)
	Games	26.96 (21.09)	35.62 (15.27)	9.72 (13.47)	8.46 (11.96)	19.01 (8.93)	1.70 (3.40)
	Competition	3.87 (5.48)	2.70 (4.68)	17.37 (22.99)	0.00 (0.00)	19.79 (10.66)	48.12 (34.47)

Note: M = Microcycles
Source: he Authors

Although the coaches differed in the emphasis placed on the means along each microcycle, the multilevel analysis did not reveal statistically significant differences in the means of training, either in the profile of the microcycles of each team or in the comparison between the profiles of the teams.

Discussion

The present study looked to better understand the process of training female teams in the U-16 team, based on the temporal distribution of the pedagogical variables, which help define the type of content and the means of training in this category of training. The investigation of the structuring of tasks revealed important evidence about the process since the temporal distribution of the type of content revealed that the teams prioritized the tactical-technical conducts. This prioritization shows that both coaches sought to develop training in an

active way, based on situations that resemble the characteristics of an official match. In addition, this training profile can contribute positively to competitive performance, since the two teams are successful in the sporting scenario in which they are located.

These findings differed from those found in futsal[7], volleyball[10], basketball[25] and handball[12]. These investigations, which used the SIATE variables and the evaluation form developed by Stefanello, found that the majority of the training was focused on the development of skills and technical components, namely the acquisition and fixation of motor responses to be employed in the game. Specifically, the study with categories of training in Parana handball [12] showed smaller amounts of training time for the development of tactical knowledge and decision making of athletes, which resulted in low levels of tactical ability in situations that were presented.

However, the findings of the present investigation had similarities with those reported in the studies involving the futsal training categories[2,26,] of volleyball[9,27], basketball[15,17,28,29] and soccer[30]. These researchers found that sports training predominantly focused on the development of tactical skills (tactical-technical conducts), provides athletes with similar situations to those encountered in the formal game. This profile of structuring training sessions, based on the offering of problem situations, in conjunction with the coach's procedures and information, requires the improvement of the athlete's decision-making capacity (individual and collective). In addition, the search for motor responses potentiates the development of the reflexive action of the athletes in the reading of the game, allowing the elaboration of intelligent and adequate answers to each case[8]. In the specific context of handball, Greco[31] emphasizes that in game situations, athletes interact with their environment all the time and because the situations that occur in the modality have high variability and unpredictability, players are required to behave tactically to act appropriately in each specific situation. This, handball training needs to take into account these characteristics and provide athletes with the conditions to deal with such constraints in an autonomous way, also increasing the level of understanding of the complexity of the game[32].

In the researches in volleyball training categories[33], grass hockey[11] and basketball[4,25] progressive evolutions were identified in the tasks proposed by the coaches, since at the beginning of the training process the analytical and fragmented work was prioritized and later the emphasis was on tactical contents. Such progressions involved exercises generally without the direct opposition of an opponent or with facilitated oppositions, which do not cause constraints at the similar intensity of an official match. In this sense, the exercises are more indicated to stimulate the improvement of the team's individual technique.

Regarding the temporal distribution means of training, it was found that both teams did not follow a fixed linear pattern along the investigated microcycles. While team A showed ripple pattern with more emphasis during the games, team B had its undulatory pattern based on exercises. The coach of team A most often used basic forms of play (functional units) to construct the team's game model, and on the other hand, team B commander employed more basic forms of exercises for technical-tactical improvement of the players. Although these findings indicate the use of different teaching-learning-training approaches by the investigated coaches, the evidence also indicates the concern of both coaches to develop the training from more active methodologies (especially competitions and games).

The predominance of game use as a means of training was found in some studies conducted in the Brazilian reality[2,8,9,26,27,28,] and other countries[15,17,29], in different teams sports modalities. In fact, games are considered to be pedagogical procedures that have great potential to problematize the technical-tactical training environment, since the logic and complexity that surround them allow a broad and multidimensional (technical, tactical, emotional) formation of the athletes[30,34,35]. In this perspective, Scaglia, Reverdito and Galatti[34] emphasize that the

training can be structured from the logic of game so that the learning is linked with the understanding of the principles of the game.

The ripple presented by the teams investigated in the present study also evidenced the use of competition as a means of training, which is characterized by encouraging athletes to experience situations of confrontation with opponents involving the competitive stress found in a formal game[36]. Investigations[2,4,16,37] corroborate in part with these findings, since the coaches investigated by them applied, for most of the training time, the competitive situations. In addition, the authors indicated that coaches are concerned about the psychological training of their athletes so that they are able to compete against other adversaries and face the adversities caused by them.

In the final microcycles, which preceded the target competition of the investigated teams, the coaches differed in relation to the means of training employed. In team A, the coach reduced the amount of games and competition in order to perform exercises aimed at improving the technical capacity of the athletes. The coach of Team B, on the other hand, developed an opposite strategy, gradually reducing the time spent for exercises and games and increasing the situations of competition, which gave the athletes more specific experiences and that the championship could present.

Although not the subject of the present study, the type of technical-tactical training offered may have competitive implications, since team A became the three-time winner of the competition in 2016, while team B ranked sixth. Thus, it is identified the need to investigate with greater depth the potentialities and difficulties faced by teams of training of handball, whether in the achievement of the training and competitive targets or considering the different models of technical-tactical training adopted.

The limitations found for the development of the research refer especially to the impossibility to follow a complete training season of the investigated teams and consequently the reduced amount of data obtained for analysis. We also highlight that we did not consider, in our analysis, the presence or absence of menarche and the biological age (somatic maturation), which can impact the athletes' development and performance.

Conclusions

The evidence found regarding the temporal distribution of the pedagogical variables in the analyzed sessions emphasized the games and the competition as a means of training and the tactical-technical conducts like a type of content. In addition to using a ripple model in the structuring of the tasks in the microcycles investigated, the coaches of the female teams prioritized the use of training situations similar to the requirements of the formal handball game.

The data found in the present study allow the analysis of the training process of female handball teams from a category that aims at sports training, providing information that can help coaches in understanding the specific demands developed in the training sessions, as well as contribute to the construction of a training process that can be characterized as an alternative to overcome traditional means. In the same way, it can collaborate around the thematic of the analysis of the sports training process, considering that this one is characterized as one of the focuses in ascension in the investigation context of sports pedagogy.

In order to to broaden the understanding of the teaching-learning-training process in the handball formation categories, it is recommended that future investigations contemplate a complete sports season, which would allow to analyze all phases of the training and identify the level of association of the methodologies used with the attainment of the formative and competitive targets. It is also suggested that the knowledge of the coaches about the structuring of the training process be investigated, allowing the comparison and the confrontation of their discourses with the data from the observations.

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