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Original

SEIS SEMANAS DE ENTRENAMIENTO INTEGRADO DE HABILIDADES MOTRICES Y TOMA DE DECISIONES DESARROLLAN LAS COMPETENCIAS MOTRICES ESPECIFICAS DEL MINIBALONMANO.

SIX WEEKS OF INTEGRATED MOTOR SKILLS AND DECISION-MAKING TRAINING DEVELOPS SPECIFICS MINIHANDBALL'S MOTOR COMPETENCIES.

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RESUMEN

El propósito de este estudio fue el describir los efectos de la ejecución de un método de entrenamiento integrado enfocado al desarrollo de las habilidades motrices específicas del minibalonmano y el proceso de toma de decisiones en niños y niñas. 32 infantes (17 niños y 15 niñas) de entre 10 y 11 años de edad, todos participantes en una clase recreativa de minibalonmano fueron sometidos a un método de entrenamiento compuesto por 4 fases, planeado y propuesto en un estudio previo. Los datos recopilados fueron analizados estadísticamente utilizando un ANOVA de mediciones repetitivas con corrección de análisis post.hoc por Bonferroni. Mejoras significativas en los valores promedio de las acciones exitosas (SA) fueron evidenciadas desde la fase 1 a la fase 4 (<0.005). En la fase 1 y 2, un detrimento en las habilidades específicas del minibalonmano fue observadas, pero solo como parte del proceso y no como resultado definitivo. Aunque factores fisiológicos no fueron tomados en cuenta, otros factores pertenecientes a la neuro ciencia sí pudieron explicar el fenómeno obtenido. 6 semanas de un método integrado de entrenamiento de minibalonmano, implementado en 2 sesiones semanales, parece ser una herramienta efectiva para desarrollar positivamente a adquisición de habilidades motrices específicas del minibalonmano y para mejorar el proceso técnico-táctico de toma de decisiones.

Palabras clave: Minibalonmano, habilidades motrices, modelo de entrenamiento integrado, proceso de toma de decisiones.

ABSTRACT

The aim of this study was to describe the effects of the execution of an integrated training method focused in the development of specific mini-handball's motor skills and decision-making processes for children. 32 children (17 boys and 15 girls) aged between 10 and 11 years old, all of them participants on a recreational mini-handball class, where submitted in a 4 phases training method planed and proposed in a previous study. Outcomes of mini-handball´s motor skills development were statistically analyzed using Repeated measures ANOVA with corrected Bonferroni post-hoc analysis. Significant improvements in mean values of successful actions (SA) where shown from phase 1 to phase 4 (<0.005). In phase 1 and 2, a detriment on specific mini-handball's motor skills where observed but only as part of the process not as a definitive result. Although physiological factors where not took in consideration, other factors belonging to neuroscience did explained the obtained phenomenon. 6 weeks of a mini-handball integrated training method, performed by 2 sessions per week, seems to be an effective tool to develop positively the acquisition of specific mini-handball's motor skills and to improve technical-tactical situation of decision-making processes.

Keywords: Mini-handball, motor skills, integrate training model, decision-making process

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INTRODUCTION

Mini handball has evolved from it nature as a pre sport game, in the school context, to become nowadays in a recognized sport by many clubs and federation throughout the world. Being used by teachers and coaches as an instrument to train and develop future elite athletes. (Camacho & Cardenosa et al., 2018). Due to this, investigation of what occurs in to the game field, together with systematization and creation of methodological processes that helps to develop mini-handball´s motor skills, appear to be very significant in order to continue with this evolution (García, 2000; Vuleta, Milanović, & Ćaćić, 2013). It seems important to know that definition of motor skills and its association with the development of the ability to make decisions in sports, started to being re-conceptualized in a process in the 80´s, motivated by the work of Kugler, Kelso & Turvey (1982). These new concepts took the understanding about the motor development into the ideas where the cognitive control of actions interacts with modern concepts of the ecological model of Gibson (1986), founded in the analysis of the dynamic processes of motor coordination and direct perception. For the followers of these approaches, cognitive models allowed a greater comprehension about what exist, but it did not explain the dynamics of the change, as it did not consider that the determinant of those changes were able to be modified. Models of motor control and coordination are the ones that needs and exterior entity that triggers the process of change, which can be counteracted with the autonomous approaches for which the conduct emerge as a consequence of an “atopoietic” process based on the dynamic laws (Maturana & Varela, 1998).

In mini-handball, the execution of motor skills during the changing scenarios, have as a motivation factor the success of scoring a goal through the addition of the individual actions and it repercussion on the collective, as well as to avoid that the opposing team achieve the same goals in defensive and in offensive situations (Antón García, 2002; Ferrari, Sarmiento & Vaz, 2019; García & Juan, 1998). For this, the decision to select motor actions and later to execute them, in order to solve an usually unfavorable scenario, will depend on the volume of sport´s situation that the athlete has trained and his/her cognitive skill related to observe and evaluate the variety of stimulus that conjugates in the motor context, finding a favorable answer according to the motor repertoire and the situations that eventually the athlete can improvise thanks to the speed and the quality on the decision-making process, especially about the selected motor program (Le Boulch, 2001; Parlebas, 2008; Seiru-Lo, 2017).

Nowadays, is well known that, thanks to the development of physical capacities (strength, speed & endurance), psychological capacities (problems resolution and self-esteem) and cognitive capacities (decision-making process and knowledge about the sport), the specific technical and tactical tools are learned easily and with a higher quality. Regarding the parameters that are described by biomechanics and the contexts that they are performed (Bojić & Pavlović, 2015). However, few are the published mini-handball training methods, focused on the development and formation of motor skills and decision-making process as base of formation on this sport (Camacho Cardenosa et al., 2018; Galíndez Meco & Ortega Parraga, 2014; Oviedo, Buelot, Saavedra, & Alva, 2012). Is due to all explained above that the aim of this study is to describe the effects of the implementation of a mini-handball training method, based on the integrate model (Pino & Moreno, 1996) with focus on technical-tactical skills and the decision making ability, on children’s specific motor skills performance

METHODS

Subjects

32 children (17 boys and 15 girls) aged between 10 and 11 years old, took part of this study. All of them participant on a recreational mini-handball class in the school where they belong, with no mini-handball experience in previous years. For this study purposes children where inscribed as volunteers with a prior authorization of their parents/guardians. All subjects participate singly in the process, although in groups exercises. However, all of them where evaluated individually in each phase of the training progression.

Procedures

Subjects where submitted in a 4 phases mini-handball training method, planed and proposed in a previous study (Espoz-Lazo, Orellana, & Reyes-Contreras, 2011), with focus on the development of 8 variables related to mini-handball´s specific technical-tactical skills and decision-making abilities. Each phase differentiates itself through levels of difficulty

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associated to mini-handball's tactical situations (from no opposition to active opposition). Also by a progressive increment on the amount of stimulus that participants had to respond by moving as fast as they could trough a basic structure made by plastic cones (as delimitation of space in order to obligate the application of motor actions in a reduced circumstances) (Figure 1 and 2). Each session was recorded by two video cameras located in two strategic places in order to record all movements of every participant. Once the entire method was applied, total of videos where analyzed using a motor behavior assessment tool described by Dugas (2006) registering the data in to an excel® sheet.

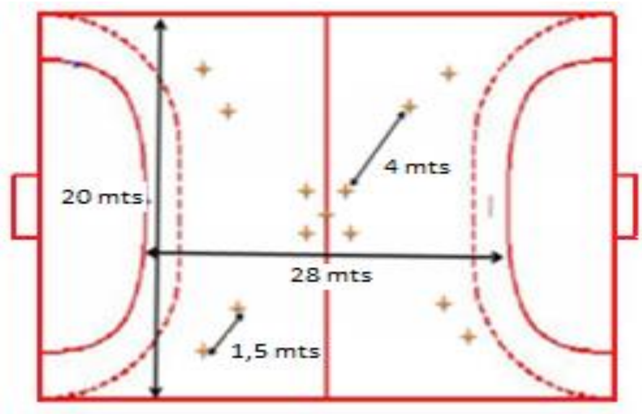

Figure1: Diagram of the structure used for the training method

Figure 2: live visualisation of the structure used for the training method

Phase 1: On each cone situated outside of the zone C, one player was located with a ball. This player was denominated as "the passer" (person who gives the pass). Inside the zone A, four attackers where located and performed the work described next: After the signal (given by the coach), attackers leaved the zone A and ran through the zone C to receive a pass from the passers. After receiving the ball, attackers had to go to the zone B using the dribbling skill until they reached one of the vertices of the zone A. Once there, attackers had to decide the exact moment where they must enter to the marked zone in order to avoid any contact with other attackers (Figure 3). Once attackers entered to the zone A using dribbling, they leaved the zone again and gave the ball back to any other passer. After that, the attacker ran back to the zone A, once reached one of the vertices, attacker decided where to enter on the zone A, being careful to avoid any contact or any interference with other attackers. When attackers finished the tasks, they selected a new passer and started the circuit again. This was repeated 6 times in a row as fast as they could. This phase was performed 5 times in 3 separated sessions. Once completed, players started the phase 2 in a following session.

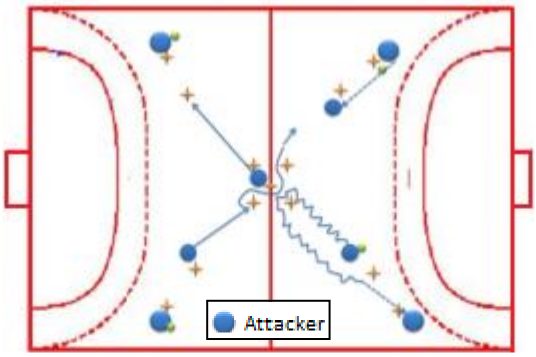

Figure 3: Diagram of the player's actions during phase 1

Phase 2: Under the same structure of cones, in the zone C, 4 passers where allocated with a ball in each cone. Inside the zone A, 4 attackers where situated to perform the main tasks. In this Phase, 4 defenders where added into the zone B. The work of the attackers from zone A was to run as fast as they could until they reached passers from zone C to receive a pass from them, meanwhile defenders had passively get near of each attacker to intervene the line where attackers had to come back to the zone A from zone C (Figure 4). Attackers when tried to go to the zone

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A with dribbling as indicated in the main instructions, due to the intervention of the defender, had to perform a feint with a change of direction in front of the defender in order to overpass them and reach again the zone A. Once there, attackers had to decide where and when to enter to the zone A to avoid hitting or interfere with their partners. Then, Attackers had once again to leave the zone A and go to zone C but this time with dribbling. Once there, they had to give a pass to the passers and come back to the zone A running, repeating this whole sequence 6 times. This phase was performed 5 times in 3 separated sessions. Once completed, players started the phase 3 in a subsequent session.

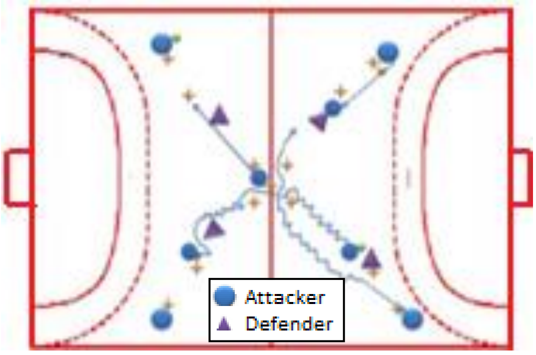

Figure 4: Diagram of the player's actions during phase 2.

Phase 3: Regarding the structure of cones mentioned before, 4 passers with a ball where located in each part of zone C, 4 attackers in zone A and 4 defenders in zone B as in phase 2. None the less, in this phase the work of defenders was more active than before. The work in this opportunity was that the 4 attackers had to get out from their initial zone and run until zone C, once there, they had to receive a ball from a passer, during that situation, a defender had to intercept the pass while the attackers had to receive it freely performing an unmarking action against the defender. After the attacker had received the ball, he/she had to dribbling back to the zone A and give the pass in return to the same passer from whom had received the pass before. In case that a defender had accomplished his/her task of intercepting the ball, the attacker had to receive the ball back from the defender and then perform in front of him/her a feint of steps with change of direction and then dribbling back to zone A, one there, give a pass to the passer in zone C, repeating this whole sequence 6 times. This phase was performed 5 times in 3 separated sessions. Once completed, players started the phase 4 in a following session.

Phase 4: As in phase 3 previously described, in phase 4 players executed the same tasks with the difference that attackers once had reached zone A by dribbling, they did not have to pass the ball to the same passer but a different one. In that way, a new situation of decision-making process had to be done by the attackers, repeating this whole sequence 6 times. This phase was performed 6 times in 3 separated sessions. Once completed, players finished all the whole the method.

Statistical Analysis

All descriptive data are presented as means and standard deviation (SD) (Table 1). Reliability on the measurements of different mini-handball´s motor skills acquisition was determined by Interclass Correlation Coefficient (ICC) (Hopkins, 2000) Outcomes of mini-handball´s motor skills of each session for each phase were statistically analyzed using Repeated measures ANOVA with corrected Bonferroni post-hoc analysis. Effect size and reached statistical power were calculated using G*Power 3.0.10 software (Universität Düsseldorf, Germany), resulting in 18 participants to obtain significant statistics result with a statistical power of 0,95. Distribution of dependent variables were tested by using the Shapiro-Wilk test of normality. Mauchly Test of Sphericity was used to determine that the assumption of sphericity had not been violated. If the assumption of sphericity was violated, the Greenhouse-Geisser adjustment was applied. Effect size were reported as partial eta square for the main effects of the analysis. A level of 0,05 was consider a priori to be statistically significant. Statistical analysis was performed using IBM SPSS Statistics Software 22 edition 9.5.00. (SPSS Inc., Chicago, IL, USA).

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TABLE 1. Mean ± SD Amount of effective specific mini-handball's motor skills and decision-making process during each session per phase

Group	Subgroup	Running X±SD	Reception X±SD	Dribbling X±SD	Decision Making X±SD	Pass X±SD	Decision Making 2 X±SD	Unmarking X±SD	Feint X±SD	Change of Direction X±SD	Decision Making 3 X±SD
	Session 1	22.2 (2.1)	17.7 (2.9)	15.8 (2.2)	11.6 (2.1)	13.2 (3.5)	x	x	x	x	x
Phase1	**Session 2**	21.3 (2.3)	18.0 (2.4)	16.0 (2.4)	12.4 (2.1)	14.4 (3.7)	x	x	x	x	x
	Session 3	25.5 (2.1)	20.4 (3.2)	18.4 (3.1)	18.8 (2.3)	19.9 (4.5)	x	x	x	x	x
	Session 1	22.5 (1.9)	17.8 (2.8)	15.9 (2.3)	11.3 (1.7)	13.5 (3.6)	13.1 (0.5)	10.3 (1.4)	10.0 (0.3)	14.0 (0.3)	x
Phase 2	**Session 2**	21.3 (2.3)	17.8 (2.7)	16.0 (2.4)	12.5 (2.4)	14.6 (3.9)	13.0 (0.2)	10.2 (0.8)	8.1 (0.5)	12.2 (0.8)	x
	Session 3	26.2 (2.5)	20.7 (3.0)	19.1 (3.3)	18.8 (2.2)	19.8 (4.5)	19.9 (0.3)	21.7 (1.4)	16,0 (0.2)	18.2 (0.9)	x
	Session 1	28.1 (1.6)	23.6 (2.1)	22.3 (2.6)	20.5 (2.5)	22.8 (3.0)	17.5 (1.6)	17.4 (2.5)	19.2 (3.1)	21.2 (2.5)	x
Phase 3	**Session 2**	26.8 (2.6)	22.3 (1.6)	24.6 (3.7)	22.3 (2.6)	25.2 (3.5)	22.3 (3.6)	19.2 (3.0)	17.2 (3.6)	20.7 (3.6)	x
	Session 3	31.4 (1.9)	27.0 (2.8)	26.3 (3.1)	24.8 (3.0)	29.6 (2.8)	24.6 (1.6)	25.4 (2.3)	24,6 (3.8)	24.7 (2.1)	x
	Session 1	26.9 (2.4)	27.3 (2.6)	28.5 (1.2)	25.8 (3.4)	26.6 (1.6)	25.8 (5.0)	27.1 (4.8)	25.9 (4.7)	25.7 (3.6)	27.0 (5.0)
Phase 4	**Session 2**	33.5 (2.8)	31.3 (3.2)	29.0 (2.3)	30.1 (4.1)	28.6 (1.9)	26.7 (4.7)	31.9 (4.2)	28.0(5.0)	26.0 (3.2)	30.0 (2.4)
	Session 3	34.3 (1.0)	34.5 (2.6)	33.8 (0.8)	33.4 (3.7)	33.2 (1.6)	31.8 (4.2)	28.0 (5.1)	31.3 (5.7)	32.4 (4.8)	30.9 (1.9)
All		27.07 (4.5)	23.7 (5.6)	22.7 (6.1)	20.9 (7.2)	22.5 (6.7)	22,7 (5.8)	22.6 (6.9)	21.2 (7.5)	22.6 (6.0)	30.4 (0.6)

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RESULTS

Results obtained during phase 1 has shown that there were no significant improvements on performance comparing session 1 with session 2 ($p<0.05$). In fact, there is an important detriment on specific handball skills acquisition and a maintenance on concrete decision-making process with no progresses. However, when comparing session 1 with session 3 and session 2 with session 3, there are significant improvements in all the skills evaluated and so in the ability to make decisions as well. Same phenomenon happens on phase 2, where session 1 when is compared with session 2, presents also a loss on general performance related with the application of different handball motor skills. Nevertheless, a substantial development is observed in the decision-making process with a mean value of 1.188 Successful Actions (SA) and in the skill of pass with a mean value of 1.156 SA, both significant at <0.001. Then, comparing session 1 and 2 with session 3, there are significant improvements in all skills and decision-making process even though in this phase, 4 extra handball motor skills where added with no previous experiences during the application of the method.

Regarding Phase 3, improvements are now more progressive from session 1 to session 2 and session 3 except for running, reception and feint, which present a similar decrease than in previous phases, probably due to the addition of a more active defence players interacting with the moment in which the attackers had to performed these 3 specific skills. In the meantime, the progressive improvements of the other abilities could be explained because there are not substantial changes on the difficulty from phase 2 to phase 3 regarding these skills, and no incorporation of extra mini-handball’s specific motor competencies as in phase 1 to phase 2.

Finally, in phase 4, similar behaviour occurs as in phase 3. In this opportunity most of the skills and decision-making processes presents progressive improvements excluding reception, which shows a significant loss of -1.219 SA, significant at 0.001 and for dribbling which it did not change significatively, both from session 1 to session 2. However, is important to highlight that this last phase is the most difficult to perform due to the defence´s work and the addition of a more complex decision-making action that differs from all other previous phases. Nonetheless, session 3 presents again significant enhancement in almost all skills and decision-making process compare with session 1 and 2. Only running did not present substantial advances probably due to some fatigue effect related to the difficulty of the exercise. (Table 2)

DISCUSSION

Data obtained in this study shows that the progressive process of acquiring the specific mini-handball’s motor skills through a particular method, occurs in an undulatory form where in the initial session, in which the movements are required for the first time fulfilling specific conditions, is completed with successful actions which later, in the second session, same actions in the same conditions are achieved with more difficulty or directly not completed positively, evidencing a significant decrease in the effectiveness of the specific mini-handball´s motor skills. However, in the third session, this phenomenon changes, evidencing significant improvements in all the evaluated skills and decision-making processes. Repeating this singularity in the different phases described, but with a smaller wavelength.

Theoretically, this undulatory phenomenon is explained by Liew, Cameron, & Lockman (2018) and Sanchez-Bañuelos (2003) whom describes that a motor regulation occurs in the initial learning process by a visual control in 3 steps: The first called “gross coordination”, where tasks are self-regulated by the efficacy of actions but not efficiency. So is not important how is performed but if the goal is achieved. Second called “Fine coordination”, where now technique is the focus of the action. How is performed is more important that the result of the task, so failures are more often. And finally, the “Variable availability”, where both focuses are now concatenated.

Efficiency and efficacy are equally important in order to achieve motor aims. No studies where found that describe the same undulatory phenomenon in sport’s specific motor skills learning process, where an initial performance in SA is obtained followed by a detriment of the same actions during the learning development that finish with a significant improvement. However, a research in the neuroscience field, explains that during learning of new motor sequences several neurons from presupplementary motor area (PMA) of the brain are

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TABLE 2. Mean Difference +SD Pairwise comparation of each specific mini-handball´s motor skills between sessions per phase

	Sessions		Phase 1		Phase 2		Phase 3		Phase 4	
			Mean Difference	Std. Error	Mean Difference	Std. Error	Mean Difference	Std. Error	Mean Difference	Std. Error
Running	1	2	0.906*	0.192	1.156*	0.225	1.250*	0.311	-6.688*	0.832
		3	-3.281*	0.295	-3.719*	0.419	-3.313*	0.231	-7.531*	0.550
	2	1	-0.906*	0.192	-1.156*	0.225	-1.250*	0.311	6.688*	0.832
		3	-4.188*	0.309	-4.875*	0.519	-4.563*	0.233	- 0.844	0.399
	3	1	3.281*	0.295	3.719*	0.419	3.313*	0.231	7.531*	0.550
		2	4.188*	0.309	4.875*	0.519	4.563*	0.233	0.844	0.399
Reception	1	2	-0.313	0.260	0.063	0.269	1.219*	0.154	1.219*	0.154
		3	-2,688*	0.244	-2.844*	0.298	-3.438*	0.345	-3.438*	0.345
	2	1	0.313	0.260	-0.063	0.269	-1.219*	0.154	-1.219*	0.154
		3	-2.375*	0.265	-2.906*	0.325	-4.656*	0.408	-4.656*	0.408
	3	1	2.688*	0.244	2.844*	0.298	3.438*	0.345	3.438*	0.345
		2	2.375*	0.265	2.906*	0.325	4.656*	0.408	4.656*	0.408
Dribbling	1	2	-0.250	0.354	-0.031	0.366	-2.281*	0.292	-0.625	0.569
		3	-2.688*	0.415	-3.188*	0.493	-4.031*	0.203	-5.281*	0.169
	2	1	0.250	0.354	0.031	0.366	2.281*	0.292	0.625	0.569
		3	-2.438*	0.294	-3.156*	0.431	-1.750*	0.273	-4.656*	0.495
	3	1	2.688*	0.415	3.188*	0.493	4.031*	0.203	5.281*	0.169
		2	2.438*	0.294	3.156*	0.431	1.750*	0.273	4.656*	0.495

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Decision Making	1	2	-0.844	0.365	-1.188*	0.319	-1.781*	0.160	-4.281*	0.247
		3	-7.250*	0.467	-7.500*	0.359	-4.219*	0.615	-7.594*	0.249
	2	1	0.844	0.365	1.188*	0.319	1.781*	0.160	4.281*	0.247
		3	-6.406*	0.276	-6.313*	0.319	-2.438*	0.518	-3.313*	0.244
	3	1	7.250*	0.467	7.500*	0.359	4.219*	0.615	7.594*	0.249
		2	6.406*	0.276	6.313*	0.319	2.438*	0.518	3.313*	0.244
Pass	1	2	-1.219*	0.413	-1.156*	0.409	-2.406*	0.241	-2.000*	0.394
		3	-6.656*	0.671	-6.344*	0.653	-6.781*	0.310	-6.594*	0.481
	2	1	1.219*	0.413	1.156*	0.409	2.406*	0.241	2.000*	0.394
		3	-5.438*	0.460	-5.188*	0.454	-4.375*	0.214	-4.594*	0.241
	3	1	6.656*	0.671	6.344*	0.653	6.781*	0.310	6.594*	0.481
		2	5.438*	0.460	5.188*	0.454	4.375*	0.214	4.594*	0.241
Decision Making 2	1	2	-	-	0.125	0.087	-4.875*	0.375	-4.281*	0.247
		3	-	-	-6.813*	0.130	-7.125*	0.125	-7.594*	0.249
	2	1	-	-	-0.125	0.087	4.875*	0.375	4.281*	0.247
		3	-	-	-6.938*	0.043	-2.250*	0.424	-3.313*	0.244
	3	1	-	-	6.813*	0.130	7.125*	0.125	7.594*	0.249
		2	-	-	6.938*	0.043	2.250*	0.424	3.313*	0.244
Unmarking	1	2	-	-	0.125	0.133	-1.719*	0.292	-4.844*	0.225
		3	-	-	-11.406*	0.391	-8.000*	0.273	-0.875*	0.253
	2	1	-	-	- 0.125	0.133	1.719*	0.292	4.844*	0.225
		3	-	-	-11.531*	0.301	-6.281*	0.267	3.969*	0.289
	3	1	-	-	11.406*	0.391	8.000*	0.273	0.875*	0.253
		2	-	-	11.531*	0.301	6.281*	0.267	-3.969*	0.289

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activated, while not during performance of these sequences. In fact, a functional blockade of the PMA conduct to discriminatory deficits when learning new sequences (Hikosaka, Nakamura, Sakai, & Nakahara, 2002). The learning process from each initial session of each phase of the method used in this research, can be explained by the mentioned study. There is probably expected that PMA neurons are activated in the initial sequence in order to learn the expected sequence, while in session 2 a detriment on performance is observed probably due to an intention to improve performance instead of tuning the skills.

By the other hand, the improvements in all sessions number 3 for each phase, can be explained due to the interaction of motor cortex and the sub cortical areas as responsible for learning and consolidation of movements (Kawai et al., 2015) understanding that the initial learning of sequences happens in pre frontal and parietal cortex and performance of movements are connected from these brain areas to the frontal cortex by PMA neurons (Hikosaka et al., 2002).

Other possible explanation is given by the study of Moreno & Ordoño (2009) and the study of Yildirim, Bilge, & Caglar (2019) whom describes that the same phenomenon that occurs during strength and conditioning training called super-compensation happens when motor skills are in process of learning. This means that with the initial stimulus of information regarding a specific skill, results in a stress answer that decreases the ability to reproduce the desired movement, which later improves after resting. The loss of SA performance in session 2 of in all phases of the method here studied, might have occur due to a fatigue effect produced by the initial learning process of the specific mini-handball´s skills.

Finally, some limitations of the study are important to highlight as the lack of data related to height and weight, and their implication in fatigue effects associated to a high Body Mass Index and it relation to physical condition and performance (Ortega, 2012). In the same line, the unknown perception of efforts that every subject had experienced during the study (Rodriguez, 2016), or the objective quantification of the internal load by controlling, for example, heart rate or the daytime in which sessions where performed (Wulf, Shea, & Lewthwaite, 2010), and/or supervising nutritional aspects that could impair performance and learning processes (Sorhaindo & Feinstein, 2006). However, even though there are some physiological variables that where not controlled, it seems that it did not represent an actual limitation for the application of the mini-handball training method described in this study, because at the end of each phases there were always significant improvements in the SA of specific mini-handball´s motor skills and in all decision-making processes.

In conclusion, six weeks of a mini-handball integrated training method, performed by 2 sessions per week, seems to be an effective tool to develop positively the acquisition of all specific mini-handball motor skills and to improve technical-tactical situation of decision-making processes.

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