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The effect of SAQ trainings in developing some anaerobic abilities and basic skills of table tennis players

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Abstract

The physical abilities of table tennis players are crucial in determining their success in the sport. In order to develop those physical aspects and abilities modern training methods should be applied, such as speed, agility and quickness (SAQ) method, this type of training method enhances anaerobic capabilities. The study aims to prepare specific training program using SAQ method to develop some anaerobic abilities as well as some basic skills of table tennis players. 6 male players of Brayate sport club selected as study population and sample. The experiment design of one independent sample used in the study. The duration of SAQ training program lasted for 6 weeks within 3 training units per week. The findings of the study show that SAQ training is an effective method of training to develop physical components, in addition, the results show an improvement in the game basic skills. Physical fitness significantly impacts table tennis performance through the development of agility, speed and strength.

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Introduction:

Table tennis is a demanded sport that requires high levels of various physical aspects. The physical abilities of players are crucial in determining their success in the sport. It is well known that sport training especially aims to complete preparation of athletes for high level competition, therefore trainings must be comprehension in terms of physical, skills, psychological and physiological preparation, and it is coaches' duty to apply a training method which appropriates with the players abilities and leads to physical and performance improvement. (Jabbar et al., 2023)

In order to develop those physical aspects and abilities modern training methods should be applied, such as speed, agility and quickness (SAQ) method, this type of training method enhances anaerobic capabilities, and it is the ability of rapid cover of distances (Bompa & Buzzichelli, 2019) Agility is defined as a complex set of interrelated skills enable athletes to respond to a stimulus with deceleration, (Kadhim, 2024)change of direction and reacceleration. Likewise, it is quick change of body position during movement without losing balance (Twist & Benicky, 1996). While quickness is reading the processes in the surrounding with appropriate response and explode quickly and power to maximize athlete's time (Mark & Todd, 2007). The outcomes of several studies indicate that applying SAQ trainings regularly improve overall performance especially response time, coordination and balance. Beyond the gym or athletic field, these improvements are applicable to daily life, simplifying repetitive tasks and lowering the chance of injury.

Speed, Agility, and Quickness (SAQ) training is a method of training program designed to performance enhancement and improving athletic functional movement in various activities. The focus in this training method is on three key components which are (speed, agility, and quickness). These abilities are necessary for who participates in recreational sports. The benefits of the SAQ training are not only for athletes but also for everyday activities helping in developing physical fitness in general and stability and coordination in particular through incorporating various movements include differ motion phases. SAQ trainings can be applied 2-3 times a week according to the training objectives. Common examples of SAQ trainings are figure-8 run, wall drills and L.E.F.T. drills, these drills improve patterns of dynamic movement and cardiovascular fitness (Henriques, 2014)

SAQ trainings are crucial to be used in order to develop anaerobic abilities due to its importance and effectiveness. It is a program that designed specifically to assist players' speed and agility performances and develop sprint abilities during matches (Pearson, 2001) The SAQ training focuses on high rated short-time performance movement tasks, this type of movements in trainings require quickness in which depends on anaerobic energy system, meaning that applying a range of movement objectives, including forward and backward running, lateral shuffles, and ladder drills, this method of training enables rapid transitions, movement coordination, and reaction time (Trecroci et al., 2022) coordination and balance components can be enhanced by SAQ drills, these two components are essential skills for athletes. performing agility drills show regularly leads to improvements in overall coordination of athletes, which translates to better performance in their respective sports (Gabbett, 2016) Meanwhile, speed is players ability of rapid change of direction, accelerate, decelerate, cut, and tur, which has an important role in reducing the risks of injuries and optimizing the high-intensity performance (Jovanovic et al., 2011)

SAQ trainings can cover various training intensities from low to high (Azmi & Kusnanik, 2018) In order for a table tennis player to be successful in the game should have correct movement skills while the game require movement in all directions and rapid reactions to the ball. A single program of SAQ trainings can affect different types of physical aspects of players states, and improves dynamic balance abilities in addition to increasing capabilities in controlling the game (Al-Diwan et al., n.d.) Efficient movement require not only speed and agility, but also quickness (Jassim, 2022)

As a former professional player who now teaches at a university, the researcher observed training methods in a few table tennis clubs. Some of the trainers, like Brayate Sport Club, lacked the knowledge to use the modern training methods and programs that fit the table tennis game's needs, which resulted in sporadic improvements in physical abilities and skills. Consequently, the researcher provides a training program that uses the SAQ training method, enabling players to appropriately develop their skills in accordance with the demands of the game. The study aims to prepare specific training program using SAQ method to develop some anaerobic abilities as well as some basic skills of table tennis players. The researcher hypothesis that there is no significant difference between the pre and post test results of physical and skill tests, and the study attempts to reject that hypothesis.

Methodology:

6 male players of Brayate sport club selected as study population and sample. The characteristics of (age, height and weight) are presented in table (1). None of the sample individuals had serious injuries or illness.

Table (1)

Variables	mean	Standard deviation
Age	15.4	1.3
Height	168.5	5.9
Weight	56.6	4.7

Procedures:

The researcher used the experiment design of one independent sample with pre and post tests. After determining the physical and performance tests, the players agreed to change their training habits, therefore, the researchers run an exploratory experiment in (Wednesday 2/10/2024) in order to determine the tools required, ability of participants to apply the test, required time for each test as well as data recording procedure. The statistical package of social sciences (SPSS) is used for data analysis.

The pre-tests were conducted on (Sunday 6/10/2024) to record the sample data before applying prepared training program units. The physical tests of (20m spring, lateral change of direction and ruler drop) were selected to test physical abilities along with the performance tests of (forehand, backhand and stroke) for the basic skills of the sample.

The duration of SAQ training program lasted for 6 weeks within 3 training units per week, a total of (18) training session applied, each session varied in time according to the session objectives. The training intensity, volume and rest time is considered in which suits with players physical abilities and performance level starting with low intensity with gradual increase in the intensity volume until reaches its peak.

Then the post tests were proceeded on (Sunday 17/11/ 2024) after finishing of applying all the training units under the same conditions of the pre-test. A unit of the training program is illustrated in appendix (1).

Results:

Table (2) shows the results of pre and post tests for physical variables

variables	Pre tests		Post tests		(t) value	significant
	mean	s.d	mean	s.d		

20m print (second)	4.5	0.4	4.1	0.3	6.2	0.05
Lateral change of direction (second)	4.2	0.5	3.9	0.2	3.7	0.05
Ruler drop (cm)	19.7	1.2	16.6	1.8	5.9	0.04

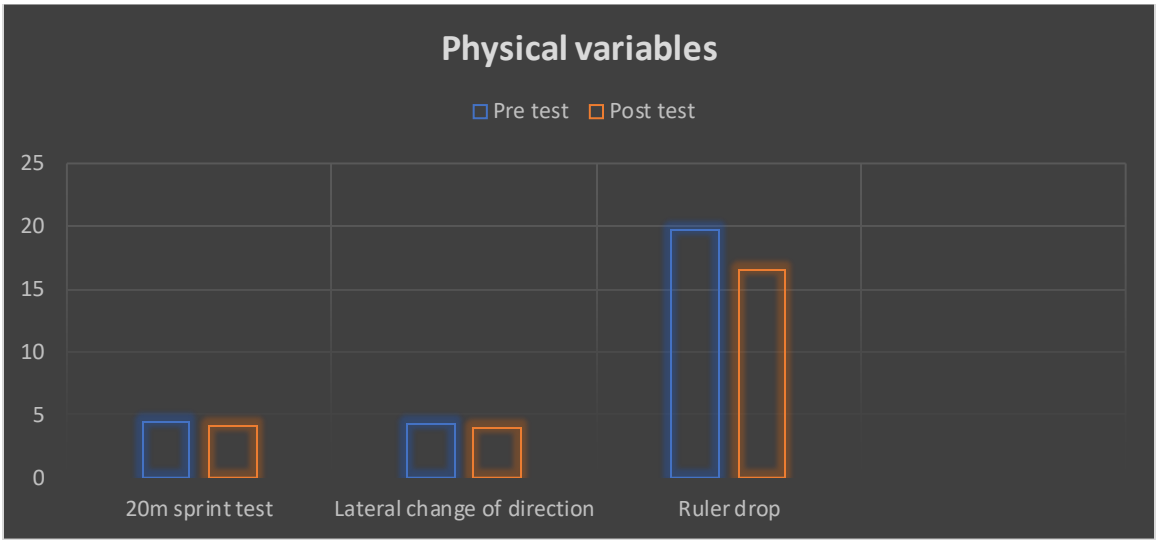

Chart (1) illustrates the comparison of pre and post tests for physical variables

Table (2) shows the results of pre and post tests for physical variables (20m print (second), Lateral change of direction (second) and Ruler drop (cm)). The pre-test means of the physical variables were (4.5, 4.2, 19.7) respectively, meanwhile the mean of the post tests for the same variables were (4.1, 3.9, 16.6) respectively, with the significant of (0.05, 0.05, 0.04). while the significant outcomes are smaller than (0.05) means there are statistically significant differences between the results of the pre and post teste and in advantage of the post tests.

Table (3) show the results of basic skills

variables	Pre tests		Post tests		(t) value	significant
	mean	s.d	mean	s.d		
Forehand	16.2	0.8	17.5	1.5	3.58	0.04
Backhand	14.6	1.2	15.2	1.9	5.11	0.07
Forehand stroke	14.9	1.4	15.8	2.1	4.37	0.05

Table (3) shows the results of performance skills (forehand, backhand and forehand stroke) of the sample. The means of the pre test were (16.2, 14.6,14.9) respectively. Meanwhile the means of the post test were (17.5, 15.2,15.8) respectively. The (t) values for the same tests were (3.58, 5.11, 4.37) with significant of (0.04, 0.07, 0.05). the significant outcomes are smaller than (0.05) which illustrates significant differences between the outcomes of the pre and post teste and in

advantage of the post tests except for the backhand hit skill which shows significant value greater than (0.05) meaning that there is no significant difference between pre and post tests for this test.

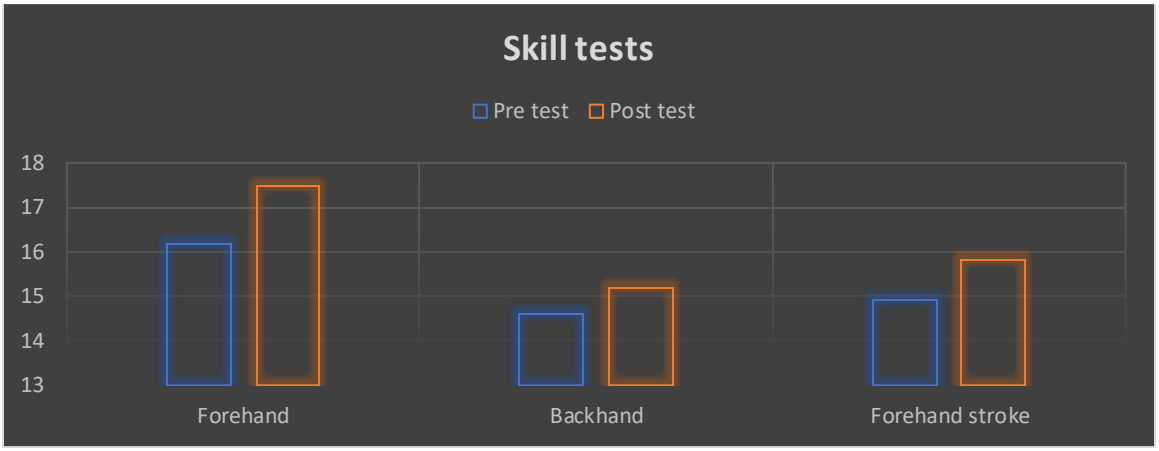

Chart (2) illustrates the comparison of pre and post tests for skill tests

Discussion:

The findings of the study show that SAQ training is an effective method of training to develop physical components. Therefore, these findings reject the null hypothesis and accept the alternative hypothesis, in addition, the results show an improvement in the game basic skills. These results supported by outcomes of several researches, for example (Azmi & Kusnanik, 2018) states that SAQ training is a complex exercise enhance the physical fitness of players. It sought to determine the preparation of Speed, Agility, and Quickness (SAQ) training on developing the effective movement of tennis players as well as the influence of SAQ training on developing the effective movement of tennis players, according to the study analysis. "SAQ exercises works as a system with specific instruction aimed to improve basic motor skills and athletes' capacity to level up their skill at faster speeds featured with higher precision.

likewise, it cultivates the capacity to apply maximal force when engaging in high-speed movement activities. (Velmurugan & Palanisamy, 2012) reported that SAQ trainings are advantageous in developing physical systems that require rapid movements in order to be more energetic, moreover, motor abilities depend on the body balance and coordination from the player especially during playing the sport. Pearson's (2006) assertion that the "SAQ training program develops both of general and activity physical fitness levels and improve athletes' performance during matches.

The relationship between physical fitness and table tennis performance is significant and multifaceted. Table tennis is a sport featured with high-intensity, such type of sports requires various components of physical attributes, including agility, speed, strength, endurance, and coordination. These components of physical fitness directly influence a player's on-court performance. Another essential component for table tennis players is speed, players with higher speeds can reach the ball faster, increasing their chances of executing effective shots. The results of the study show that the experiment group overcome the control group and achieved a progression in sprint test time. This improvement in time reduction belongs to the effectiveness of the SAQ trainings applied by the experiment group. This result is similar to the outcome of the (Lee et al., 2024) study that 8-week of training method improves sprint performances over 20- and 30-m.

Agility in table tennis represents skills such as accurate reading and rapid respond to the surrounding situations that require fast decision making and visual scanning to enable players of appropriate direction changing and having better positioning during training and matches.(Khalaf et al., 2018) The results of the current study show the significant difference between experiment and control groups and in advantage of the experiment group. The SAQ trainings applied by the experiment group led to an improvement in players agility. This finding is similar to previous research, which reduced time in the reactive agility test through SAQ training (Trecroci et al., 2016)

The nature of table tennis requires strong skills and fast movements and the game method is not constant. In order for a player to play strong on the ball should have high level of technical pace skills that dependable in the game such as forehand, backhand, pull and push. Now when it comes to table tennis, the main part of the skill is the level of speed along with agility. In a match, the primary focus is on the accurate and firm strokes, along with the precision of foot movement. There is scientific evidence that supports the claim that athletes have developed a trained method that improves the sensitivity while increasing the strength and speed of the body. This form of training enhances the movements that an athlete is capable of executing effectively and, it also improves the activities performed by athletes. Injuries that arise during competitions can to a certain extent be reduced with maximum sensitivity while performing movements to increase muscle speed. With the changes in the rules of table tennis, the pace of the competition

has certainly increased and so has the intensity of the competition. Athletes need to possess excellent muscle and cardiovascular fitness (Zhan & Cui, 2023)

Conclusion:

It is well known that developing components of physical fitness like (agility, speed and strength) directly affects table tennis performance. These physical abilities not only support compound and complex movements, but also involve in competitive success and overall athleticism. One of the main essential points in trainings programs aiming to improve performance is precise use of these components. These attributes not only enhance a player's ability to perform complex movements but also contribute to and. For players aiming to improve their performance, a well-rounded fitness regime that targets these physical components is essential.

Recommendations:

1- Further researches should be conducted on differ physical fitness components of the sample including coordination, flexibility and endurance.
2- Conducting similar studies on differ sample in age and gender.
3- In order to introduce decent methods of exercise science including SAQ trainings, seminars and workshops for table tennis coaches must be hold.

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Conflict of Interest

The author declares no conflict of interest.

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Appendix (1)

SAQ Training Unit

Exercise	Description	Reps/Sets	Rest	Intensity	Time Spent per Set (mins)
1. Ladder Drills (Quick Feet)	Quick steps in and out of the ladder, focusing on foot speed.	3-4 sets, 20-30 seconds per set	30-45 seconds between sets	Moderate (7/10 effort, focus on foot speed)	3-4 minutes (Total)
2. Cone Weaving	Weave through 6-8 cones in a zig-zag pattern for quick direction change.	3-4 sets, 10-15 seconds per set	30-45 seconds between sets	Moderate (7/10 effort, sharp turns focus)	3-4 minutes (Total)
3. Shuttle Runs	Sprint 10 meters to a marker, touch the ground, sprint back.	4-6 sets, 10 meters each	30-45 seconds between sets	High (8/10 effort, fast acceleration)	5-7 minutes (Total)
4. Reaction Ball Drills	Catch a reaction ball after it bounces unpredictably.	3-4 sets, 30 seconds per set	30 seconds between sets	High (9/10 effort, focus on fast reflexes)	3-4 minutes (Total)
5. Box Drills	Perform sprint, shuffle, and backpedal around a box of 4 cones.	4-6 sets, 20 seconds per set	30-45 seconds between sets	High (8/10 effort, coordination focus)	5-6 minutes (Total)
6. Table Tennis Specific Footwork	Shadow forehand, backhand, and lateral movement, simulating actual play.	3-4 sets, 10-15 reps per side	30 seconds between sets	Moderate to High (7-8/10 effort, focus on technique)	5-6 minutes (Total)
7. Suicide Sprints	Sprint back and forth between markers in a set pattern.	4-5 sets, 15-20 meters each	30 seconds between sets	High (9/10 effort, explosive speed)	5-7 minutes (Total)
8. Tennis Ball Toss	Partner tosses a ball; player moves to catch it quickly.	3-4 sets, 30 seconds per set	30-45 seconds between sets	High (8-9/10 effort, focus on fast reaction time)	3-4 minutes (Total)
9. Zig-Zag Sprint	Sprint in a zig-zag pattern around cones for agility and speed.	4-6 sets, 20-25 meters each	30 seconds between sets	High (8/10 effort, lateral movement focus)	5-7 minutes (Total)
10. Shadow Table Tennis Drills	Perform footwork drills while pretending to hit balls (shadow play).	3-4 sets, 20-30 seconds per set	30 seconds between sets	Moderate (7/10 effort, smooth, controlled movement)	5-6 minutes (Total)

Total Time for Each Workout Session:

- **Warm-up (10-15 minutes):**
  - Dynamic stretching and light jogging or footwork drills to prepare the body.
- **Main Workout (SAQ Drills):**
  - For a moderate-intensity session, this workout differs in time (depending on the number of sets and rest time).
- **Cool-down (5-10 minutes):**
  - Light jogging or walking, followed by static stretching focusing on hamstrings, quads, calves, and shoulders.

Total Time Spent per Workout:

- **Total Duration:** 40-60 minutes (including warm-up, main workout, and cool-down).
  - If performing all 10 exercises, this would take around **50-60 minutes**, with appropriate rest periods between sets and exercises.
  - For a shorter, more focused session, **5-7 exercises** can be performed, reducing the total time to **40-45 minutes**.

Intensity Guidelines:

- **Moderate (7/10 effort):** working pace is challenging for the player, good form throughout the drill must be stable. This level focus on improving control, technique, and quick foot movement.
- **High (8-9/10 effort):** Players should be pushing their limits during high-intensity drills, focusing on fast bursts, sharp direction changes, and rapid reactions.
- **Maximum (10/10 effort):** For drills like **reaction ball drills**, players should be exerting themselves at full intensity, reacting as quickly as possible without sacrificing form.

Progression Over Time:

- **Increase intensity** by reducing rest times or increasing the number of repetitions.
- **Gradually extend the drill duration** (e.g., from 20 to 30 seconds per set) as the player becomes more skilled.
- **Add complexity** for example: reaction drills (e.g., responding to visual or auditory cues) or raising the difficulty of footwork (e.g., adding cross-over steps during shuttle runs).

By maintaining this structured training plan, the player will develop improved speed, agility, coordination, and reaction time—skills critical for excelling in table tennis.