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## Impact of psychomotor skill training on selected psychomotor abilities of male handball players

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### Abstract

A modern trend that allows the selection system optimization is that of the introduction of tests that assess the coordination skills level development. In handball, player has to run, jump and throw the ball during shooting, and passing the ball both in position of stationary and moving. Psychomotor skills, in general terms, can be described as the continuous relationship between mental processes and human physical movements. Development of psychomotor behaviors of players combined with a good physical training can lead to optimal manifestations of the players' skills during the matches. The purpose of the study was to evaluate the psychomotor abilities of handball male players based on the two variables, hand-eye coordination and dynamic balance. The pre-post random group experimental design was formed with two groups, group I trained with psychomotor skills and group II trained with their traditional practices. The results of the study revealed that psychomotor skill training had significant improvement on hand-eye coordination (6.53  $p < 0.05$ , 19%) and dynamic balance (7.33  $p < 0.05$ , 15%) from their baseline performance with significant 'f' values. The study evaluated the selected psychomotor abilities of professional handball players. The increasing frequency of handball games is associated with persistent development of technical skills. Recommendations on infusing psychomotor abilities in handball training can be implemented by coaches to progress the game.

**Keywords:** sports, psychomotor abilities, handball; hand-eye coordination, dynamic balance

### Introduction

Handball is a sport of complex movements in nature. During the play, the movements of a player is somewhat differed from other sport as the player has to run, jump and throw. A modern trend that allows the selection system optimization is that of the introduction of tests that assess the coordination skills level development. Handball is a game mainly based on coordination (Spori *et al.*, 2010) [12]. An hour-long handball tournament requires a player to show off his or her skills. In order to do this, each player must undergo physical and physiological training to prepare for the game's physical and physiological demands. When shooting and passing, a player must not only execute the fundamental motions of running, jumping, and throwing, but also do all of these actions while simultaneously running, jumping, and throwing the ball. Where the coordination of body and mind, as well as the physical and motor talents they had, may make it possible to successfully execute passes, throws, and shots. Even though the area of psychomotor skills is continually changing and growing, there is still a lot of room for improvement. To put it another way, psychomotor skills can be defined as the ongoing relationship between mental processes and human physical movements, which is correlated and dependent on the level of development of specific skills such as static and dynamic balance, coordination, dexterity, speed, and spatial-temporal organization. We may present the two components of psychomotor skills individually in order to obtain an ideal degree of comprehension of this topic (Przednowek *et al.*, 2019) [13]. Physical training is the primary method of developing physical abilities in today's system of training, but psychomotor training, which is essential to good skill execution, is not used. The current training method for handball has a gap in it.

For best performance in matches, players must develop psychomotor behaviors and physical training appropriate to each position on the field, both of which are necessary for maximum performance. To maximize a player's potential, physical and mental training must be combined in order to maximize their ability to execute core skills, techniques, and strategies effectively.

As a result, a player's ability to perform a skill well in a competitive scenario requires psychomotor training.

### Materials and Methods

In order to meet the objectives of the current research, 30 male intercollegiate level handball players from the Coimbatore district were recruited using a random selection process. The ages of the subjects varied from 18 to 25 years old. The pre-post random group experimental design was employed to meet the goals of this investigation. The experimental group I received psychomotor skill training, whereas the experimental group II received conventional instruction and served as a control group, with each group consisting of 15 people. Hand-eye coordination and dynamic balance were the variables investigated in this research, and they were chosen and tested among samples from two different groups utilizing standardized tests, as described above. The variables in this study were measured using the mirror tracing test and the modified bass balancing test, which were both developed by the researchers. This was taken into

consideration as the pre-test score.

The experimental group received psychomotor training on alternate days of the week for a total of 12 weeks, whereas the control group received no therapy at all during that time. It was decided to utilize 40 minutes of training time for psychomotor skills training, and the drills relating to coordinative abilities, balancing exercises, and basic fundamental skills shown in table 1 were employed. In regards to the instructions, warm-up, lead-up game, and warm-down, subjects were allocated 20 minutes each. Following the end of the training session, samples from both groups were tested using the same methodology as in the pre-test. The acquired data was subjected to a Paired t-test in order to determine whether or not there were any statistically significant changes from baseline to post therapy. The comparative effects analysis of covariance was employed and examined among the players who were treated with psychomotor skill and the control group in order to investigate the findings.

**Table 1:** Showing the Psychomotor Skill Training Exercises

| S.no | Exercises         | Repetition    |                 |                 |
|------|-------------------|---------------|-----------------|-----------------|
|      |                   | I to IV Weeks | V to VIII Weeks | IX to XII Weeks |
| 1    | Orientation       | 3 Min         | 3 Min           | 3 Min           |
| 2    | Warm Up           | 7 Min         | 7 Min           | 7 Min           |
| 3    | Zig Zag Run       | 4 Min         | 4.5 Min         | 4 Min           |
| 4    | Babby Huddle jump | 4 Min         | 4.5 Min         | 4 Min           |
| 5    | Backward Run      | 4 Min         | 4.5 Min         | 4 Min           |
| 6    | Wall pass         | 4 Min         | 4.5 Min         | 4 Min           |
| 7    | Dribble           | 4 Min         | 4.5 Min         | 4 Min           |
| 8    | Passing           | 4 Min         | 4.5 Min         | 4 Min           |
| 9    | Ball Taping       | 4 Min         | 4.5 Min         | 4 Min           |
| 10   | Shooting          | 4 Min         | 4.5 Min         | 4 Min           |
| 11   | Lead Up Game      | 5 Min         | 5 Min           | 5 Min           |
| 12   | Review            | 2 Min         | 2 Min           | 2 Min           |
| 13   | Warm Down         | 7 Min         | 7 Min           | 7 Min           |

### Results and Discussion

**Table 2:** Significance of mean gains & losses between pre and post-test scores of psychomotor skill training group on selected psychomotor abilities of male handball players

| Variables              | Pre-test (Mean $\pm$ S.D) | Post-test (Mean $\pm$ S.D) | MD   | SEM  | 't' ratio |
|------------------------|---------------------------|----------------------------|------|------|-----------|
| Hand Eye Co-ordination | 34.07 $\pm$ 6.24          | 27.53 $\pm$ 5.44           | 6.53 | 0.61 | 10.74*    |
| Dynamic Balance        | 50.27 $\pm$ 7.15          | 57.60 $\pm$ 7.42           | 7.33 | 1.16 | 6.34*     |

\* Significant at 0.05 level

Performances requiring muscular usage need precise, smooth, and correctly timed execution of psychomotor skills. Coordination of movement in response to a specific stimulus is the focus (Singer, 1980) [4]. There are several psychomotor skills that combine many sub-skills into a more complicated talent, known as the "whole skill." An executive subroutine is learning to combine an existing skill into a new skill that has previously been learned by the learner (Fitts and Posner, 1967) [5]. In this research, the two psychomotor talents were

compared. Psychomotor abilities are shown in Table 2, with t-values of 10.74 (hand-eye coordination) and 6.34 (coordination) (dynamic balance). When the "t" values for chosen, psychomotor skills were compared to the crucial value of 2.14 for degrees of freedom 1, and 14, it was found that the average gains or losses were statistically significant. Psychomotor skill training had a substantial impact on hand-eye coordination (6.53 p 0.05, 19 percent) and dynamic balance (7.33 p 0.05, 15 percent) after 12 weeks of practice.

**Table 3:** Significance of mean gains & losses between pre and post-test scores of control group on selected psychomotor abilities of male handball players

| Variables              | Pre-test (Mean $\pm$ S.D) | Post-test (Mean $\pm$ S.D) | MD   | SEM  | 't' ratio |
|------------------------|---------------------------|----------------------------|------|------|-----------|
| Hand Eye Co-ordination | 33.07 $\pm$ 5.52          | 34.60 $\pm$ 5.80           | 1.53 | 1.53 | 1.00      |
| Dynamic Balance        | 49.33 $\pm$ 7.15          | 48.80 $\pm$ 7.42           | 0.53 | 1.29 | 0.41      |

\* Significant at 0.05 level

Frequency of repetition and feedback throughout the learning process are two important components of psychomotor skill

education. Methods of practice include blocked practice, serial practice, random practice, and mental practice

(Kalkhoran and Shariati, 2012; Zipp and Gentile, 2010) [6, 12]. t values for the specified techniques of hand-eye coordination and dynamic balance were found to be 1.00 and 0.41 in the tables provided in Section 2.2. It was found that the 't'-values on selected psychomotor skills failed to meet the critical value of 2.14 when compared to the degree of freedom of 1.14 when compared to the critical value of 2.14. As a result, it was deemed to be of little statistical import. Reaction time has been shown to be affected by characteristics such as body height, training level, and dominant hand (Justin *et al.*, 2011). (Dane and Erzurumluoglu, 2003) [9]. In addition, Wik *et al.* (2019) [10] found that training plans must be tailored to the player's position and the league in which they are

participating. Badau *et al.* (2018) [11] performed a basic response time evaluation on athletes with a dominant and non-dominant hand in a variety of sports disciplines. In the end, these abilities may be learned and applied to different areas for further learning and psychomotor advancement. On the other hand, Gallahue and Ozmun (1995) placed a greater focus on motor development throughout the course of a lifetime. Application entails increasing skill levels through practice, while utilization entails improving the skill over time. As a result of this, we endeavor to explain the different phases of motor skill development and give a thorough rationale for the control and acquisition of motor skills.

**Table 4:** Analysis of variance on initial and final means of selected psychomotor abilities of male handball players

| Variables             |               | Sources      | SS      | DF    | MS     | F-ratio |
|-----------------------|---------------|--------------|---------|-------|--------|---------|
| Hand Eye Coordination | Initial Means | Between sets | 7.50    | 1.00  | 7.50   | 0.22    |
|                       |               | Within sets  | 971.87  | 28.00 | 34.71  |         |
|                       | Final Means   | Between sets | 374.53  | 1.00  | 374.53 | 11.85*  |
|                       |               | Within sets  | 885.33  | 28.00 | 31.62  |         |
| Dynamic Balance       | Initial Means | Between sets | 6.53    | 1.00  | 6.53   | 0.13    |
|                       |               | Within sets  | 1458.27 | 28.00 | 52.08  |         |
|                       | Final Means   | Between sets | 580.80  | 1.00  | 580.80 | 9.02*   |
|                       |               | Within sets  | 1802.00 | 28.00 | 64.36  |         |

\* Significant at 0.05 level

"Working memory" is a phrase that refers to the coordination between the brain and the body's ability to recall information. In the working and long-term memory, encoding and retrieval processes facilitate data organization and search. To ensure that information is easily accessible, it must be organized in a manner that is both efficient and effective (Gagne, 1985). There is a 0.22 F-value for hand-eye coordination in Table 3 of this research, and a 0.13 value for other psychomotor skills (dynamic balance). There is no statistical significance to the F-values reported for the aforementioned variables. Since it failed to reach the required critical value of 4.20 for df 1,28, it is concluded that the initial mean difference between the psychomotor skill training group and the traditional training group on the variables used in this study before the treatment is statistically not significant. The observed F-value for the final means on selected psychomotor abilities is 11.85 (hand-

eye coordination) and 9.02 (dynamic balance). Since the observed F-value on these variables is greater than the critical value of 4.20 for DF 1,28, It is concluded that the observed final mean differences between the psychomotor skill training group and the traditional training group on the variables used in this study after 12 weeks of training treatment were statistically significant. In a similar study, Grigore *et al.* (2012) [3] reported that there was direct contact with an opponent (handball, basketball, karate) and the level of eye-hand coordination was much higher than in players/sportspeople doing contactless sports (gymnastics, dance, sprint, and swimming). However, literature evidence conveyed that the psychomotor abilities of handball players presented a much higher level of the abilities than non-trained people, and the differences observed between the groups were statistically significant.

**Table 5:** Analysis of covariance on adjusted post- test means on selected psychomotor abilities of handball players

| Variables             | Sources      | SS     | DF    | MS     | F-ratio |
|-----------------------|--------------|--------|-------|--------|---------|
| Hand Eye Coordination | Between sets | 444.50 | 1.00  | 444.50 | 26.09*  |
|                       | Within sets  | 460.09 | 27.00 | 17.04  |         |
| Dynamic Balance       | Between sets | 472.85 | 1.00  | 472.85 | 20.76*  |
|                       | Within sets  | 615.11 | 27.00 | 22.78  |         |

\* Significant at 0.05 level

Selective attention, response selection, perception speed, and a high level of sensory and motor fitness are sports competition elements that help a competitor win the game (Derri *et al.*, 1998; Paul and Garg 2012) [14, 15]. Generally, such skills as the ability to acquire visual information about an approaching object (ball) and a high level of eye-hand coordination mean players can react more effectively to external stimuli and adapt their movements to the situation on the court (Paul *et al.*, 2011) [16]. In the mentioned research, it was also shown that perceptual abilities combined with the ability to predict movement and share attention help to achieve success in team sports (Krawczyk *et al.*, 2018) [17]. Table 4 reveals that the obtained "F" value was 26.09 for hand-eye coordination and 20.76 for dynamic balance. Since

the observed F-values on these variables were higher than the required critical value (4.21) at the 0.05 level of significance for df 1,27, it was found that the adjusted post-test mean differences among the two groups on selected psychomotor abilities (hand-eye coordination and dynamic balance) were found to be statistically significant. It was concluded that the selected psychomotor abilities were influenced by the treatments used in the present study.

## Conclusion

From the results derived, the following conclusions have been made: The study evaluated the selected psychomotor abilities of professional handball players. From the results, we conclude that the increasing frequency of handball games is

associated with persistent development of the technical skills of handball players. Recommendations on infusing psychomotor abilities into professional handball training can be implemented by the coaches to progress the game, improve anticipation and decisiveness in game play. The present findings show that it is crucial to develop and improve the psychomotor abilities in the handball training process.

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