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Laterality training in the technical and offensive fundamentals of U-12 soccer players. Theoretical validation

El entrenamiento de la lateralidad en los fundamentos técnicos-ofensivos de futbolistas sub-12. Validación teórica

Treinamento de lateralidade nos fundamentos técnicos e ofensivos dos jogadores de futebol sub-12. Validação teórica

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ABSTRACT

Laterality is considered as the functional domain of one side in the body over the other to carry out specific activities. In sport laterality is systematically enhanced, since the improvement of all body parts infers competitive advantages of high technical-tactical value. The objective of this research is to theoretically validate, through national and international experts, a proposal of laterality indicators to be taken into account in the training of the technical-offensive foundations of U-12 soccer players, evidencing the importance of each indicators in each group of independent experts. This is a theoretical-descriptive research of correlational order and qualitative analysis, intentionally selected 10 national experts (Ecuador) and 10 international experts (Spain and Italy) for the quantitative and qualitative determination of indicators that evaluate laterality. There are significant differences in indicator Visual Laterality (p = 0.000), Shoulder Laterality (p = 0.000), Waist Laterality (p = 0.000), Static Leg (p = 0.000), Director Foot (p =

0.043) and Non-director Foot (p = 0.000), while in the Dynamic Leg indicator there were no significant differences (p = 1.000) between independent groups. International experts comprehensively assess all the laterality indicators studied, providing a higher total score. Consequently, the need to carry out methodological work in national experts in order to improve understanding of laterality training importance in all its manifestations is evident.

Keywords: Soccer; Laterality; Theoretical validation.

RESUMEN

La lateralidad se considera como el dominio funcional de un lado del cuerpo sobre el otro para la realización de actividades específicas. En el deporte, la lateralidad es potenciada de forma sistemática, dado que el perfeccionamiento de todas las partes del cuerpo infiere ventajas competitivas de alto valor técnico-táctico. El objetivo de esta investigación es validar teóricamente a través de expertos nacionales e internacionales una propuesta de indicadores de lateralidad a tener en cuenta en el entrenamiento de los fundamentos técnico-ofensivos de futbolistas sub-12, evidenciando la importancia que brinda cada indicador en cada grupo de expertos independientes. Esta Investigación es de tipo teórico-descriptiva, de orden correlacional y análisis cualitativo, seleccionado intencionalmente a diez expertos nacionales (Ecuador) e internacionales (España e Italia) para la determinación cuantitativa y cualitativa de indicadores que evalúan la lateralidad. Como parte de los resultados se evidencian diferencias significativas en el indicador lateralidad visual (p=0.000), lateralidad de hombros (p=0.000), lateralidad de cintura (p=0.000), pierna estática (p=0.000), pie director (p=0.043) y pie no director (p=0.000), mientras que en el indicador de pierna dinámica no se presentaron diferencias significativas (p=1.000) entre grupos independientes. los expertos internacionales valoran integralmente todos los indicadores de lateralidad estudiados, brindando un mayor puntaje en total. Por consiguiente, se evidencia la necesidad de realizar un trabajo metodológico en los expertos nacionales en función de mejorar la comprensión sobre la importancia del entrenamiento de la lateralidad en todas sus manifestaciones.

Palabras clave: Fútbol; Lateralidad; Validación teórica.

RESUMO

A lateralidade é considerada como o domínio funcional de um lado do corpo sobre o outro para o desempenho de atividades específicas. No desporto, a lateralidade é sistematicamente melhorada, uma vez que a melhoria de todas as partes do corpo infere vantagens competitivas de elevado valor técnico-táctico. O objetivo desta investigação é validar teoricamente através de peritos nacionais e internacionais uma proposta de indicadores de lateralidade a ter em conta na formação dos fundamentos técnicos e ofensivos dos jogadores de futebol sub-12, mostrando a importância de cada indicador em cada grupo de peritos independentes. Esta investigação é de tipo teórico-descritivo, de ordem correlacional e análise qualitativa, selecionou intencionalmente dez peritos nacionais (Equador) e internacionais (Espanha e Itália) para a determinação quantitativa e qualitativa de indicadores que avaliam a lateralidade. Como parte dos resultados, são evidenciadas diferenças significativas no indicador visual de lateralidade (p=0,000), lateralidade do ombro (p=0,000), lateralidade da cintura (p=0,000), perna estática

(p=0,000), pé direcionador (p=0,043) e pé não direcionador (p=0,043). 000), enquanto que no indicador dinâmico das pernas não houve diferenças significativas (p=1.000) entre grupos independentes. Os peritos internacionais valorizam integralmente todos os indicadores de lateralidade estudados, fornecendo uma pontuação mais elevada no total. Por conseguinte, é evidente a necessidade de realizar um trabalho metodológico nos peritos nacionais, a fim de melhorar a compreensão da importância da formação em lateralidade em todas as suas manifestações.

Palavras-chave: Futebol; Lateralidade; Validação teórica.

INTRODUCTION

Sports training is an organized and previously planned process that can be malleable in relation to what the competition demands, it must be taken into account that the process must be governed under various principles of training, among which stand out the individualization, specialization and specificity (Calero., 2018) since in soccer the training of a goalkeeper can never be the same as that of a striker. All training in sport has as one of the main objectives to develop the conditioning and determining physical abilities, (López Revelo & Cuaspa Burgos, 2018) as well as the acquisition or learning of specific and essential sport skills that in relation to the level of learning will allow the achievement of the motor achievements proposed.

For Zeeb (2012) technical preparation is the "level, degree or capacity to correctly control the ball in any game situation. According to this definition, it is assumed that during technical preparation the development of skills that are decisive during official competition is sought; that is, the purpose is to ensure that the player effectively executes the different technical fundamentals according to the situation in which he/she finds him/herself (Bernal-Reyes, Cabezón, González, Romero-Pérez, & Gavotto-Nogales, 2018). Today soccer demands athletes with excellent physical and technical-tactical performance, for which various training strategies are drawn by determining directions in order to meet the objectives set during the competition (Torres, Coca, Morales, García, & Cevallos, 2015; Sánchez, Aguilar, Alava, & Cruz, 2018) However, when an athlete lacks one or more of these elements the achievement of the goals is hindered, which is why the correct development of the technical fundamentals at early ages is of vital importance for the soccer player.

Offensive technical fundamentals in soccer are all the motor actions that if executed correctly lead to 3ite results in 3iterat competitions. Among the most relevant physical abilities to train in soccer players from early ages is coordination and its variants (Rojas, Natali, López Montalvo, Vallejo Rojas, & Chávez Cevallos, 2019; Rommers, *et al.,* 2019; Morales & González, 2015). Coordination is a determinant capacity trained in all sports including soccer, in addition it is directly linked to the rational and harmonious execution of the technical fundamentals according to sport.

If we analyze a soccer match, either during training or in the competitive stage, it could be determined that the offensive technical fundamentals are of utmost importance, as evidenced in the international 3iteratura, (Sarmento, *et al.,* 2020; Carbo, Vélez, Cañizares, & Echeverría, 2019), since the offensive fundamentals allow achieving the main objective of soccer which is to score in the opponent's goal.

One of the main drawbacks that players present during their training is the preference to use the dominant foot and exclude the non-dominant foot, added to the conformism of some coaches not to train both hemispheres. In this sense, Mayolas, Villarroya and Reverter, (2011) describe that "The laterality of the upper limb is mostly right-handed in the population." This statement helps to determine that there is a greater number of right-handed than left-handed population; therefore, we will have more cases where the non-dominant leg to be used is the left as dictated by the various tactical situations in soccer.

In soccer, it has been seen that youth athletes when executing offensive technical fundamentals (passing, driving or shooting at goal) that when using the dominant leg their reaction capacity is faster than when using the non-dominant leg, this is due to an inadequate adaptation in training, since it is attempted to bring the child/adolescent closer to the adult game, thus preventing the player from drawing his own line of play adapted to his needs. Given the above, it is extremely useful to train laterality in most sports, including soccer, (de la Osa, Córdova, Concepción, Madrigal, & André, 2018; González, Córdova, Madrigal, & Pérez, 2019; Pietsch & Jansen, 2018; Granero-Gil, *et al.*, 2020; Petro & Szabo, 2016) given that it allows enriching the technical-tactical game according to the situations presented in training and competition.

However, a preliminary diagnosis shows that during the soccer matches of the U-12 category studied, there are deficiencies in the execution of the technical and offensive fundamentals with the less dominant leg, and it can also be observed that the national coaches in general do not apply adequate processes during the teaching of the athlete's technique, an aspect that must be solved in order to improve the coordination component as a determining aspect of sporting performance.

In this sense, and as a preliminary step to a group of technical-offensive actions applied later in the praxis as a model of sports training, it has been traced preliminarily and as a purpose of the research to validate theoretically through national and international experts a proposal of indicators of laterality to take into account in the training of technical-offensive fundamentals of U-12 soccer players, showing the importance given by each indicator in each group of independent experts.

MATERIAL AND METHODS

A theoretical-descriptive research of correlational order and qualitative analysis was carried out, intentionally selecting ten national (Ecuador) and international (Spain and Italy) experts according to the academic classification of experts for the quantitative and qualitative determination of the indicators that evaluate a research variable (laterality). In order to consider the experts, their direct experience in the branch of knowledge (ten years) and the national results in initiation soccer (medals) were taken into account.

The theoretical indicators evaluated in both independent groups are as follows:

1. Visual laterality (LV in Spanish): since there are two lateral hemispheres, it includes the potential of training the right and left eye.

2. Shoulder laterality (LH in Spanish): of supposed importance for marking, feints and integral movement from the technical-tactical point of view.

3. Waist laterality (LC in Spanish): includes the direction of rotation of the waist, the preferential being the most complete and balanced.

4. Dynamic leg (Pdi in Spanish): fundamental leg to perform the technical movements of reception, control and placement of the ball.

5. Static leg (PE in Spanish): non-fundamental leg to perform the technical movements of reception, control and placement of the ball.

6. Directing foot (PD in Spanish): the foot with which the ball is preferentially struck.

7. Non-directional foot (PnD in Spanish): the foot with which the ball is not the preferred foot to strike the ball.

All the indicators set out above have a training purpose by priority for athletes of U-12 category (Sport Initiation), the experts will include for their evaluation 5 items of Likert-type scaling, assigning each evaluation a numerical and qualitative value respectively. These items are described below:

- 1 point: bad.
- 2 points: fair.
- 3 points: good.
- 4 points: very good.
- 5 points: excellent.

To correlatively compare the results in the two independent groups of experts, the Mann-Whitney U test ($p \leq 0.05$) will be used since there is no normal distribution in the data.

RESULTS AND DISCUSSION

Table 1 shows the ratings made by the two independent groups consulted. There is evidence of a lower average score by the national experts in various indicators related to the laterality required by the soccer players. For the case of the indicator "Visual laterality" the national experts made a rating of three points on average, while the rating made by the international experts was higher (five points), indicating that the visual field has priority as part of the laterality training in soccer players in countries such as Spain and Italy, as demonstrated by Sánchez Escudero (2019), an aspect that implies increases in the rate of performance accuracy in players with greater visual training (Table 1).

Table 1. - Evaluations by group of experts for each theoretical indicator

No	National experts							International experts						
	LV	LH	LC	Pdi	PE	PD	PnD	LV	LH	LC	Pdi	PE	PD	PnD
1	2	2	2	5	3	5	2	4	3	4	5	5	5	4
2	3	2	3	5	4	4	2	4	3	4	5	5	5	4
3	2	2	2	5	2	5	3	5	4	4	5	5	5	5
4	2	2	2	5	3	4	2	5	4	3	5	5	5	5
5	2	2	2	5	4	5	2	5	3	4	5	5	5	4
6	2	2	2	5	4	4	2	4	3	5	5	5	5	4
7	3	2	3	5	3	3	2	5	4	5	5	4	4	5
8	2	2	2	5	3	4	2	5	4	3	5	5	4	4
9	4	2	3	5	4	4	2	5	5	4	5	5	5	5
10	3	3	2	5	3	3	1	5	4	5	5	4	5	5
☐	**3**	**2**	**2**	**5**	**3**	**4**	**2**	**5**	**4**	**4**	**5**	**5**	**5**	**5**

For the case of shoulder laterality, national experts rated its importance for training at two points on average, while international experts gave an average rating of 4 points to this indicator. The laterality of the shoulder in the soccer player is an aspect valued in some works consulted, such is the case of González, Córdova, Madrigal, & Pérez (2019), where the evaluation of the sense of rotation as an indicator of performance in soccer players is evident.

In waist laterality training for U-12 soccer players, national experts rated it with two points as average, while international experts gave it an average rating of four points, an indicator considered in the international literature to measure the integral laterality of the soccer player (González, Córdova, Madrigal, & Pérez, 2019).

On the other hand, for the case of dynamic leg training, the national experts considered of high importance in U-12 categories, by rating such indicator with 5 points as average, just like the international experts (five points as average). However, in the case of the static leg, the national experts gave it a medium importance (average rating of three points), while the international experts gave a rating to the training of the non-dextrous leg of five points on average. The literature evidences the transcendental importance of lower limb training in soccer from early ages, (Bernal-Reyes, Cabezón, González, Romero-Pérez, & Gavotto-Nogales, 2018; Carbo, Vélez, Cañizares, & Echeverría, 2019; Rojas, Natali, López Montalvo, Vallejo Rojas, & Chávez Cevallos, 2019) including aspects directly related to laterality training according to Mayolas (2011). Such training must possess in itself an integrality from the technical-tactical point of view, given that the effect on the dominance of the legs on the ability to change direction with or without ball is vital in the sporting success of the soccer player, as evidenced by Rouissi, *et al.*, (2016). In this sense, the training of the non-right-handed lower limb is usually a priority from an early age, an aspect that external evaluators consider to be of relevant importance.

In the case of the directing foot, the national experts gave it an average qualitative qualification of very good (four points), while the qualification of the international experts reached a qualification of excellent with an average of five points. In the case of the non-director foot, the national experts gave it an average qualification of two points (regular) in the priority for the training of initiation soccer players, while the international experts gave the indicator a priority of five points (excellent) on average. In this sense, it is evident the usefulness at least theoretically that the international experts give to ball striking with both feet, surpassing the qualifications made by the national experts, justified decisions given that the evaluations of performance in the technique of ball striking with the foot in soccer are performed in both members, right-handed and non-right-handed (Zambrano, José, & Merchan, 2019; Carbo, Vélez, Cañizares, & Echeverría, 2019).

Table 2. - Correlations established with the Mann-Whitney U test

Ranges				
	Groups LV	N	Average range	Sum of ranges
Data LV	LV. national experts	10	5,65	56,50
	LV. international experts	10	15,35	153,50
	Total	20		
Data LH	LV. national experts	10	5,70	57,00
	LV. international experts	10	15,30	153,00
	Total	20		
Data LC	LV. national experts	10	5,80	58,00
	LV. international experts	10	15,20	152,00
	Total	20		
Data Pdi	LV. national experts	10	10,50	105,00
	LV. international experts	10	10,50	105,00
	Total	20		
Data PE	LV. national experts	10	5,90	59,00
	LV. international experts	10	15,10	151,00
	Total	20		
Data PD	LV. national experts	10	7,80	78,00
	LV. international experts	10	13,20	132,00
	Total	20		
Data PnD	LV. national experts	10	5,50	55,00
	LV. international experts	10	15,50	155,00
	Total	20		

Table 3. - Test statistics[a]

	Data LV	Data LH	Data LC	Data Pdi	Data PE	Data PD	Data PnD
Mann-Whitney U	1,500	2,000	3,000	50,000	4,000	23,000	,000
Wilcoxon's W	56,500	57,000	58,000	105,000	59,000	78,000	55,000
Z	-3,820	-3,869	-3,694	,000	-3,675	-2,294	-3,969
Asymptotic sig. (bilateral)	,000	,000	,000	1,000	,000	,022	,000
Exact significance [2*(one-sided sig.)].	,000[b]	,000[b]	,000[b]	1,000[b]	,000[b]	,043[b]	,000[b]

Caption: [a]Grouping variable: LV groups, [b]Not corrected for ties.

Table 2 shows the correlations performed for the two independent groups, where the Mann-Whitney U Test shows significant differences in the LV indicator (p=0.000), the LH indicator (p=0.000), the LC indicator (p=0.000), the PE indicator (p=0.000), the PD indicator (p=0.043) and the PnD indicator (p=0.000), while in the Dynamic Leg indicator (Pdi) there were no significant differences (p=0.000) when comparing the theoretical evaluations performed by each expert in the two independent groups. 000), while in the Dynamic Leg indicator (Pdi) there were no significant differences (p=1.000) when comparing the theoretical evaluations performed by each expert in the two independent groups, both presenting an identical average range (10.50) (Table 2 and Table 3).

Once diagnosed theoretically through internal and external experts, it is recommended in a second phase of the research to implement a training strategy of all the laterality indicators evidenced in the present research from the practical point of view, designing a specialized content of the athlete's preparation for a certain time, and evaluated the scopes and limitations achieved through various performance assessment tests in the different indicators of laterality studied, for which the literature evidences some control actions, as provided in González, Córdova, Madrigal, & Pérez (2019).

CONCLUSSIONS

Conclusively, it is confirmed that the international experts comprehensively assess all the laterality indicators studied, providing a higher total score than the national experts. Therefore, it is evident the need to carry out a methodological work in the national experts in order to improve the understanding of the importance of laterality training in all its manifestations. On the other hand, it is recommended to design a specialized training plan that covers the needs of the laterality component in U-12 level soccer players, as a continuation of the present research.

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Authors' contribution:
Cristian Andreé Chicaiza Jácome: Conception of the idea, literature search and review, instrument making, instrument application, compilation of information resulting from the instruments applied, satistic análisis, preparation of tables, graphs and images, database preparation, general advice on the topic addressed, drafting of the original (first version), review and final version of the article, article correction, authorship coordinator, translation of terms or information obtained, review of the application of the applied bibliographic standard.