



ANALYTICAL STUDY OF SOME STEP VARIABLES AND RATE SPEED RUNNING THE 200-METER EFFICIENCY CURVE AND ACHIEVEMENT

Instructor Riyadh Jassim Mohammed

Directorate of Education Al - Qadisiyah

reead19755@gmail.com

Article history:	Abstract:
<p>Received: 20th January 2024 Accepted: 11th March 2024</p>	<p>Athletics events are distinguished by their digital achievements (fastest, farthest, highest). Among these events is the 200-meter running event, which has a special nature because the athlete runs the first half in the form of an arc and the second half in the form of a straight line. The variables that occur during arc running on the runner's body play a major role in the achievement through the mechanical position of the runner's body during arc running. . The importance of the current research lies in the fact that arch running in the (200 m) is different from running events, so the mechanical conditions are more difficult for the 200 m runner than for the rest of the runners of longer-distance events. Therefore, the research problem focused on studying some of the biomechanical variables in running the arc (200 m). Which affects the mechanical situation and its relationship to achievement. The study aimed to know the effect of the variables studied in the curve time of (100 m) and completion of (200 m), on the players of the national athletics team in running (200) meters, numbering (4) competitors. After anthropometric measurements were taken of the players, a field experiment was conducted in a monument Eleven cameras were used to photograph the curve for the first and second distances of (100 metres) to measure the variables of the study (step - average speed for completing 200 metres). By processing the results, the researcher concluded that there was a fluctuation in speed between increase and decrease in the areas that the researcher specified for every (10 metres), as well as The exaggerated increase in stride length led to a decrease in speed and irregularity in stride length and number, which made the runner not run on a curved line adjacent to the field. Through the conclusions, the researcher recommends the need for our coaches to focus when training our runners on increasing speed (acceleration) in the arc, so that the runners continue at the same level after They must reach the highest speed, and there must be a clear plan for the runner so that he can cover the 200 meters at high speed and not exaggerate the stride length and focus on combining the appropriate stride length with high repetitions to obtain the highest speed in arc running</p>

Keywords: stride length and frequency - speed rate - achieving the 200m event

Definition of the research:(Summary)

1- Introduction and importance of research:-

Athletics events are distinguished by digital achievements (the fastest, farthest and highest) and that reaching these achievements can only come through the use of the best scientific methods in order to obtain an advanced digital level in these events.

World records for athletics have evolved as a result of the development of science and technology in detecting obstacles to obtaining the best numbers in events and addressing those obstacles in scientific ways, and among the sciences that helped the development of sports achievement in general is biomechanics (biomechanics) as "it is the field in which all knowledge, information and research methods associated with the structural and functional formation of the musculoskeletal system in humans are applied"¹⁽¹⁾

¹⁽¹⁾ Talha Hossam El-Din, Biomechanics, Theoretical and Applied Foundations. Cairo, applied Dar Al-Fikr Al-Arabi, 2002, p. 7.

Biomechanics is one of the modern sciences that have influenced the scientific progress of human motor performance, which specialized in sports movement and technical performance, which had a great impact on the progress of modern records. One of the most exciting and interesting athletics events for the audience is the fast running events, which are characterized by the intensity of competition and the short time of their performance, which sometimes makes it difficult for the viewer to know the positions of the winners, except through high-speed imaging devices to determine these centers.

One of these activities is the event of running the (200 m), which has a special because the athlete runs in which the first half is in the form of an arc and the second half in the form of a straight, and the variables that occur during the arc run on the runner's body play a major role in achievement through the mechanical position of the runner's body while running the arc.

The importance of the current research lies in the fact that the arc running in the (200 m) is different from the rest of the runner, the speed of the runner in the arc of (200 m) is faster than the speed of the runner in the (400 m) and (800 m), so the mechanical conditions are more difficult for the runner of the (200 m) than the rest of the runners of the longest-distance events, so the researchers decided to study some of the kinematic variables in running the arc of (200 m).

1-2 Research problem: -

The difficulty of breaking the Iraqi record in running the (200 m) for a long period of time, and after the Iraqi number from the world record, despite the fact that the means of training have become clear and with accurate results, is a realistic problem suffered by our runners, and perhaps one of these reasons is the lack of any analytical study within the country of the Iraqi champions to know the level of Iraqi runners in the technical performance during the arc run of (200 m) and its relationship to achievement, so the researcher decided to study some biomechanical variables in the arc running (200 m) affecting the mechanical situation and its relationship to achievement.

1-3 Research Objectives:

The current research aims to:

- 1- An analytical study of some step variables and the average speed of running the curve (200 m) and the achievement of the Iraqi champions.
- 2- Knowing the effect of the studied variables on the time of the curve (100 m) and the achievement of (200 m).

4.1 Impose research

1-4 Research Areas:

The areas of research are determined by the following:

- 1- Human field: Iraq's champions in running (200 m) and their number is (4) runners.
- 2- Spatial field: Athletics stadium at the Faculty of Physical Education / Al-Jadriyah.
- 3- Time Domain: The experiment was conducted from 10/8/2023 to 3/9/2023.

3. Research Methodology and Field Procedures:

3.1 Research Methodology:

The researcher used the descriptive research methodology, which "is concerned with clarifying the reality of accidents, and determining their present facts through analysis and evaluation for the purpose of drawing important conclusions to correct or update this reality or develop new knowledge of it" ⁽²⁾ which is the appropriate approach to the nature of the current research problem.

3-2 Research Sample:-

"A sample is the group examined or monitored on which the experiment is carried out and consists of one or two or more persons."³ The research sample consisted of (4) runners representing the best runners of the Iraqi national team in running (200 m) for the 2021 sports season, and Table (1) shows the anthropometric measurements of the research sample.

Table (1)

Shows the values of anthropometric measurements, their arithmetic means, and their standard deviations of runners

²Mohamed Hassan Allawi, Osama Kamel Rateb : Scientific Research in Physical Education and Psychology, Cairo, Dar Al-Fikr Al-Arabi, 1999 , p. 217.

³ Wajih Mahgoub, Kinetic Analysis. Baghdad, Ministry of Higher Education and Scientific Research Press, 2001, p. 216.

Aquarium width cm	Shoulder width cm	The length of the forearm cm	The length of the humerus cm	Arm length cm	Leg length cm	Thigh length cm	The length of the leg cm	Trunk length cm	Body length cm	Variables
27	37	21	34	55	55	47	102	44	167	Runner No. 1
28	42	27.5	31	58.5	48	53	101	48	173	Runner number 2
27	39	28	37	61	51	54	105	45	170	Runner number 3
28	37	26	31	57	47	56	103	60	187	Runner number 4
27.5	38.75	25.3	33.25	57.88	50.25	52.5	102.75	49.25	174.25	Arithmetic mean
0.58	2.39	3.20	2.87	2.53	3.59	3.87	8.66	7.37	8.25	Standard Deviation+
1	5	7	6	6	8	9	19	16	20	extent

3.3 Means of collecting information and devices used:

3.3.1 Means of collecting information:

- Arab and foreign sources.
- Software and applications used in the computer.
- Observation and analysis.
- Personal Interviews

3.3.2 Used devices:

The researcher used the tools through which he was able to collect data and operate the devices, which are as follows:

- 5 video cameras of the type (Panasonic).
- laptop
- Laser discs (CD) number (2) of the type (Sony).
- Stopwatch number (4).
- Scale^{4(*)}.
- Tape measure length (80 m).
- Balance device number (1).
- Numbers (10).
- Beginning predicate number (1).

3.4 Exploratory Experiment:

The researcher conducted the exploratory experiment on 12/8/2023. On a group of runners who ran short distances, their number reached (3) outside the original sample, on the athletics field in the College of Physical Education / University of Baghdad, and the aim was to determine the appropriate distance for each camera and determine the shooting distance to stand on the obstacles to work to avoid them in the main experiment, as Wajih Mahjoub confirms (that the procedures of the exploratory experiment lead to avoiding shortcomings while determining the place, time and duration of the experiment).⁽⁵⁾

3.5 Main experience:

3.5.1 Preparation for the field experiment: -

After conducting the exploratory experiment in which the number of cameras was determined, the researcher prepared for the field experiment on Monday (20/8/ 2023) On the athletics field in the College of Physical Education / University of Baghdad, by installing the locations of the cameras and marking them with function points, and determining the locations of the signs to facilitate the process of installing cameras on the day of the field experiment.

Through the conduct of the exploratory experiment, each (10 m) camera was determined to visualize (12 m), and signs were placed at the end of each (10 m) arc and was determined on the same field, and the locations of the

^{4(*)} The researcher made the scale of the drawing from a material (plastic) that can be arched.

⁵ Wajih Mahgoub, *Research Methods and Methods*. Mosul, Dar Al-Kutub for Printing and Publishing, 1993, p. 236.

cameras were determined by the center of the circle, as a tape measure was fixed from the center to a distance of (20 cm) within the third field, and this distance reached (37.34 m), and the distance between the cameras and the field of photography (21.20 m), and the height of each camera from the ground (123.5 cm) measured from the center of the lens, and reached after Cameras for the center of the running arch (16.14 m), and the 10 cameras formed a small arc and the distance between one camera and another (4.70 m).

3.5.2 Field experience

On Monday, 3/9/2023, at exactly ten thirty in the morning, the four best runners of the sports season (2021) were tested for a distance of (200 m) and in the presence of the work team, a distance of (100 m) arc ran using eleven cameras was filmed, and it was erected in the locations that were identified in preparation for the field experiment, and each runner was photographed individually and on the third field using the beginning of sitting, and the time of 200 m was fully calculated and the time of 100 m arc.

3.7 Research variables:

1. Repeat the right leg step:

It is the number of times the right foot of the leg folds the ground during the 100 m arc run.

2. Repeat the left leg step:-

It is the number of times the left foot of the leg folds the ground during the 100 m arc run.

3. Step length for right leg:-

It is the distance between the metatarsal of the left leg in the posterior pivot and the metatarsal of the right leg in the front pivot.

4. Step length for left leg:

It is the distance between the metatarsal of the right leg in the posterior pivot and the metatarsal of the left leg in the front pivot.

5 - Time and speed per (10 m)

6- Anchorage 200 m

3.8 Statistical treatments:

The researcher used only two statistical laws:⁶

1- Arithmetic mean:-

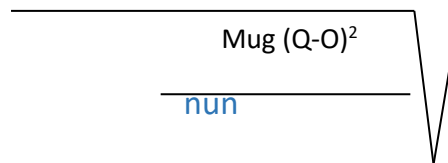
Mug

$$\text{Arithmetic mean} = \frac{\text{Mug}}{\text{nun}}$$

2- Standard deviation:

Mug S

$$\text{Standard deviation} = \sqrt{\frac{\sum (Mug - \bar{Mug})^2}{n - 1}}$$



4- PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS:

4.1 Presentation, repetition, analysis and discussion of step length results:

4.1.1 Presentation of the results of the length of the step, its frequency and analysis:

TABLE (2) SHOWS THE VALUES OF THE ARITHMETIC MEAN AND STANDARD DEVIATIONS OF THE LENGTH AND FREQUENCY OF THE RIGHT LEG AND THE LEFT LEG, AND THESE VALUES VARIED ACCORDING TO THE CHANGE OF VALUES BETWEEN THE STEPS OF THE SAME RUNNER AND THE RUNNERS.

Table (2)

Shows the values of the arithmetic means and standard deviations of step length and frequency

Runner number 4	Runner number 3	Runner number 2	Runner No. 1	Step length and
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⁶1- Muhammad Jassim Al-Yasiri, Marwan Abdul Hamid: Statistical Methods in the Fields of Educational Research, Amman, Al-Warraaq Publishing Corporation, 1st Edition, 2002, pp. 1, 65

Step left (cm)	Right step(cm)	Step left (cm)	Right step(cm)	Step left (cm)	Right step(cm)	Step left (cm)	Right step(cm)	frequency
122.93	92.09	112.16	104.69	85.83	81.92	89.5	67.43	1
137.43	135.19	155.17	166.37	122.89	120.93	156.08	138.73	2
140.35	155.09	175.28	192.55	155.07	160.07	181.12	169.56	3
155.23	176.64	189.65	213.73	165.82	168.62	189.25	200.12	4
161.39	200.07	196.12	231.33	176.84	186.88	194.95	206.89	5
167.22	202.95	223.79	231.54	199.6	192.26	201.62	200.89	6
186.32	200.12	224.43	241.39	208.56	213.29	206.11	212.02	7
205.95	224.23	223.97	233.99	206.55	214.01	212.86	210.68	8
207.7	228.45	233.99	235.77	206.05	219.23	186.05	218	9
224.23	231.73	223.54	233.15	208.99	223.99	213.11	214.8	10
217.86	238.08	220.97	238.44	214.55	225.73	217.69	228.28	11
227.18	238.87	225.44	235.62	216.42	225.8	217.69	213.19	12
228.18	242.21	225.44	240.4	219.68	230.46	210.59	220.09	13
206.74	231.22	225.44	238.36	215.37	235.96	221.27	213.62	14
218.22	235.11	230.2	242.12	219.44	229.44	226.33	233.08	15
221.37	238.96	230.77	240.89	215.37	234.17	217.23	233.22	16
237.06	240.46	215.62	239.22	215.42	232.18	217.23	236.14	17
237.06	238.96	230.21	245.3	214.16	236.73	227.77	242.36	18
235.51	235.77	238.36	244.3	208.91	214.16	214.15	225.82	19
236.73	239.11	230.5	244.51	205.18	226.5	222.55	227.77	20
233.61	237.94	228.22	245.83	201.51	221.8	203.35	235.63	21
235.22	235.5	225.12	238.81	213.22	213.22	222.72	216.26	22
238.07	216.09	227.11	236.41	206.64	206.64	212.96	210.16	23
237.33	233.82			210.37	210.37	212.96	212.76	24
				202.01	208.14		225.96	25
204.9538	214.5275	213.5435	226.727	196.35	205.18	203.1308	207.81	Arithmetic mean
37.018	38.611	29.884	32.344	33.107	38.79	29.336	37.147	Standard deviation +
4918.29	5148.66	4911.5	5214.72	4914.45	5132.5	4875.146	5213.4	Total
10067.5512		10126.2215		10046.95		10088.599		Total

4.1.2 Discuss the results of the length and frequency of the step:

By viewing and analyzing the data of Table (2) and following up the values of the length of the step and its frequency during the running of the (100 m) arc, we notice in general the unequal runners all in the length and frequency of the step, and the values of the length of the right leg step differed from the values of the left leg step length of all runners because of the distance of the right leg from the left leg relative to the center, and thus the right leg is farther by the pelvic width distance from the left leg, so you travel a longer distance, and in order to change the direction of the runner with an arc Running, the movements of the right side of the body should not be equal to the movements of the left side of the body, including the distance of the length of the step, through the wider range of movements of the right side from the left side of the body, as well as the weakness of the left leg in general. The distance of the runners' step length has varied even when they reach the highest speed, i.e. there is instability of the step, even if the difference is very little, and it is noted that the runner No. (4), who got the best time in running the (100 m) arc has equal the length of the left leg step with the two steps (17 and 18) of the steps of his left leg and did not get any equality to the steps of the right leg. As for runner No. (3), the length of the left leg step was equal in steps (12, 13 and 14) of his left leg, and there was no equality in the steps of his right leg, and the runner No. (2) did not get any equality in his steps for the right and left sides. As for runner No. (1), the length of the left leg step was equal in the steps (11 and 12) of his left leg and none of the steps of his right leg were equal.

From the above, we notice that the equality of steps that happened in some steps of the left leg of the runners and did not happen in the steps of the right leg indicates that the runner who runs on the bow He tries at each step to change his direction in running with the continuation of the arc running at its same high speed, so the changes that occur in the angles of the body and their directions when taking steps are difficult to maintain the equal length of the step, and despite this, some of the steps of the left leg of some runners have been equal, which are very few and no step is equal to the right leg because of the greatest burden in changing direction on the right side of the body, which requires increasing the speed of the parts farthest from The center, which is the right side, in the arc run, which leads to the difficulty of equalizing the length of the step for the leg itself and the unequal length of the step between the right leg and the left leg, so the arithmetic mean of the right leg was higher than the arithmetic mean of the left leg and all runners, and the difference in the distance traveled on the right side

from the distance traveled on the left side during the running of the (100 m) bow for runners (1, 2, 3 and 4) amounted to (338.32 cm, 218.05 cm, 303.22 cm and 230.37 cm) respectively and in order to change the direction in arc running, this difference must be in distance because the distance between the right side of the body from the left side of the body is different, so expanding the movements of the right side away from the center is necessary for arc running. The distance of (100) meters arc for runners (1, 2, 3 and 4) has increased as it reached (88.599 cm, 46.95 cm, 126.22 cm and 67.55 cm) and this increase is due to the distance between the starting line and the first predicate and after the runner from the inner line of the field and the closer the runner to the inside line of the field, the less the distance, and the distance was measured from the first predicate (close to the starting line) to a distance of (100 m) from the starting line.

As for the number of steps in which the runners differed to run the (100 m) arc, the runner No. (2) recorded the highest number of steps among the runners, and he has the best time in running (200 m) and the second time in the (100 m) arc run among the runners. As for the runner No. (3), he was the lowest runner in the number of steps and the highest length of the step, and he had the highest time in running the (100 m) arc and (200 m) among the runners, and the number of steps of the runner No. (4) was closer to the arithmetic mean of the runners in the number of steps, and he has the best time in running the (100 m) arc and the second in the time of (200 m). The number 1 runner is closer to the highest in the number of steps among runners.

It is clear from the above that the runner who got the lowest number of steps was the highest in time, and the lowest speed among the runners, and this is due to the exaggeration of the length of the step at the expense of its number, who recorded the longest distance of the length of the right step and the left step among the runners, which led to the movement of the body's center of gravity moving up and down.

The highest difference in the upward and downward transmission of the center of gravity was the No. 3 runner, who had the longest man of the runners, and the longest leg of the runners (2) and (4) who were taller than him, who advanced him with achievement. The runner No. (2) was the most steps and the closest to the best in the time of running the (100 m) arc and the best in the (200 m), and was the least distance in height and descent to the position of the center of gravity during the run, and the closest in length of his body to the middle. The arithmetic length of the body of the runners and his leg length was the lowest of the runners' legs, and he recorded the lowest distance in the length of the right and left step of all the runners. The runner No. (4) was the best in the time of running the (100 m) arc and the longest body among all runners and has the longest trunk and the length of his leg in the thigh more than in the leg and these physical measurements do not serve the runner in the run, but he was the best because of the good link between the length of the step and its repetition as he recorded the number of steps was closest to the arithmetic mean of the number of steps runners, which enabled him to take an appropriate step neither long nor short made him the best in the time of running The 100 m arc among the runners, resulting in the center of gravity of the body moving up and down a distance that was also close to the arithmetic mean of the difference in the height of the body center of gravity of the runners. The runner No. (1), which was the transition of the center of gravity to the top and down very close to the runner No. (4) and from the arithmetic mean of the difference in the height of the center of gravity of the body to the top and bottom, and was the shortest of the runners with a long leg length relative to the length of the body with the longest leg and the shortest thigh among all runners and these specifications are preferred as they serve the runner during the run, and the number of steps was closer to the highest number of runners all Despite this, he finished third in the 100m and 200m runners. Zaki Darwish stressed the need for the difference in the height of the center of gravity to be between (8-12 cm) while running.⁽⁷⁾ The runners all achieved a difference in the transition of the center of gravity of the body within this difference except for the runner No. (1), whose hip height difference was less than the (8-12 cm). 338.31cm, 218.05cm, 299.78cm and 230.37cm) for runners (1, 2, 3 and 4) respectively.

From the foregoing, it is clear to the researcher that the difference in distance exists as long as there is a distance in the moving parts around the axis of rotation, which is the center of the circle around which the runner runs, meaning that the radius of the right side is longer than the radius of the left side.

4-2 Presentation, analysis and discussion of the results of time and speed per (10 m) arc run:

4.2.1 Presentation and analysis of the results of time and speed for each (10 m) arc run: -

Table (3) shows the different values of the arithmetic means and standard deviations of time and speed in arc running per (10 m) for runners, and the following is a summary of these results:

1. Time and speed for the distance from the beginning to (10 m): -

Runner No. (4) recorded the lowest time in the first (10 m) among the runners was (1.5448 s) and his speed was (6.49 m/s), and the runner No. (2) recorded the highest time with a record of (1.7272s) and his speed reached (5.81 m/s), while the runner No. (3) recorded a time of (1.6315s) and his speed was (6.13 m/s), while the runner No. (1) recorded a time of (1.6594s) and his speed reached (6.06 m/s).

2. Time and speed for the distance from (10 m) to (20 m): -

Runner No. (4) recorded the best time (1.168s) and his speed was (8.62 m/s), while runner No. (1) recorded the highest time (1.2708s) and recorded the lowest speed (7.87 m/s), while runner No. (2) covered the distance with

⁷ International Amateur Association of Athletics Federations (IAAF) from 2001 to 2004, translated and prepared by Sareeh Abdul Karim and others, Baghdad, 2001.

a time of (1.224s) and reached a speed of (8.19m/s), and runner No. (3) covered the distance with a time of (1.2513s) and a speed of (8m/s).

3. Time and speed for the distance from (20 m) to (30 m): -

The runner No. (4) recorded the lowest time to cover this distance (1.0676s), his speed was (9.43 m/s), and the runner No. (3) recorded the highest time (1.1721 seconds) and his speed was (8.54 m/s). The runner No. (2) covered the distance with a time of (1.0744 seconds) and a speed of (9.34 m/s), and the speed of the runner No. (1) was (9.17 m/s) while the time recorded in this distance was (1.0951 seconds).

Table 3 shows the values of the arithmetic means and standard deviations of time and speed in arc running per (10 m)

Runner number 4		Runner number 3		Runner number 2		Runner No. 1		Speed
Speed per 10m (m/s)	Time per 10m (s)	Speed per 10m (m/s)	Time per 10m (s)	Speed per 10m (m/s)	Time per 10m (s)	Speed per 10m (m/s)	Time per 10m (s)	
6.49	1.5448	6.13	1.6315	5.81	1.7272	6.06	1.6494	Start – 10 pm
8.49	1.168	8	1.2513	8.19	1.224	7.87	1.2708	10pm – 20pm
9.43	1.0676	8.54	1.1721	9.34	1.0744	9.17	1.0951	20pm – 30pm
8.4	1.1932	8.33	1.2038	9.7	1.033	8.92	1.1221	30pm – 40pm
9.43	1.0676	9.09	1.1088	9.09	1.1016	8.92	1.1221	40pm – 50pm
9.43	1.0676	8.26	1.2196	9.7	1.0336	8.62	1.1627	50pm – 60pm
9.17	1.0927	8.77	1.1404	9.09	1.1016	9.52	1.0545	60pm – 70pm
9.8	1.0299	9.61	1.0454	9	1.1152	9.9	1.014	70m – 80m
9.8	1.0299	8.54	1.1721	9.7	1.0336	8.77	1.1492	80m – 90m
8.84	1.1304	9.09	1.1088	9.34	1.0744	9.43	1.068	90m – 100m
8.928	1.13917	8.436	1.20538	8.896	1.15186	8.718	1.17079	Arithmetic mean
0.986	0.0888	0.5498	0.0884	0.6894	0.1177	0.6552	0.1052	Standard Deviation+
	11.3917		12.0538		11.5186		11.7079	Time 100 m
	22.37		22.91		22.32		22.58	Time 200 m

4. Time and speed for the distance from (30 m) to (40 m): -

Runner No. (2) recorded the lowest time for this distance (1.033s) and a speed of (9.70 m/s), while the highest time was recorded by the runner No. (3) who covered the distance with a time of (1.2038 seconds) and a speed of (8.33 m/s). The time of the runner No. (1) was (1.1221 seconds) and his speed was (8.92 m/s), while the speed of the runner No. (4) was (8.40 m/s) and his time was (1.1932 seconds).

5. Time and speed for the distance from (40 m) to (50 m): -

Runner No. (4) recorded the lowest time to cover the distance (1.0676s) and his speed was (9.43 m/s), while the highest time was recorded by the runner No. (1) (1.2121 s) and his speed was (8.92 m/s), and the speed of runners No. (2) and No. (3) were equal as they recorded a time of (1.1016 seconds) and a speed of (9.09 m/s).

6. Time and speed for the distance from (50 m) to (60 m): -

Runner No. (2) recorded the lowest time to cover this distance (1.0336 seconds) and a speed of (9.70 m/s), while the highest time was recorded by the runner No. (3) (1.2196 seconds) with a speed of (8.26 m/s). While runner No. (4) recorded a time of (1.0676 s) and a speed of (9.43 m/s), and runner No. (1) recorded a time of (1.1627 seconds) and a speed of (8.62 m/s).

7. Time and speed for the distance from (60 m) to (70 m): -

No. (1) recorded the lowest time in this distance among runners (1.0545s) and his speed was (9.52 m/s), while runner No. (3) recorded the highest time in this distance among runners (1.1404 seconds) and his speed was (8.77 m/s). While runner No. (4) recorded a time of (1.0927 seconds) and a speed of (9.17 m/s), and runner No. (2) recorded a speed of (9.09 m/s) and a time of (1.1016 seconds).

8. Time and speed for the distance from (70 m) to (80 m): -

Runner No. (1) recorded the lowest time to cover this distance (1.014s) and his speed was (9.90 m/s), and runner No. (2) recorded the highest time in this distance with (1.1152 seconds) and a speed of (9 m/s), while runner No. (4) covered the distance with a time of (1.0299s) and a speed of (9.80 m/s), and runner No. (3) covered the distance with a time of (1.0454s) and a speed of (9.61 m/s).

9. Time and speed for the distance from (80 m) to (90 m): -

Runner No. (4) recorded the lowest time to cover this distance (1.0299s) and reached a speed of (9.80 m/s), and the highest time of runner No. (3) was (1.1721s) and a speed of (8.54 m/s), while runner No. (2) recorded a time of (1.0336s) and a speed of (9.70 m/s), and runner No. (1) recorded a time of (1.1492s) and a speed of (8.77m/s).

10. Time and speed for the distance from (90 m) to (100 m): -

Runner No. (1) recorded the lowest time and the highest speed with a time of (1.068s) and a speed of (9.43 m/s), while runner No. (4) recorded the highest time and lowest speed with a speed of (8.84 m/s) and a time of (1.1304s), and runner No. (2) recorded a time of (1.0744s) and a speed of (9.34 m/s). The runner No. (3) recorded a time of (1.10s) and a speed of (9.09m/s).

11. Time (100 m) arc:-

The runner No. (4) recorded the lowest time for (100 m) arc ran among the runners, reaching (11.39 s), and the arithmetic mean of the time of each (10 m) reached (1.139 s) and the standard deviation (0.152), while the runner No. (3) recorded the highest time in the (100 m) arc ran among the runners (12.05s), and the arithmetic mean of the time of (10 m) was (1.205s) with a standard deviation of (0.161), while the runner No. (2) recorded a time of (11.51s), and the arithmetic mean was (1.15s) per (10m) and the standard deviation was (0.209). Runner No. (1) recorded a time of (11.70s) in the (100m) ran an arc and reached the arithmetic mean of each time (10m) (1.17s) and the standard deviation was (0.182).

The runner No. (4) recorded the highest arithmetic mean of speed per (10 m) reaching (8.7783 m/s) and the standard deviation was (1.175), while the runner No. (3) recorded the lowest arithmetic mean of speed per (10 m) as it reached (8.2961 m/s) with a standard deviation of (0.938), and the runner No. (2) recorded an arithmetic mean of speed per (10 m) of (8.681 m/s) and the standard deviation was (0.986), while the runner No. (1) recorded an arithmetic mean of speed per (10 m) of (8.541 m/s) with a deviation Standard (1.086).

12. Time (200m)

Runner No. (2) recorded the lowest time in running (200 m) amounted to (22.32 s), runner No. (3) recorded the highest time of (22.91 seconds), runner No. (4) recorded a time of (22.37 seconds) and runner No. (1) recorded a time of (22.58 seconds) in running (200 m).

4.2.2 Discussion of speed and time results:

One of the most important variables of the study is the speed that gives the result of the race, as the first winner is the fastest in cutting the race distance, and the speed of all runners in running the (100 m) arc oscillating in the distances determined by the researchers, which is for every (10 m).

By presenting and analyzing the data of Table No. (3), and following up the time and speed of each (10 m) and the time of running the (100 m) arc and the time of running the (200 m). Through Figure No. (15), it is clear that runner No. (2), who was ranked first in the time of running (200 m), came second in the time of running the (100 m) arc among the runners, and that runner No. (4), who was ranked second in the time of running the (200 m), has obtained the best time in running the (100 m) arc among the runners, and the reason for the delay of runner No. (2) from runner No. (4) in the time of running the (100 m) arc to Runner No. (2) was late in the first run (10 m) as he recorded the highest time for the first run (10 m) among the runners, and runner No. (4) recorded the lowest time in the first run (10 m) among the runners, meaning that the starting speed of the runner No. (4) was higher than the starting speed of the runner No. (2) at the beginning of the race.

The runner No. (3) had the second best starting speed after runner No. (4), followed by runner No. (1), which was a first run time (10m) for runners (1 and 3) less than the first running time (10 m) for runner No. (2), who ranked first in the 200 m race.

The most distance runner in increasing speed from the beginning is the runner No. (2), as he continued to increase his speed to a distance of (40 m), while the rest of the runners had increased their speed from the beginning to a distance of (30 m), and the speed of all runners fell after the increase in speed, i.e. the speed has not yet proven the highest increase from the beginning. The speed of runner No. (1) was fixed to a distance of (20 m) when she descended after the highest speed reached during the increase in speed. As for the runners (2, 3), their speed oscillated between decrease and increase per (10 m) after they reached the highest speed during the increase in speed from the beginning, while the runner No. (4) dropped his speed to a distance of (10 m) after increasing speed and then increased and fixed to a distance of (20 m) at a speed equal to the highest speed reached during the increase in speed. Among the runners were in the distance from (70 m to 80 m), but on the other hand, this distance was preceded by a significant drop in speed for the distance from (30 m to 60 m), which led to the possibility of the runner to increase his speed in the distance from (60 m to 70 m) and then reach the highest speed in the distance from (70 m to 80 m) after which there was a significant drop in speed in the distance from (80 m to 90 m). 20 m) in the distance from (70 m to 90 m), and he is the only runner who has continued at his maximum speed (20 m) continuously. Then the speed in the distance from (90 m to 100 m) decreased significantly. The runner No. (2) achieved his maximum speed at the end of the increase in speed, and he is the only runner who reached his maximum speed in increasing speed in the distance from (30 m to 40 m), that is, there is a decrease, then an increase, then a decrease, then an increase, but he always reached by increasing the speed to the maximum speed he reached during the increase in speed, and his speed did not decrease much when it decreased, that is, the speed of the runner No. (2) was not less than (9 m / s) when it decreased, while it decreased among runners The runner No. (3) obtained the maximum speed in the distance from (70m to 80m) after a clear decrease in speed and continued at his maximum speed to a distance of (10m) and then decreased significantly in the distance (from 80m to 90m).

The researcher found through his analysis of the speed of runners in every (10 m) that there is no specific or clear plan for Iraqi runners in running the arc (200 m), but there is a fluctuation in speed between increase and

decrease for short distances. There was no stability in the speed after it increased. Runners differed in the locations and distances of the top speed. Figure (16) shows the fluctuation in the speed of runners per (10m) during the running of (100m) arc and the speed had an inverse correlation with time.

5. CONCLUSIONS AND RECOMMENDATIONS:

5.1 Conclusions:

In light of the results that appeared through the analysis of the research variables, the researcher concluded the following:

1. It has been shown through the analysis of the speed results that there is a fluctuation in speed between increase and decrease in the areas determined by the researcher per (10 m) for all runners.
2. It was clear from the analysis of the speed results that there was no specific or clear plan for Iraqi runners to cover the distance of 100 meters from the beginning of the 200 meters.
3. The results of the analysis showed that the exaggerated increase in the stride length led to a decrease in speed.
4. The study of variables showed that there is a difference in the movements of the legs to the side and forward, which led to an irregularity in the length and number of steps, which made the runner not run on a curved line adjacent to the field

5.2 Recommendations:

In light of the findings of the researcher, he recommends the following:

1. The need for our trainers to focus when training our runners on increasing the speed (acceleration) in the arc that the runners continue at the same level after they reach the highest speed, and that there is a clear plan in front of the runner so that he can cover the (200 m) at high speed.
2. The need not to exaggerate the length of the step and focus on combining the appropriate step length with high repetition to get the highest speed in arc running.
3. Coaches should instruct our runners to run within the 20cm distance close to the inner edge of the field because the farther he gets outward, the more time.
4. The need for high physical training regardless of the reasonable weight gain for the runners of (200 m), and not to fear hindering the force expelling this weight, because the physical force gives high speed, and the correct mechanical conditions lose the centrifugal force value that increases with the increase in the weight of the runner.
5. The need to train the runners of the (200) m to start in the bow like the runners of the (100) m.

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