



## **Effect of exercises using Sensball to develop some physical and skill abilities of football players aged 10-13 years**

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### **Abstract**

The current study aims to develop exercises using Sensball technique to enhance physical and skill abilities of football players aged 10-13 years. It also seeks to determine values of pre- and post-tests, identify impact of Sensball exercises to develop of certain physical and skill abilities in experimental group, and identify any differences in physical and skill abilities between two groups in post-tests. The study problem stems from fact that most youth training relies on traditional methods for developing players' physical and skill variables, neglecting newer methods and approaches. The researcher employed an experimental method using a randomized equivalent groups design with pre- and post-tests for both experimental and control groups, as this approach was deemed most suitable for the research problem. The research population consisted of football players aged 10-13 years, while the research sample comprised 26 young players from the Kiwan Sports Club football team. Twenty of these players were then randomly selected by lottery. The study results showed that training method used did not produce a clear and significant improvement in physical and skill abilities of young football players in control group. However, Sensball exercises positively impacted development of physical and skill abilities in post-tests and across all skills studied. Sensball exercises demonstrated a superior effect on physical and skill development in post-tests for both groups, with experimental group showing most significant improvement in both physical and skill abilities. The researcher recommends utilizing exercises developed to create similar programs for

developing specific physical and skill abilities in football players aged 10-13, and applying research findings by incorporating Sensball exercises into training of football players aged 10-13.

**Keywords: Sense Ball, Physical Abilities, Skill Abilities, Football, Young Players.**

## Introduction

Football is a cultural phenomenon that preoccupies all nations in general, and it has attracted widespread attention from researchers and coaches with aim of achieving and investing player's physical and technical abilities and capabilities, taking into account specifics of game. Therefore, when developing training programs, consideration must be given to good technical and physical preparation so that its level and speed are consistent with movement performed by player on field.

Sports training always receives attention from coaches and experts in sports field because it is a means to reach highest possible athletic level for athletes, as it is "a special, organized process of comprehensive physical education based on scientific and educational principles, which aims to bring individual to high athletic levels". (Amira Hassan Mahmoud, p. 231)

Therefore, scientific methods, approaches, and curricula must be used in training in order to achieve goals and duties that serve and achieve progress in level, to achieve basic principles of football, which are safety, enjoyment, and fairness. Among these new methods is use of "Sensball" exercises, which are considered a new training method and are widely used with young age groups in order to increase sense of touch and skill with ball, as "sense of touch with ball grows with practice and becomes a special kind of high observation that enables him to deal with ball with experience, and from this arises that player accurately understands properties of ball". (Hanafi Mukhtar, p. 114)

Physical preparation is a link in chain of preparing football players, and it is part of integrated construction of training situation, as it raises level of players' performance of basic skills and increases their physical fitness. Thus, achieving success for young athletes comes through highest performance efficiency in training or competitions using modern training methods, which has a major role in developing the training process, which is suitable for players' conditions and their physiological, mental and psychological characteristics. (Saad Munim Al-Sheikhli, p. 95).

Skill development of players aims to teach, develop, master, and solidify athletic motor skills that can be used in athletic competitions to achieve highest athletic accomplishments. Reaching pinnacle of global athletic levels is only possible through mastering and solidifying motor skills. No matter how high an athlete's level of physical fitness or what innate and willpower traits they possess, they will not achieve desired results unless all of this is linked to complete mastery of athletic motor skills in their specific sport. (Muhammad Hussein Al-Bashtawiz, p. 199)

Developing athletic skills is not limited to physical aspect alone, but extends to include cognitive and perceptual aspects of the skill. Majed (2022) emphasizes importance of this aspect, finding that strategies that focus on cognitive acquisition of basic skills (in handball) contribute to effective learning and improved performance. Therefore, Sensball exercises used in current research may not only develop physical and skill abilities, but may also contribute to deepening understanding of young players of skill and how to perform it. Purpose of physical and skill preparation of players aged 10-13 years is to bring them to desired or required physical, psychological and skill condition. Physical condition can be improved by improving physical abilities such as strength, speed, endurance, flexibility, agility, coordination, movement and accuracy and improving skill in young players such as stopping, control, passing, heading the ball, running with ball... etc.

Significance of current research lies in its attempt to utilize Sensball exercises as a modern training method, aligning with contemporary trends in sports training that emphasize effectiveness of innovative strategies. In this context, Hussein, Majid, and Hassan (Hussein et al., 2023) indicated that use of problem-solving-based training strategies resulted in greater development of fundamental tennis skills compared to traditional methods, underscoring the importance of exploring new training approaches for skill development.

After reviewing international information network, the researcher noted that one of new methods used in field of youth football exclusively is Sensball exercises within training curricula for players. Through the researcher's follow-up or observation of training of youth teams, and being a former player and coach, noticed that most youth, junior, and even senior players have varying physical and technical capabilities during matches, due to many mistakes they make, especially in technical aspect, which is characterized by a lack of accuracy, focus, and weakness. This may be due to fact that most junior training relies on traditional methods in developing physical and technical variables of players without taking into account new methods and techniques. Therefore, the researcher wanted to study use of Sensball exercises from an academic and scientific perspective and know extent of their impact on level of players, especially in physical and technical abilities.

Research Objectives are preparing exercises using Sensball to develop some physical and skill abilities for football players aged (10-13) years. Identifying values of pre- and post-tests of physical and skill abilities for control group. Identifying effect of exercises using Sensball in developing some physical and skill abilities of football players aged 10-13 years for experimental group. Identifying differences in physical and skill abilities of football players aged 10-13 years in post-tests between two groups.

Research hypotheses represent an effect of using Sensball exercises between pre- and post-tests in physical and skill abilities. An advantage in effect of using Sensball exercises in developing some physical and skill abilities, and in favor of experimental group. Statistically significant differences in post-tests of control and experimental groups in physical and skill abilities, in favor of experimental group.

### *Terms Defining*

Sensball: The researcher defines it operationally as a ball carried in a net used to increase technical abilities of player as well as to develop physical and skill aspects.



Figure 1. Sensball

### **Research methodology:**

The researcher used experimental method with method of random equivalent groups and with a pre- and post-test design for both experimental and control groups, as it was suitable for research problem. Research population was chosen from football players aged 10-13 years, and research sample was chosen from youth of Kiwan Sports Club football, numbering 26 players, then 20 of them were chosen randomly by drawing lots, and after excluding 6 of them for pilot study, and thus sample represents 76.92% of original population. Then the researcher divided them randomly by drawing lots into two equal groups of 10 players for each of experimental and control groups. After that the researcher carried out homogeneity and equivalence procedures for two research groups.

### *Tests used*

After study's physical and skill abilities were established by scientific committee to finalize research framework, physical abilities were represented as strength endurance, speed endurance, agility, and flexibility, and skill abilities were represented as ball control, passing, catching, heading, and rolling. Subsequently, in order to arrive at tests adopted in research, the researcher used content analysis method in football, sports training, and research that used physical and skill ability tests to prepare a set of tests to measure most important basic physical and skill tests, in accordance with the nature of research. The researcher included these tests in two questionnaires, which included physical tests (Appendix 1) and the skill tests (Appendix 2 ).

These questionnaires were presented to a group of specialists in field of testing, measurement, training and football to choose appropriate tests for study. After collecting, sorting and arranging questionnaires, the researcher took tests for physical and skill abilities that were chosen, according to agreement rates that exceeded 75%.

Table 1. Expert Agreement Ratios

No.	Tests used in research	compatibility ratio
1	60-second stand-up and jump test from a seated position	100%
2	180m Shuttle Run Test	100%
3	Running test between markers for a distance of 7m	100%
4	Front flexion test of trunk	75%
5	Control ball for most seconds	85%
6	Passing towards small target at a distance of 20 m	80%
7	Controlling ball's movement from a distance of 6 m within a square of 2 m.	90%
8	Ball head as far as possible player himself throws ball.	70%
9	Ball dribbling in a zigzag line	75%

#### *Physical tests*

1- Test of standing up and jumping from a seated position for 60 seconds:

Test Objective: To measure strength endurance. Equipment: Stopwatch. Performance Description: From a seated position, athlete stands up and jumps upwards, extending their knees and ankles, then returns to starting position. Athlete continues this for 60 seconds. Failed attempts are not counted. Scoring: According to following schedule: Number of repetitions in 60 seconds.

2- 180m Shuttle Run Test:

Purpose of test is to measure speed endurance. Equipment: a stopwatch, four sprint markers 15 m. apart, and a measuring tape. Performance description: After starting signal, athlete sprints from first marker starting point to second, back to starting point, then to third, back to starting point, and finally to fourth, back to starting point. This completes 180-meter test. Recording: time is recorded in seconds to nearest 1/1 of a second.

3- Running test between markers for a distance of 7m:

Purpose of test: To measure agility. Equipment: Stopwatch, 6 markers, measuring tape. Performance description: first marker is 2 meters from starting line, and distance between markers is 1 meter. subject stands on starting line, and upon receiving signal, subject begins to run quickly between markers back and forth. Recording: time taken by subject to the nearest 1% of a second is recorded.

#### *Skills tests*

### 1- Ball Controlling greatest number of times within 30 seconds:

Test Objective: To measure ability to control a ball in air for 30 seconds using all parts of body except hands. Equipment: 3 soccer balls, stopwatch. Performance Description: Upon instruction, player throws ball and then begins to control it so that it neither falls nor touches ground. player is given one attempt within 30 seconds. Scoring: number of times ball is hit in 30 seconds is counted. player loses one point for each time ball touches ground.

### 2- Passing towards a small target at a distance of 20m:

Purpose of test: to measure handling accuracy. Equipment: 5 soccer balls , a 1x1m goal. How to play: player passes five balls to designated goal. After passing first ball, player passes second, and so on until all five balls have been passed. Scoring: Two points for each successful pass and each goal. Passes that go outside goal are not counted. A total of 10 points is awarded for all five attempts.

### 3- Controlling ball's movement from a distance of 6m inside a square of 2m:

Objective of test: Stopping controlling and stopping ball's movement. Equipment: 5 soccer balls, a square with sides measuring 2 meters, and a line drawn 6 meters from square. Procedure: player stands behind designated test area. The examiner throws ball high to player, who then enters test area and attempts to stop ball's movement with any part of their body except their arms. player then returns to starting area and starts again. This process is repeated five times consecutively. If player fails to stop ball, if player crosses designated test area, or if ball touches their arm while they are stopping it, test is unsuccessful. Scoring: 2 points for each successful attempt on first touch, 1 point for each successful attempt on second touch, 0 points if ball goes outside designated test area, 10 points if ball goes outside test area. total score for all five attempts.

### *Homogeneity and equivalence between two groups*

Homogeneity and equivalence were ensured between experimental and control groups based on abilities assessed in research, which included certain physical and technical skills in football. Tables 2, 3, 4, and 5 illustrate results.

Table 2. homogeneity of sample for control group

Growth indicators	Measurement unit	Mean	Standard deviation	Mediator	Torsion coefficient
Age	Year	12.80	0.788	13	0.407
Height	cm.	1.54	0.106	1.56	0.569-
Mass	Kg.	42.60	7.94	42.70	0.549-

From Table 2, it is clear that research sample for control group is homogeneous in age, height, and mass, as values of skewness coefficient were respectively 0.407, -0.569, 0.549, and all of them are values within ( $\pm 1$ ). This indicates that scores are distributed normally.

Table 3. homogeneity of sample for experimental group

Statistical indicators	Measurement unit	Mean	Standard deviation	Median	Torsion coefficient
Age	year	13.40	0.69	13.50	0.780-
Height	cm.	1.58	0.093	1.59	0.518-
Mass	Kg.	43.70	7.76	42.50	0.136-

Table 3 shows that research sample for control group is homogeneous in age, height, and mass, as values of skewness coefficient were (-0.780, -0.518, -0.136), respectively, and all of these values are within ( $\pm 1$ ). This indicates that scores distributed moderately.

Table 4. Statistical parameters, calculated t-value, and significance of differences for equivalence of research sample members in terms of physical abilities.

Tests	Measurement unit	Control group		Experimental group		Calculated (t) value	Probability ratio	Sig. Level
		M.	St.d	M.	St.d			
60-minute sit-up and jump	Rep.	35.40	3.92	36.50	2.07	0.78	0.443	Insig.
180m Shuttle Run	Sec.	43.06	4.34	40.48	2.04	1.70	0.106	Insig.
Running between markers for a distance of 7m	Sec.	7.76	5.25	7.39	0.60	1.76	0.096	Insig.

From Table 4, it is clear that differences were not significant between individuals of two research groups in physical abilities, as calculated value of (t) was less than probability ratio in all physical abilities, and this indicates equivalence of two groups in physical abilities.

Table 5. Statistical features and value (t) Calculated and significant differences for equivalence of research sample members in terms of skill abilities

Tests	Measurement unit	Control group		Experimental group		Calculated (t) value	Probability ratio	Sig. level
		M.	St.d	M.	St.d			
Controlling ball within 30 seconds	Rep.	37.70	7.35	41.90	7.72	1.25	0.229	Insig.
Passing	Degre	2.00	0.94	1.80	0.63	0.56	0.058	Insig.

towards small target, distance is 20m	e							
Controlling ball's movement from a distance of 6 meters	Degre e	5.50	2.27	7.40	2.32	1.85	0.081	Insig.

From Table 5, it is clear that differences were not significant between individuals of two research groups in skills, as calculated value of (t) was less than probability ratio in all skill abilities, and this indicates equivalence of two groups in skills.

### *Exploratory experiment*

Pilot study is one of most important procedures recommended by scientific research experts to obtain accurate results. It is a preliminary experimental study conducted by the researcher on a small sample before conducting their research, with aim of testing research methods and tools. Pilot study was conducted on 14/7/2025 between 9-11 am at Kiwan Club stadium on a sample of 6 six players from research population, chosen randomly. Objective of this study was ability of support team. Setting a time limit for conducting tests. Suitability of equipment and tools used. Validity of tests. Knowing time period tests take.

### *Exploratory testing of training curriculum*

The researcher, with help of team's coach, conducted a pilot training session on 6 six players from research community on 7/14/2025, at (1-3 pm). These were same players on whom pilot experiment for physical and skill ability tests was conducted, and they were excluded from main experiment. Objective was to ensure that training session was carried out at specified time, to ensure that times set by the researcher were carried out in training session according to working energy systems, to ensure intensity of exercise through appropriate repetitions and matching them, and to identify obstacles and difficulties that may occur in carrying out main experiment.

### *Pre-tests*

The researcher and his team conducted pre-tests after distributing opinion survey forms, questionnaires, and proposed training program to specialists. This took place three days after pilot study and included physical and skill tests, as determined by experts and specialists. Pre-test was administered on July 23-24, 2025, to research sample at Kiwan Sports Club stadium. From 1-3 pm , tests were conducted over two days as follows day 1, July 23, 2025, included following skill tests ball control, passing, dribbling, heading, and dribbling. Day 2, July 24, 2025, included following physical tests strength endurance, speed endurance, agility, and flexibility.

### *Training curriculum*

After completing pre-test, training program was implemented. Program was developed after reviewing principles of sports training science, and it was implemented after making a number of modifications to it following exploratory trial and benefiting from observations of experts in field of sports training science. Prepared training program (Appendix 9) was designed and presented to a group of experts (Appendix 5). This program included design of various exercises using Sensball drills to develop physical and technical skills. First group experimental group trained using Sens ball drills, while control group followed program implemented by trainer. Training program for experimental group consisted of 24 training units, with three training units per week for two months. Training units were conducted on Saturdays, Mondays, and Wednesdays of each week. Program was applied to a portion of main section of training unit, with two average training cycles. The researcher used high-intensity interval training throughout program. Training units were implemented during general preparation period from August 1, 2025, until 20/9/2025, noting that training session lasted between 90-120 minutes.

Notes on training curriculum:

1- The three training sessions were implemented in one week in this manner:

First training session: players perform exercises from a stationary position.

Training session two: players perform exercises from a moving position.

Third training session: player performs running exercises.

2- Exercise volume, exercise intensity, and rest periods in these forms:

Volume of exercise time of performing the exercise is fixed.

Intensity of exercise repetitions varies from few repetitions to many repetitions. Rest between one exercise and another, or between one set and another, at a ratio of 1:3.

3- Part of main section in first week is 42 minutes, and in eighth week (74).

### *Post-tests*

Post-test was conducted on research sample, after completion of training program, in order to determine level of physical and skill abilities reached by research sample, for two days, from 7-8/10/2025, from 1-3 pm, in same context used in pre-test.

### *Statistical methods*

Data were statistically processed using SPSS statistical package to extract following: percentage, mean, standard deviation, independent samples t-test, similar samples t-test, skewness coefficient, chi-squared.

## Results

### *Pre- and post-test results for control group*

Table 6. Statistical parameters of pre- and post-tests of physical abilities for control group.

Tests	Meas ureme nt unit	Pre-test		Post-test		Calcula ted (t) value	Proba bility ratio	Sig. level
		M.	St.d	M.	St.d			
60-second stand-up and jump test from a seated position	Rep.	35.40	3.92	36.80	4.49	1.80	0.105	Insig.
180m shuttle run test with four markers, distance among markers 15m	Sec.	43.06	4.34	42.50	4.37	1.98	0.079	Insig.
Running test among markers for a distance of 7m	Sec.	7.76	0.25	7.43	0.53	2.04	0.071	Insig.

Probability value (probability ratio) is significant when it is  $\leq (0.5)$ . Table (6) shows that there is no statistically significant difference for pre-tests of 60-second sitting jump test, which measures strength endurance, and calculated value of (t) was (1.80). Mean and standard deviation for pre-tests and post-tests and for control group in physical abilities were (35.40) and (3.92), respectively. As for post-tests, mean and standard deviation were (36.80) and (4.49), and probability ratio value is (0.150), which is greater than significance level of (0.5).

As for 180-meter shuttle run test with four markers, which measures ability to endure speed for pre-tests, mean and standard deviation reached (43.06) and (4.34) respectively. As for 180-meter shuttle run test, which measures ability to endure speed for post-tests, mean and standard deviation reached (42.50) and (4.37) respectively. Calculated (t) value reached (1.98), and probability ratio value equals (0.079), which is greater than significance level of (0.5), indicating that there are no statistically significant differences.

It is also evident that for 7m obstacle course test, which measures agility for pre-tests, mean and standard deviation were (7.76) and (0.25), respectively. It is also evident that for 7m obstacle course test, which also measures agility for post-tests, mean and standard deviation were (7.43) and (0.53), respectively. Calculated (t) value was (2.04), and probability ratio value was (0.071), which is greater than significance level of (0.5), indicating that there are no statistically significant differences.

The researcher attributes this to lack of intensive and continuous training on these physical abilities during training units, as (Qasim Hassan Hussein) confirms that training process is “that organized continuous process that gives individual knowledge, skill, ability, ideas and opinions necessary to perform a specific task”.

*Presentation, analysis, and discussion of pre- and post-test results for experimental group*

Table 7. Statistical parameters of pre- and post-tests of physical abilities for experimental group

Tests	Mea sure ment unit	Pre-test		Post-test		Calc ulate d (t) valu e	Proba bility ratio	Sig. level
		M.	St.d	M.	St.d			
60-second stand-up and jump test from a seated position	Number of time s	36.50	2.07	43.90	2.33	6.81	0.000	Sig.
180m shuttle run test with four 15m markers	second	40.48	2.04	39.24	1.61	2.80	0.021	Sig.
Running test among markers for a distance of 7m	second	7.39	0.60	6.45	0.29	4.89	0.001	Sig.

Probability value (probability ratio) is significant when it is  $\leq (0.5)$ .

Table (7) shows that mean and standard deviation of pre- and post-tests for experimental group in physical abilities, as mean and standard deviation of pre-tests for 60-second sitting jump test, which measures strength endurance ability, were (36.50) and (2.07), respectively. Similarly, for post-tests, mean and standard deviation of 60-second sitting jump test, which measures strength endurance ability, were (43.90) and (2.33), respectively. Calculated (t) value was (6.81), and probability ratio value was (0.000), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for 180-meter shuttle run test with four markers, distance between each marker being 15 meters, which measures speed endurance ability, mean and standard deviation for pre-tests were (40.48) and (2.04), respectively. Likewise, for 180-meter shuttle run test with four markers, distance between each marker being 15 meters, which measures speed endurance ability for post-tests, mean and standard deviation were (39.24) and (1.61), respectively. Calculated (t) value was (2.80), and probability ratio value was (0.021), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for 7m obstacle course test, which measures agility, mean and standard deviation of pre-tests were (7.39) and (0.60) respectively. Similarly, for 7m obstacle course test, which measures agility, mean and standard deviation of post-tests were (6.45) and (0.29) respectively. Calculated (t) value was (4.89), and probability ratio value was

(0.001), which is less than significance level of (0.5), indicating existence of statistically significant differences.

Significance of differences points to effectiveness of training program developed by the researcher, which was based on scientific principles and fundamentals of designing exercise programs using Sensball. This is evident in results of this group, as program significantly impacted players' physical performance and development, which is of paramount importance for football players. This was confirmed by Saad Munim and Hefal Khurshid, who stated that training is an educational process built on scientific foundations that develops player's physical abilities, enhances their technical skills, and provides them with diverse tactical experiences. Furthermore, it cultivates willpower and refines moral qualities of a player, all within a well-planned and structured training program aimed at enabling all team members to reach highest level of athletic performance in order to achieve training objective: winning matches. Regarding result of 60-second standing and jumping test, which measures strength endurance, the researcher attributes significance of differences to correct application of training method and its inherent characteristics and advantages that contributed to its development, as well as to program's components. Training, for specified period, included exercises aimed at developing this quality, as repetition of exercises using Sensball during specific times and repetitions, with a focus on good performance through adjusting technique, as focused during performance of sample members of these exercises on precise technique of performance during time specified for performing each exercise.

As for 180m shuttle run test, which measures speed endurance, the researcher attributes significance of differences to method used in determining intensity and giving it rest periods that are appropriate to interval training method and with a load ratio of (1:3), which was determined with extreme precision in intensity, volume, and rest between repetitions and between sets. We must not forget method that was implemented during designed exercises, which are exercises using Sensball and its variety, so that works in suitable conditions that help him raise level of physical readiness. In addition to variety of exercises and physical abilities that the researcher used by performing exercises in a fixed position, from movement, and from running over course of week that passed, training had a comprehensive characteristic, and this helped to develop physical abilities greatly. Comprehensive and balanced training of all physical abilities helps to develop those abilities to a greater extent than training physical ability alone. The researcher attributes existence of significant differences between results of pre- and post-tests of experimental group for 7m running test between spikes, which measures agility characteristic, to fact that prepared training program worked to develop this characteristic because it met players' physical needs in a modern scientific manner and with a methodology directed towards goal of development and raising level of players.

#### *Post-test results for control and experimental groups*

Table 8. Statistical parameters of post-test of physical abilities for control and experimental groups.

Tests	Mea sure ment unit	Control group		Experiment al group		Calc ulate d (t) valu e	Proba bility ratio	Sig. level
		M.	St.d	M.	St.d			
60-second stand-up and jump test from a seated position	Rep.	36.80	4.49	43.90	2.33	4.44	0.00	Sig.
180-meter shuttle run test with four markers, distance among markers 15m	Sec.	42.50	4.37	39.24	1.61	2.22	0.04	Sig.
Running test among markers for a distance of 7m	Sec.	7.43	0.53	6.45	0.29	5.11	0.00	Sig.

The probability value (probability ratio) is significant when it is  $\leq (0.5)$ .

It is evident from looking at Table (8), which shows mean and standard deviation of post-tests for control and experimental groups in physical abilities, in test of standing up and jumping from a seated position for 60 seconds, which measures strength endurance ability of control group, mean and standard deviation reached (36.80) and (4.49) respectively. As for test of standing up and jumping from a seated position for 60 seconds, which measures strength endurance ability of experimental group, mean and standard deviation reached (43.90) and (2.33) respectively. Calculated value of (t) reached (4.44), and value of probability ratio is equal to (0.00), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for 180m shuttle run test, which measures speed endurance ability of post-tests for control group, mean and standard deviation reached (42.50) and (4.37) respectively. Likewise, for 180m shuttle run test, which measures speed endurance ability of experimental group, mean and standard deviation reached (39.24) and (1.61) respectively. Calculated (t) value reached (2.22), and probability ratio value equals (0.04), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for 7m obstacle course test, which measures agility ability of post-tests for control group, mean and standard deviation were (7.34) and (0.53) respectively. Likewise, for 7m obstacle course test, which measures agility ability of experimental group, mean and standard deviation were (6.45) and (0.29) respectively. Calculated (t) value was (5.11), and probability ratio value was (0.00), which is less than significance level of (0.5), indicating existence of statistically significant differences.

The researcher attributes significance of differences in all physical tests to validity of training method used, which relied on exercises using Sensball, indicating that this type of exercise had a positive effect on development that occurred in strength endurance as well as speed endurance (3). The researcher sees reasons for development as fact that organized training works to develop physical aspect by effect of exercises performed by athlete during training units, which constitute a fundamental and important factor in bringing about required adaptation process.

*Pre- and post-test results for control group*

Table 9. Statistical parameters of pre- and post-tests of skill abilities of control group

Tests	Meas ureme nt unit	Pre-test		Pre-test		Calcul ated (t) value	Proba bility ratio	Sig. level
		M.	St.d	M.	St.d			
Controlling ball within 30 seconds	Rep.	37.70	7.35	39.70	6.60	1.30	0.227	Insig.
Passing towards small target, distance is 20m	Degre e	2.00	0.94	3.00	1.05	2.24	0.062	Insig.
Controlling ball's movement from a distance of 6 meters	Degre e	5.5	2.27	6.5	1.96	1.17	0.273	Insig.

Probability value (probability ratio) is significant when it is  $\leq (0.5)$ .

It is evident from looking at Table (9), which shows mean and standard deviation for pre-tests, post-tests, and control group in skill abilities, that mean and standard deviation, respectively, for pre-tests of test of controlling ball for greatest number of times within 30 seconds, which measures ability to control, reached (37.70) and (7.35). As for post-tests of test of controlling ball for greatest number of times within 30 seconds, which measures ability to control, mean and standard deviation, respectively, reached (39.70) and (6.60). Calculated value of (t) was (1.30), and value of probability ratio is (0.227), which is greater than significance level of (0.5), indicating that there are no statistically significant differences.

As for passing test towards small target that is 20m away, which measures passing accuracy ability of pre-tests, mean and standard deviation reached (2.00) and (0.94) respectively. As for passing test towards small target that is 20m away, which measures passing accuracy ability of post-tests, passing mean and standard deviation reached (3.00) and (1.05) respectively. Calculated (t) value reached (2.24), and probability ratio value equals (0.062), which is greater than significance level of (0.5), indicating that there are no statistically significant differences.

As for test of controlling ball's movement from a distance of 6 meters inside a 2-meter square, which measures damping ability of pre-tests, mean and standard deviation reached (5.5) and (2.27) respectively. As for test of controlling ball's movement from a distance of 6 meters inside a 2-meter square, which measures damping ability of post-tests, mean and standard deviation reached (6.5) and (1.96) respectively. Calculated (t) value reached (1.17), and probability ratio value equals (0.273), which is greater than significance level of (0.5), indicating that there are no statistically significant differences.

Attributes lack of significant differences in all skill abilities to methodology followed by trainer, as it did not reach level of significance. This may be due to lack of scientific organization of training units that ensures development among sample members. It may

also be due to limited exercises used in methodology followed, in addition to most trainers relying on personal experience in implementing training units without referring to basics of known training methods. This is because sports training is "an educational process that is subject to practical foundations and principles and aims primarily to prepare individual to achieve highest possible athletic level in a specific type of sports activity".

*Pre- and post-test results for experimental group*

Table 10. Statistical parameters of pre- and post-tests of skills abilities of experimental group

Tests	Mea sure ment unit	Pre-test		Post-test		calc ulate d (t) valu e	Proba bility ratio	Sig. level
		M.	St.d	M.	St.d			
Controlling ball within 30 seconds	Rep.	41.90	7.72	52.80	5.05	3.43	0.008	Sig.
Passing towards small target, distance is 20m	Degr ee	1.80	0.63	4	0.94	6.13	0.00	Sig.
Controlling ball's movement from a distance of 6 meters	Degr ee	7.4	2.32	8.50	1.72	2.54	0.032	Sig.

Probability value (probability ratio) is significant when it is  $\leq (0.5)$ .

It is evident from looking at Table (10), which shows mean and standard deviation for pre- and post-tests for experimental group in skill abilities, that mean and standard deviation, respectively, for pre-tests for test of controlling ball for greatest number of times within 30 seconds, which measures ability to control ball, reached (41.90), (7.72), and likewise for post-tests, mean and standard deviation, respectively, for test of controlling ball for greatest number of times within 30 seconds, which measures ability to control ball, reached (52.80), (5.05), and calculated value of (t) reached (3.43), and value of probability ratio is equal to (0.008), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for passing test towards small target that is 20 meters away, which measures passing accuracy ability, mean and standard deviation of pre-tests reached (1.80) and (0.63) respectively. Likewise, for passing test towards small target that is 20 meters away, which measures passing accuracy ability of post-tests, mean and standard deviation reached (4) and (0.94) respectively. Calculated (t) value reached (6.13), and probability ratio value equals (0.00), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for test of controlling ball's movement from a distance of 6m inside a 2m square, which measures damping ability, mean and standard deviation for pre-tests reached (7.4) and (2.32) respectively. Likewise, for test of controlling ball's movement from a distance of 6m inside a 2m square, which measures damping ability for post-tests, mean and standard deviation reached (8.50) and (1.72) respectively. Calculated (t) value

reached (2.54), and probability ratio value equals (0.032), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for significance of test of controlling ball for greatest number of times within 30 seconds, which measures skill of being able to control ball in air within 30 seconds, it is due to what exercises using Sensball included in terms of physical and skill abilities in training units according to a precise scientific method, which are similar to what happens in match and are repeated extensively, which is considered basis of game, and controlling ball is one of basic rules and a first step in implementing other skills such as dribbling, passing, or shooting at goal.

#### *Post-test results for control and experimental groups*

Table 11. Statistical parameters of post-test of skill abilities for control and experimental groups

Tests	Meas ureme nt unit	Control group		Experimen tal group		cal cul ate d (t) val ue	Prob abili ty ratio	Sig. level
		M.	St.d	M.	St. d			
Controlling ball within 30 seconds	Rep.	39.70	6.60	52.80	5.05	4.98	0.000	Sig.
Passing towards small target, distance is 20m	Degre e	3.00	1.05	4.00	0.94	2.24	0.038	Sig.
Controlling ball's movement from a distance of 6 meters	Degre e	6.50	1.96	8.50	1.72	2.43	0.026	Sig.

Probability value (probability ratio) is significant when it is  $\leq (0.5)$ .

It is evident from looking at Table (11), which shows mean and standard deviation of post-tests for control and experimental groups in skill abilities, that in test of controlling ball for greatest number of times within 30 seconds, which measures ability to control ball for control group, mean and standard deviation reached (39.70) and (6.60) respectively, and likewise for test of controlling ball for greatest number of times within 30 seconds, which measures ability to control ball for experimental group, mean and standard deviation reached (52.80) and (5.05) respectively, and calculated value of (t) reached (4.98), and value of probability ratio is equal to (0.000), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for passing test towards small target that is 20 meters away, which measures passing accuracy ability of post-tests for control group, mean and standard deviation reached (3.00) and (1.05) respectively. Likewise, as for passing test towards small target that is 20 meters away, which measures passing accuracy ability of experimental group, mean and standard deviation reached (4) and (0.94) respectively. Calculated (t) value reached (2.24), and probability ratio value equals (0.038), which is less than significance level of (0.5), indicating existence of statistically significant differences.

As for test of controlling ball's movement from a distance of 6m inside a 2m square, which measures damping ability of post-tests for control group, mean and standard deviation reached (6.50) and (1.96) respectively. Likewise, for test of controlling ball's movement from a distance of 6m inside a 2m square, which measures damping ability of experimental group, mean and standard deviation reached (8.50) and (1.72) respectively. Calculated (t) value reached (2.43), and probability ratio value equals (0.026), which is less than significance level of (0.5), indicating existence of statistically significant differences.

Although our research have not directly measured mental training, a study by Karim et al. (2025) demonstrated a relationship between mental training and decision-making speed. This suggests that Sensball exercises, by imposing a high level of concentration (similar to mental training) between player and ball, contribute to development of cognitive aspects (such as decision-making) in parallel with skill-based aspects.

The researcher attributes these differences in all skill tests to diverse use of Sensball method, encompassing both movement and stillness, as well as application of scientific principles in executing exercises through controlled training components. Sports training experts emphasize that "diversifying training methods and subjecting them to scientific principles contributes to development of training process and allows principle of adaptation to clearly influence athletes' physical and skill levels". Therefore, the researcher believes that controlling components of training load, method of performing exercises and their suitability to targeted ability, nature of repetitions, specific Sensball technique used, and interval training method that relies on incomplete rest all contributed to positive changes and developments in various physical and skill abilities, thus raising level of technical performance.

## **Conclusions**

In light of research objectives and hypotheses, and within limits of the research sample, research methodology used, and nature of statistical methods used to analyze results, the researcher reached following conclusions: training method used have not shown a clear and real improvement in physical and skill abilities of junior football players in control group. Exercises using Sensball had an impact on development of physical and skill abilities in post-test results and in all abilities under study. There is an advantage to effect of Sensball exercises in developing physical and skill abilities for post-tests for both groups, and in favor of experimental group in physical and skill abilities.

## **Recommendations**

In light of conclusions reached by the researcher, the researcher recommends following: to utilize exercises prepared by the researcher in building similar curricula to develop some of physical and skill-related abilities of football players aged 10-13. Utilize research findings and use Sensball exercises when training football players aged 10-13 year. Design other exercises using Sensball for other physical abilities that are appropriate to type of skill and then identify their effect on those skills. When using Sensball exercises, you should choose exercises that resemble type of activity.

Conducting similar studies to determine impact of exercises using Sensball on level of certain abilities in other activities.

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