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**EVALUATION OF THE PHYSICAL QUALITIES
OF THE MIDDLEDISTANCE ATHLETES OF
THE NATIONAL MILITARY TEAM OF
ALGERIA**

Djamal Djennad

Madani AbdeRaouf²

¹ University of Bejaia djamal.djennad@univ-bejaia.dz

² University of Bejaia abderaouf.madani@gmail.com

ABSTRACT

The half-distance has always been considered the most spectacular queen in all athletics meetings. Indeed, national records are significant compared to world records like the athletes Morceli and Boulmerka. The military sport, by means of the new means and the new policy of the Ministry of Defence to be present at all international events, has taken on another dimension in the selection of athletes. It is in this context that our study focuses on the physical qualities of Algerian runners selected in senior men's national team in the half-distance discipline and in order to determine the physical characteristics for this athletic specialty, compare them with international standards. For this, a sample of 15 athlete's half-distance and they are submitted to a battery of physical tests, anthropometric measures. from this we obtained the following results, on the anthropometric side our athletes have an average of (181.6cm 3.54) for height, and an average of (70.93kg 3.54),for weight, and finally an average of (183.6cm 5.02) ,For circumferential measurements The average values of the half-distance athletes selected in the national military team of Algeria gave the following results: contracted arm (28.2 1.81), forearm (22.37 1.41), thigh (48.84 3.61), leg (35.98 2.04). The same applies to skin folds and body composition All folds, under-fold scapular (4.80 0.52), bicipital (4.19 0.80), tricipital (5.24 1.26), belly (4.73 0.69), supra iliac (5.98 0.86), thigh (8.20.83), and last leg average is (6.32 0.93).

Keywords: Semi-background.physical qualities.

1- Introduction and problem

Athletics is the first Olympic discipline. It is defined as all individual sports involving running, jumping, and throwing (**Larousse Bordas-1997, first edition**). It is the basis for many team sports such as basketball, handball, and soccer.

For the categorization of races, the international association of athletics Federation (World Athletics) grouped the distances according to disciplines. The sprint race is defined from (60 to 400 meters), the middle-distance race (800 to 3000 meters), and the long-distance race (5000 meters to marathon).

According to **Humphreys J, Holman R. (1985)**, and **Camus G. (1992)** middle-distance running is defined as races between 800 and 3000 m that require between 2 and 10 minutes to complete. Races in this range rely heavily on an integrative contribution from both aerobic and anaerobic energy systems (**Brandon, L.J., & Boileau, R.A. 1992**). A middle-distance runner must have the ability to link rapid acceleration, high concentration, and responsiveness during the event where his or her muscles are used throughout the course, as well as control of breathing and finally the implementation of tactics. The best athletes are mainly from the African continent.

The notion of training in everyday language is used in a wide variety of fields and most often refers to a process that, through physical exercise, aims to reach a more or less high level depending on the objectives envisaged. (**Weineck, 1983, p.15**).

High performance requires long-term planning, individual monitoring, and hard work. Therefore, it is necessary to design training plans to help achieve high-level performance. Indeed, the achievement of performance is the result of the interaction of factors called performance factors.

As in any other sport, performance in athletics is the result of a set of factors (biological, physical, physiological, technical, etc.) among which physical qualities (strength, speed, endurance, coordination, flexibility) and morphological characteristics (height, body composition, diameters, circumference, skin folds and lengths of the body's limbs) which are considered as one of the most important parameters in sports and are often indispensable factors for the practice of certain sports. Achieving a sports performance is above all the result of a serious follow-up of adapted and structured training.

The interest of several authors in the physical qualities and morphology of high-level middle-distance runners makes clear the importance of these factors as components of performance (**Dierks and Davis, 2007; Bachero-Mena B et al., 2017;**

Mytton et al., 2015; Foster et al. 1978; Boileau et al. 1982; Camus 1992; Arrese, A.L.; Ostáriz, E.S. 2006; Vučetić, V., R Matković, B., & Šentija, D. 2008).

Performance in the middle distance specialty is largely dependent on the athlete's maximal aerobic speed and therefore the relative amount of oxygen consumed per kilometer (**Millet & Candau, 2002**). Athletes who have (or) acquired the optimal physique for a particular event are more likely to succeed than those who lack the general characteristics (**Carter, 1984**).

Anthropometric characteristics are important in their application to training. In athletes, there is a correlation between the physical qualities of the athlete and the morphotype, and the role of the physical constitution as a factor of sports ability (**Weineck, 1990**). Although the morphological criteria represent the first level of the determining factors of the performance. They are often considered basic

Factors for any sports selection (**Schürch, 1984**). In athletes, body composition measurements are widely used to prescribe desirable body weights, optimize performance in competition, and evaluate training effects (**Sinning, 1996**). (**Ripari et al., 2008**) indicate in this sense that the determination of somatotype thus represents an important starting point to choosing the most suitable sport for each subject.

Our study is interested in the physical qualities and morphological characteristics of Algerian runners selected in the senior military national team in the discipline of middle- distance, to determine the physical and morphological characteristics for this athletic specialty, as well as to compare them to international standards.

From the introduction of this event in Algeria until today, the middle-distance has always been considered the most spectacular event in all athletics meetings. Indeed, the national records are significant compared to the world records. Numerous titles and records were achieved with brilliance during the first years of the 90s by **Noureddine Morceli** with an Olympic gold medal plus 3 gold medals at the world championship and **Hassiba Boulmerka** with a gold medal at the Olympic Games plus 2 gold medals at the world championship and from the years 2012 **Toufik Makhloufi** achieves 3 Olympic medals, which makes the Algerian middle-distance is recognized at the global level. By analyzing the results obtained by our athletes on this event during the years, we note middle-distance is the specialty that brings the most awards to Algerian athletes.

II. The half-bottom:

.1. Definition:

The half-distance refers to all athletics races between sprint and long run (from 800m to 3000m), which take place in a sports venue or outside. Only the 800m and 1500m are on the program of the Olympic Games or the World Championships. The 800m is

the crucial event between the long sprint speed and the endurance events. The athletes first make a quarter turn in their own lane, like the 400m, before turning back to the rope after 100m of running. The competitors must then demonstrate, in addition to their physical ability, a tactical sense of anticipation and skill. The 1500m is a race that includes 3 laps and 3/4 around a 400m track. It requires a certain endurance, tactical sense of running and acceleration and resistance in the final lap.

NB: The half-distance races are run in a pack, except for the first 100m of the 800m, which is run in corridors.

.2. The course of the half-distance event: (800m-1500m):

The half-distance race is practiced on a stadium, in competition. It requires a lot of effort over a short period, but you have to know how to run correctly, which means saving your energy while having the best biomechanical performance. The qualities of strides, acceleration, speed retention, up to the end of the run, breath, recovery abilities during the run, aerobic and anaerobic are necessary skills for the half-distance runner. Self-control and competitive spirit can influence the course of the event and, with good training, allow the athlete to win. It should be noted that in half-distance races, competitors cannot receive outside assistance. People who are not participating in the race cannot participate in the race and lead the pace to the benefit of one or more riders. Similarly, a rider who is behind by one lap and is about to be doubled cannot become the "hare" of the leading competitors. Any runner who pushes a competitor, cuts him off or hinders his progress is disqualified.

II.2.1. the departure:

The start is given by an audible signal (shot or electrical sound signal). The starter must give the signal as soon as it has verified that the competitors are motionless in the appropriate starting position. "In all international meetings, the starter's orders are given in his or her native language or in English or French". In practice, the starter gives his commands in the language of the host country. For races over 400m, the command of the starter is «Your marks!» Invites "without delay the riders to take their full and final starting position immediately", one foot behind the line. "During the start, an athlete shall not touch beyond the line or with his or her hands". When all riders are stationary, the starter fires a pistol or engages the approved starter. After a start instanding (no starting blocks), the 800m runs in a corridor for 110m, then the runners are allowed to leave their corridors from the line of folding. This curved line of 5cm wide is drawn in the width of the track, from one end to the other at the exit of the first turn. The athlete who folds to the rope in front of this line is disqualified, hence the particular signage of this line in major competitions. Its two ends are indicated by two flags at least 1.50 m high, placed off the track. For the 800m, small cones or prisms of 5cm by 5cm and a maximum height of 15cm can be placed at the intersection of each lane line with the fold line. Two athletes can share the same corridor if necessary. At 800m and especially 1500m, departures are done in line.

Athletes are placed in a pre-determined order following the curved starting line of the rope to the outside of the track.

Under the new regulations, where “zero” false starts are introduced, when a false start occurs, the offending athlete is immediately disqualified and must withdraw from the race.

However, in international matches, countries can agree to use the curved starting line, not the 800-metre lanes, depending on the number of competitors. When walking, the body is always in contact with the ground, either on one foot or both.

But in the race, periods of support on one or the other foot alternate with a period or (phase) of suspension where the body rises above the ground.

The running man advances by jumping from foot to foot, each jump being considered a stride.

The technique of stride or run (succession of strides) is characterized by how the runner:

- Is received on the ground (receiving or amortising).
- The distance from the ground is reduced by pushing, pulsing and scratching; the runner's half-distance movement is distinguished above all by the frequency and amplitude of his strides, which are generally of a large amplitude, sometimes quite close to the values recorded in the sprint; but with lower load frequencies.

The true technical specificity of the half-distance event appears rather at the level of race management. Indeed, the adoption of a regular pace seems to be an essential element for the most rational use of physical potential.

Moreover, running within a group (platoon) requires know-how that can be classified as one of the technical elements to be acquired.

Finally, this is the corollary necessary to the ability to run at a regular pace, it will be necessary to develop in the athlete, the ability to adapt to changes in pace voluntary or provoked. The good rider is the one who knows how to adapt to all these hazards, and keep the best awareness of its possibilities as well as its limits, while being able to take charge of the race technique that is required. Experience is irreplaceable at this level. In the field of competition, this ability is essential and often establishes the difference between two athletes of apparently identical level.

II.2.2 Some special aspects for the 800m and 1500m runner

The effort of the 800m: The critical phase of this race is between 400m and 600m in a well-conducted event (anaerobic phase 65% and aerobic 35%); the distribution of the effort most often adopted is the equality of trains: first 400m equals the second 400m. It should be noted, however, that many runners from the distance below 400m prefer

to run a faster first half than the second (Fiasconaro), however, runners from the higher distance will tend to set the record with a slower first part of the event than the second (Ryun).

The 1500m effort: from 1500m, the aerobic and anaerobic processes are balanced (50% -50%). In this discipline, two types of runners meet.

On the one hand, runners resistant to muscular qualities oriented towards work in debt of oxygen such as Ryun and Snell, and, on the other hand, endurance runners, more adapted to efforts with an aerobic tendency such as Wadoux and Norpoth. The critical phase for the first will appear around 1000m, for the second around 1200m. The distribution of effort will be based on the tactic adopted or the goal pursued (victory or record). However, the former will tend to slow down the first phase of their run so that the critical phase appears later, the latter will consider the equality of trains.

II.2.3. Arrival:

There is no specific finish for the half-distance that differs from that of the other races, like these, the ranking will be in the order judged according to the position of the runner's torso (the bust, the chest) (excluding any other part of the body), the stopwatch is only triggered when the bust crosses the vertical plane of the inside edge of the finish line.

III- This leads us to the following problematic:

Do the military athletes selected for the senior men's national team have physical qualities that meet international standards and morphological profiles that place them on the international scene?

2- Hypothesis:

- The military athletes selected for the national team have physical qualities that make them perform better.

3- Research Objective:

Determine the morphological profile of the half-distance athletes selected in the national military team of Algeria. To analyze the indices of body development (body surface, corpulence indices) through the calculation methods of the different indices. • Analyze the body weight components: - Fat components. - Muscle component. - Bone components. - Water components. • To establish the somatotype of the half-distance athletes selected in the national military team of Algeria according to the method (HEATH and CARTER, 1990).

4- Research Task:

To answer our problem, we set ourselves the following tasks:

- Evaluation of physical qualities and anthropometric parameters of middle-distance athletes selected for the Algerian national military team.
- The bibliographic analysis related to our theme (keywords).
- Analysis, interpretation, and discussion of the results obtained.
- And finally, draw the necessary conclusions.

5- Means and methods of research:

5-1 Sample:

Our research was carried out on a sample of 15 middle-distance athletes of the Algerian military national team Senior men. These athletes represent an average age (24.26 ± 3.67 years) and average weight (70.93 ± 3.41 kg) and height (181.6 ± 3.54 cm).

Our study is spread out 15 days counting from the 06th month of December until the 21st of December 2021 in Bejaia (Souk el Tenine athletics stadium) during the period of preparation (training course of preparation) of the middle-distance athletes selected in the national military team of Algeria. The measures are carried out in the athletics stadium (Olympic track and medicine cabinet which is part of the stadium).

5-2. the method:

In our research, we used the descriptive method to conduct our research.

5-2.1. The descriptive method:

The descriptive method consists in describing and characterizing a phenomenon, a situation, or an event to understand and explain it. To achieve our research objective above, we proceeded with different tests that will allow us to affirm or deny the hypotheses.

6- Protocol:

The protocol put in place for the research into the evaluation of physical qualities.

- Before starting the evaluation of the middle-distance athletes selected for the Algerian national military team, the subjects were informed of the experimental protocol. The physical tests were carried out in an athletics field, in the best possible conditions, with the necessary equipment for the different events.

- The tests were carried out during the preparation period (national team training course). Before the start of the tests, the subjects were asked to warm up with sufficient recovery time. The study of the physical profile of middle-distance athletes requires an evaluation using reliable and validated tests. Among the multitude of tests for the evaluation of athletes used in the field of scientific research (Eurofit, 1992), the latter proposes a battery of 6 tests and has been the subject of validation and reliability tests, and has also been used in different contexts, clinical and research in more than 10 European countries (several of these countries have reference standards).

7- Physical tests:

7- 1. Coordination speed test: 10 x 5 m shuttle:

In order to evaluate this physical quality we chose the 10 x 5 meters shuttle race. The event takes place on a flat surface two meters wide and 5 m long. The surface must not be slippery (G. Cazorla, 1986).

The principle is to make 10 trips at maximum speed between 2 lines spaced 5 meters apart. Only one test is performed.

7-2 .50 m speed test:

To evaluate this quality, use the 50-metre standing start run. The subject stands in the running start position.

The timer is activated when the runner's back foot leaves the ground, it is stopped when the runner passes in front of the finish post.

The test is repeated twice 5 minutes apart

7-3. Sargent-Test. Lower limb explosive force test:

To assess this physical quality, vertical relaxation is chosen as the test (Cazorla et al. 1986). The course of this test requires a flat surface, a vertically calibrated wall of 1, 5 meters to 3.5 meters from the ground and a record of the results.

The test consists of two measurements:

Measure 1: the subject is placed in profile with respect to the wall, the feet quite flat. The arm on the side of the wall is raised in maximum extension of the shoulder. Note the height reached by fingertips.

Measure 2: (Sargent test) the subject places the feet slightly apart, the foot closest to the wall is 30 centimeters from it – this one. Without rebounding beforehand, he prepares his jump by lowering his arms and bending his legs; he jumps higher than possible with an outstretched arm by marking the wall with the tip of his fingers

coated with chalk. The subject repeats this event three times and only the best jump is taken into account.

7-4.Upper Gear Explosive Force Test:

To evaluate this physical quality we used the test of two-handed football throwing.

The subject throws the ball forward with two hands over the head, as if putting the ball into play in football, feet offset in the axis of the throw, one in front of the other . When throwing, the front foot should not leave the ground.

The back foot can accompany the movement and go beyond the throwing line. The performance corresponds to the distance reached measured in centimeters to 25cm higher or lower closest to where the ball fell.

It is the best of the three tests that is recorded

7-5.Flexibility Test (Standing Core Flexion):

It is a test of flexibility easily achievable at home,

The improvement of flexibility results in the fingers being as close to the ground as possible, thus shortening the measured finger-to-ground distance.

7-6. VAMEVAL Test:

This test is intended especially for long-term sports specialists (middle and long-distance runners) as well as athletes wishing to know their VMA.

This test is actually an improvement of the Léger-Boucher track test. The increment of the speed is indeed 0.5km/ h against 1km/ h in stages for the Luc-Léger, and the duration of the stages is one minute against 2 for the latter. This results in greater accuracy in the VMA obtained

I. Descriptive analysis of the performances realized in the different tests of physical qualities:

1. Descriptive analysis and interpretation of the performance in the 10 x 5 m coordination test:

For the 10 x 5 m shuttle race, the values obtained vary between **14''56 sec** and **17''39 sec**.

We have an average of **16''29 sec** with a standard deviation of **0''81 sec**.

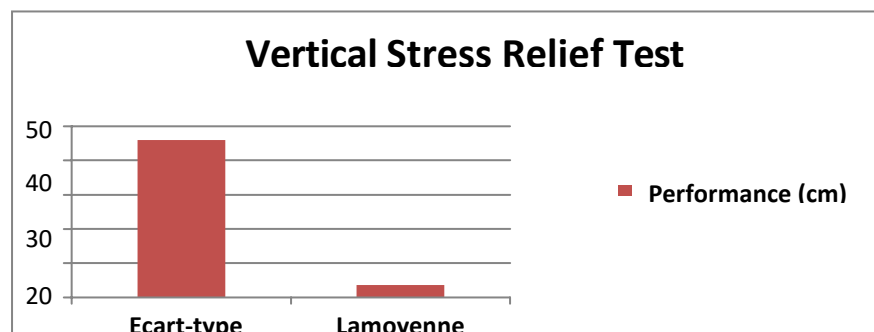
Values in sec	Appreciations
18''55 à 18''39	Low speed - coordination
18''24 à 18''09	Medium speed - coordination
17''93 à 17''77	Fairly good speed - coordination
17''60 à 17''42	Good speed - coordination
17''21 à 16''97	Very good speed -coordination
16''68 à 14''67	Excellent speed-coordination

Table 1: Values and assessments of coordination speed in men according to Cazorla and al.

From these values, we notice that our middle-distance athletes selected for the national military team of Algeria are on the interval of excellence (**16''68 to 14''67**) with an average of (16''29 sec). (Weinneck. J,1983, p. 267) indicates that "The qualities of coordination are determined, above all, by the processes of control and regulation of movement. This allows the athlete to master motor actions with precision and economy".

2. Descriptive analysis and interpretation of the performance achieved in the vertical relaxation test:

The values obtained in the vertical expansion by the middle-distance athletes selected in the national military team of Algeria are between **41 cm** and **52.6 cm**. we have an average of **45.96cm** with a standard deviation of **3.57cm**.



Graph n°1: Shows the mean and standard deviation of the values obtained in the vertical expansion test.

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Values in cm	Appreciations
38 à 39	Low relaxation
40 à 41	Average relaxation
42 à 43	A quite good relaxation
45 à 46	Good relaxation
47 à 49	Very good relaxation
51 à 63	Excellent relaxation

Table 2: Values and assessments of the explosive strength of the lower limbs in men according to Cazorla et al (G. Cazorla, P. Housseaux and G. Millet, 1986).

We will say that the middle-distance athletes selected for the military national team of Algeria have good explosive strength in the lower limbs (vertical relaxation) of average (45.96). (Balsalobre Fernandez et al., 2015; Bachero-Mena B et al., 2017) indicates factors such as vertical jump performance and personal record over (800m-3000m-5000m) have a significant correlation, suggesting a better running economy.

3-Descriptive analysis and interpretation of performance on the football throwing test:

The values obtained in the football throw by the middle distance athletes selected in the national military team of Algeria are between **16.01m** and **19.02m**. We have an average of **17.31m** with a standard deviation of **0.83m**.

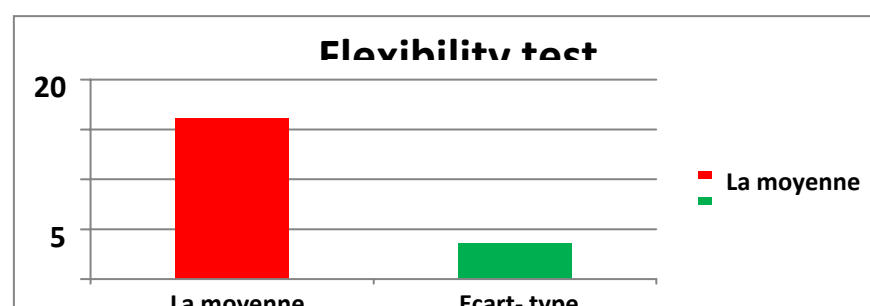
Values in sec	Appreciations
18"55 à 18"39	Low speed - coordination
18"24 à 18"09	Medium speed - coordination
17"93 à 17"77	Fairly good speed - coordination
17"60 à 17"42	Good speed - coordination
17"21 à 16"97	Very good speed -coordination
16"68 à 14"67	Excellent speed-coordination

Table 3: Values and assessments of the explosive force of the upper train in men according to Cazorla and al.

From these values, we can say that the middle-distance athletes selected for the Algerian national military team have excellent explosive strength at the level of the upper train with an average of (17.31m). ([Jung, 2003](#) ;[Legaz-Arrès et al., 2005](#)) indicate that strength training has been proposed as an important complementary training to increase performance in endurance events by improving other factors, such as running economy.

3. Descriptive analysis and interpretation of the performance on the flexibility test:

For **the flexion of the trunk in a standing position**, the values obtained by the middle-distance athletes selected for the national military team of Algeria are between **13cm** and **22.50cm**. We have an average of **16.06cm** with a standard deviation of **3.58cm**.



Graph 2: Shows the mean and standard deviation of the values obtained in the flexibility test.

Referring to **J.D.M. Howard et al. (1988)** who say that any measurement below the bench is positive, we will say that the middle-distance athletes selected in the national military team of Algeria have good flexibility at the level of the trunk because all the measurements were taken below the bench, in other words, from the fingertips to the bench.

4. Descriptive analysis and interpretation of the performances achieved in the 50 m speed test:

The performances obtained in **the 50m sprint race** by the middle-distance athletes selected for the Algerian national military team are between **6''36** sec and **6''88** sec. We have an average of **6''65** sec and a standard deviation of **0.18sec**.

Values in sec	Appreciations
7"41 à 7"34	Low speed
7"28 à 7"22	Medium speed
7"16 à 7"10	Fairly good speed
7"03 à 6"96	Good speed
6"88 à 6"78	Very good speed
6"66 à 5"87	Excellent speed

Table 4: Values and assessments of the speed of the 50 m race in men according to Cazorla and Coll. 1986.

From these values, we can say that the middle-distance athletes selected for the Algerian national military team have an **excellent** average **speed** of (6"65).

In middle-distance running, primary speed is seen through the fact that anaerobic threshold speed, ventilatory threshold speed, and VO₂max have been identified as predictors of middle-distance running performance in novice and elite athletes (Zacharogiannis and Farrally 1993; Abe et al. 1998).

5. Descriptive Analysis and Interpretation of VAMEVAL Test Performance:

The performances obtained in **the VAMEVAL test (G. CAZORLA)** by the middle-distance athletes selected for the Algerian national military team are as follows

For the VAM are between **20,5 km/h** and **23,5km/h** with an average of **21,83 km/h** and with standard deviation of **01,04 km/h** .

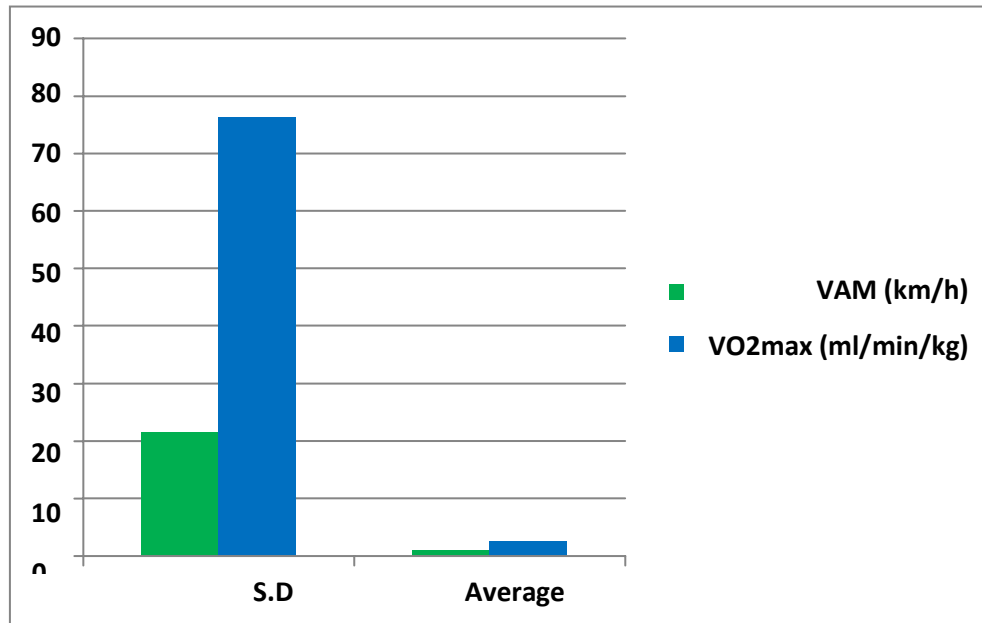
For VO₂max are between **71.75 ml/min/kg** and **82.39 ml/min/kg** with a mean of **77 ml/min/kg** with standard deviation of **2.80 ml/min/kg**

Athletes	Average VAM Km /h	Average VO2 max ml/mn/kg
The average	21,83	77
Standard deviation	1,04	2,80

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Table n°5: Represents the performances realized in the VAMEVAL test.



Graph n°3: Shows the average and standard deviation of the values obtained in VMA and VO2max.

VAM km -h- 1	VO2 max	POTENTIAL PERFORMANCE (h: min:s) according to different running distances(m)										
		800	1000	1500	2000	3000	5000	10000	15000	20000	30000	42195
14	49.0	2:59	3:56	6:30	9:05	14:28	25:20	56:15	1:27:23	1:59:22	3:15:43	4:54:07
15	52.5	2:46	3:38	5:59	8:20	13:16	23:11	50:47	1:18:46	1:47:29	2:53:20	4:17:48
16	56.0	2:35	3:24	5:32	7:43	12:15	21:23	46:17	1:11:42	1:37:45	2:35:33	3:49:28
17	59.5	2:26	3:11	5:09	7:10	11:23	19:50	42:30	1:05:47	1:29:38	2:21:05	3:26:44

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18	63.0	2:17	2:59	4:50	6:42	12:38	18:30	39:18	1:00:47	1:22:46	2:09:06	3:08:06
19	66.5	2:10	2:49	4:32	6:17	9:58	17:20	36:33	56:29	1:16:52	1:59:57	2:52:34
20	70.0	2:03	2:40	4:17	5:56	9:23	16:18	34:10	52:45	1:11:45	1:50:18	2:39:23
21	73.5	1:57	2:32	4:03	5:36	8:52	15:23	32:04	49:29	1:07:17	1:42:49	2:28:05
22	77.0	1:51	2:25	3:50	5:19	8:24	14:34	30:12	46:36	1:03:20	1:36:17	2:18:16
23	80.5	1:46	2:18	3:39	5:07	7:59	13:50	28:33	44:01	59:30	1:30:32	2:09:41
24	84.0	1:42	2:12	3:29	4:49	7:36	13:10	27:04	41:43	56:41	1:25:26	2:02:06
25	87.5	1:37	2:06	3:20	4:36	7:15	12:34	25:44	39:39	53:51	1:20:53	1:55:21

Table n°6: Presents the regressions calculated by Mercier and Léger 1982 (From the knowledge of the VAM it is possible to extrapolate VO₂max to predict the running performances likely to be reached).

Of these values, we will say that the athletes of middle-distance selected in the military national team of Algeria can claim potential performances in the events of the 800 m until the 3000m:

Athletes **1 and 13** have a VO₂max of **82.39 ml/min/kg** and a VAM of **23.5km/h**. They can achieve (with a possible margin of error of 5 to 7% more or less) the following performances: **1 min 44 sec** in the 800m; **2 min 14 sec** in the 1000m; **3 min 33 sec** in the 1500m; **4 min 58 sec** in the 2000m; **7 min 42 sec** in the 3000m.

Athletes **5 and 6 and 14** have a VO₂max of **80.5 ml/min/kg** and a VAM of **23km/h** they can achieve (with a possible margin of error of 5 to 7% more or less) the following performances: **1 min 46 sec** in the 800m; **2 min 18 sec** in the 1000m; **3 min 39 sec** in the 1500m; **5 min 07 sec** in the 2000m; **7min 59 sec** in the 3000m. Athletes **3 and 9** have a VO₂max of **77 ml/min/kg** and a VAM of **22km/h** and can achieve (with a possible margin of error of 5 to 7% more or less) the following performances: **1 min 51 sec** in the 800m; **2 min 25 sec** in the 1000m; **3 min 50 sec** in the 1500m; **5 min 19 sec** in the 2000m; **8min 24 sec** in the 3000m

Other athletes had a VO₂max of **75.25 ml/min/kg** and an VAM of **21.5km/h** for (athletes 2 and 10) and a VO₂max of **73.5 ml/min/kg** and an VAM of **21km/h** for

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(athletes 4 and 7 and 8 and 15) and also a VO₂max of **71.75 ml/min/kg** and an VAM of **20.5km/h** for (athletes 11 and 12).

According to **BERG et al. 1980, KENNY and HODGSON 1985**, Vo₂max is a success factor for middle-distance athletes, particularly for 1500m and 3000m runners, and is related to the athlete's specialty, age, and sex.

Aerobic capacity is an important aspect of the middle distance runner, especially with increasing distance (**Mytton et al., 2015; Thomson MA, 2017**).

In summary, we can say that the middle-distance athletes selected for the Algerian national military team have :

Good explosive strength in the lower limbs (vertical rebound test). Excellent speed and coordination (10 x 5 m shuttle coordination test). Excellent explosive strength in the upper extremity (soccer throwing test) Excellent speed (50m speed test).

Good flexibility at the level of the trunk (the flexion of the trunk in a standing position). Excellent maximum aerobic speed and VO₂max (Vaméval test).

Tests	Average	Standard deviation
Vertical rebound test (cm)	45,96	3,57
Shuttle coordination test 10x5 m(sec)	16,29	0,81
Soccer Throwing Test (m)	17,31	0,83
Speed test 50m (sec)	6,65	0,18
Flexibility test trunk flexion in standing position (cm)	16,06	3,58
Vaméval test .VAM in (km/h) ; VO ₂ max in(ml/min/kg)	VAM:21,83VO ₂ max:77	VAM: 1.04VO ₂ max :2,80

Table n°7: Represents averages and standard deviations of the performances realized in the different physical tests.

6- Discussion

Our research is aimed at evaluating the physical qualities of middle-distance athletes selected for the senior men's Algerian military national team, on a sample of 15 middle-distance athletes (800m, 1500m) representing an average age of (24.26 ± 3.67) years).

6-1 Coordination test (10 x 5 m shuttle):

For the 10 x 5 m shuttle race, the values obtained vary between **14''56 sec** and **17''39 sec**, with an average of **(16''29 sec $\pm$ 0''81)**.

Referring to the classification tables of the human species and the study of **Cazorla and Coll, 1986** on anthropometric measurements and physical tests, the study allowed the elaboration of scales of the physical value of young people from 12 to 18 years and more, according to the results indicate that the middle-distance athletes selected in the military national team of Algeria have an excellent speed-coordination.

The results obtained are in agreement with our theoretical analysis, (**Dierks and Davis, 2007; Hreljac, Marshall, & Hume, 2000**), which argues that expert runners have a lower risk of injury due to a running mode that mitigates the consequences of ground impacts by an adapted pre-positioning of the lower limb or by active muscular resistance to impact. Also (**Weineck. J, 1992, p. 383**) indicates that coordination allows the athlete to master motor actions with precision and economy, in determined situations, which can be foreseen (stereotypes), or unforeseen (adaptation), and to learn relatively more quickly the sports gestures.

Referring to the different statements of the authors we can conclude that coordination is necessary to acquire a better body balance, an essential rhythm quality, and great control during the race (800m-1500m-3000m), and considering the dynamics within the race.

6-2 Vertical Stress Relief Test:

The values obtained in the vertical relaxation range from **41 cm** to **52.6 cm**, with an average of **(45.96cm $\pm$ 3.57)**.

According to the study by **Cazorla et al. 1986**, middle-distance athletes selected for the Algerian national military team have good explosive strength in the lower limbs.

These results are in agreement with the scientific data (**Balsalobre Fernandez et al., 2015; Bachero-Mena B et al., 2017**) which indicates factors such as vertical jump performance and personal best over (800m-3000m-5000m) have a significant correlation, suggesting a better running economy.

On their side ([Cormie et al., 2009](#) [Jiménez-Reyes et al., 2014](#)) point out that vertical jump tests have been widely proposed as an effective and immediate assessment tool of lower limb explosive strength.

Therefore, it can be concluded that the explosive strength of the lower limbs is one of the criteria determining the performance in middle-distance running.

6-3 Soccer Throwing Test:

The values obtained in the football toss ranged from **16.01m** to **19.02m**, with a mean of

(17.31m±0.83).

According to the classification tables of the human species and the study of **Cazorla and Coll, 1986**, we will say that the middle-distance athletes selected for the national military team of Algeria have excellent explosive strength at the level of the uppertrain.

Our study coincides with the scientific data of ([Jung, 2003](#); [Legaz-Arrèse et al., 2005](#)) which indicate that strength training has been proposed as an important complementary training to increase performance in endurance events by improving other factors, such as running economy.

We can conclude that the strength of the upper limbs is one of the criteria determining the performance. For middle-distance runners, upper limb strength is one of the key factors that make them perform better.

6-4 Flexibility test (trunk flexion in standing position):

For trunk flexion in the standing position, the values obtained ranged from **13cm** to **22.50cm** with an average of **(16.06cm±3.58)**.

J.D.M.Howard et al. (1988) confirm our results indicating that any measurement below the bench is positive. We would say that the middle-distance athletes selected for the Algerian national military team have good flexibility at the trunk level because all measurements were taken below the bench, in other words, from the fingertips to the bench.

Jenkins and Beazell. (2010), shows that a runner with less flexibility consumes less oxygen over the same distance than one who is more flexible.

Therefore, we can say that a good articular amplitude has become one of the determining criteria in sports performance. Therefore, to reach the top level (elite),

athletes must have good joint flexibility. Flexibility is one of the physical qualities that make athletes perform better

6-5 Speed test (50 meters):

The performances obtained in the **50m speed race** ranged from **6''36** sec to **6''88** sec with an average of **(6''65sc $\pm$ 0''18)**.

According to the study by **Cazorla et al. 1986**, middle-distance athletes selected for the Algerian national military team have excellent speed.

The different statements of the authors give more scientific rigor to our research results (**Maffulli et al. 1991; Zacharogiannis et Farrelly 1993 Abe et al. 1998**), which emphasize the importance of speed can be seen in the fact that speed at the anaerobic threshold, ventilatory threshold, and VO_{2max} has been identified as a predictor of middle-distance running performance in novice and elite athletes

On their side (**Lacour et al. 1990**), indicates the maximum speed that can be maintained under aerobic conditions has been identified as significantly correlated with the performance of middle-distance running.

This allows us to say that speed is one of the determining criteria in sports performance. Also, we can retain that the speed allows us to take the advantage in the phase of acceleration and more on the last 10 to 20 meters of a race of middle distance. So speed is an essential element of performance in elite runners, which can place them on the international scene.

6-6 Endurance test (Vameval):

The results obtained in the VAMEVAL test ranged from **20.5km/h** to **23.5km/h** with an average of **(21.83km/h $\pm$ 1.04)** for VAM. And for VO_{2max} are between **71.75 ml/min/kg** and

82.39 ml/min/kg with an average of **(77ml/min/kg $\pm$ 2.80)**.

Referring to **Mercier and Léger 1982** (From the knowledge of the VAM it is possible to extrapolate VO_{2max} to predict the performances of race likely to be reached), the athletes of middle-distance selected in the military national team of Algeria can claim potential

performances, from **1 min 44sec** for the 800m, from **3 min 33 sec** for the 1500m, and from

7min 42 sec for the 3000m.

According to **Berg et al 1980, and Kenny and Hodgson 1985**, Vo₂max is a success factor for middle-distance athletes, especially for 1500m and 3000m runners.

The average values obtained in our study are comparable to high-level athletes such as **AOUITA** (83.4 ml/kg.mn) and **OVETT** (79.3 ml/kg, mn), and higher than the results of the study performed by (**Mohamed, S., Mohamed, A., Mokthar, C., & Feki, Y. 2005**), the VAM with an average of (20.38 km/h ± 1.45), and the VO₂max with an average of (64.76 ml/min/kg ± 7.68). (**Lacour et Col., 1989**) quotes the value of 22.9 km/h for French athletes, which demonstrates the power of this parameter in our population concerning the latter.

The different statements of the authors give more scientific rigor to our research results in the image of (**Mytton et al., 2015; Thomson MA, 2017**) who emphasize aerobic capacity is an important aspect of performance in middle-distance runners, especially when distance increases. Also (**Foster et al. 1978; Boileau et al. 1982; Camus 1992**) motion VO₂max was found to be more strongly correlated with running performance in middle-distance runners than in long-distance runners.

Using the arguments we have given, based on the exploitation of the results obtained, we can say that the VAM and VO₂max processes are of great importance in middle-distance events, and are one of the important elements of sports performance

Conclusion

In today's high-performance sport, physical qualities need to be improved for a good planning of training programs (short and long term). Also, a good recovery and a good diet put the athlete at the top of his physical form at the time of the competition

As in any other sport, performance in athletics is the result of a set of factors (biological, physical, physiological, technical, etc.) among which physical qualities (strength, speed, endurance, coordination, flexibility). Achieving a sporting performance is above all the result of a serious follow-up of adapted and structured training

It is in this context that we started a research on the physical qualities of the Algerian runners selected in the senior military national team in the discipline of middle distance, intending to determine the physical for this athletic specialty, as well as comparing them to international standards

This research allowed us, in a well-elaborated framework, to have an overview of the physical and morphological profile of these athletes because in the light of the results obtained

For physical tests

For the 10 x 5 m shuttle race, given the results obtained and compared to the classification tables of the human species and the study of **Cazorla et al, 1986**, the results indicate that our athletes fit within the average values of the times achieved by high-level athletes.

It is the same for the Vertical Relaxation Test The values obtained were **41 cm** to **52.6 cm**, with an average of **(45.96cm±3.57)**. These results are in agreement with the scientific data (**Balsalobre Fernandez et al., 2015; Bachero-Mena B et al., 2017**) which indicate that factors such as vertical jump performance and personal best over (800m-3000m-5000m) have a significant correlation, suggesting a better running economy.

Also, the values obtained in the football throw are between **16.01m** and **19.02m**, with an average of **(17.31m±0.83)**. Compared to the study by **Cazorla et al. 1986**, we can say that middle-distance athletes selected for the Algerian national military team have high explosive strength in the upper body.

It should also be noted that for the flexibility test the trunk flexion in the standing position the values obtained ranged from **13cm** to **22.50cm** and referring to the work of **(16.06cm±3.58) J.D.M.Howard et al. (1988)** confirm our results, similarly, **Jenkins and Beazell, (2010)**, show that a runner with less flexibility consumes less oxygen over the same distance than one who is more flexible.

This is also what we can see in the performances obtained in **the 50m speed race** between **6''36** sec and **6''88**, according to the study by **Cazorla et al, 1986**, so our athletes are within the times required for a better performance

The results obtained in the VAMEVAL test ranged from **20.5 km/h** to **23.5km/h** for the VAM. And for VO2max are between **71.75 ml/min/kg** and **82.39 ml/min/kg**, according to **Berg et al 1980, Kenny and Hodgson 1985**, the Vo2max is a success factor for middle- distance athletes, particularly for 1500m and 3000mrunners.

The average values obtained in our study are comparable to high-level athletes such as **AOUITA** (83.4ml/kg.mn) and **OVETT** (79.3 ml/kg, mn)

In conclusion, about the physical qualities of the group selected in the national military team, we can say or advance that they can claim a place at the level of the international arena especially as they have very good support.

Recommendations

In this perspective, our recommendations are: Train more PE teachers and sufficient quality athletic coaches Organise more mass cross-country in schools, motivating the best athletes Organize internal and external training courses to improve the quality of the supervisors (Initiator, 1st degree, 2nd degree, 3rd national degree); To increase the number of public sports facilities by developing sports areas and slopes To guide young people towards the half-way point in an organized manner; Organize half-day and detection operations; Organize training camps for the 800m and 1500m to improve the visibility of these races; Create camps in the departments and raise awareness among local elected officials to encourage their collaboration; Regularly organize competitions so that young people can enjoy running; to organize detection days for the small category that should be framed to make it more efficient

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