



Impact Of Transitional Periods On Some Physical Qualities Among Handball Players Playing In National Excellence In Algeria

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Received: 10/2024, Published: 11/2024

Abstract:

Handball is a sport characterized by physical qualities of strength and speed, but which also requires intense sequences of effort and an alternation between a phase of sprints and rest that in turn require a good quality of endurance. The development of a training program for a team requires finding consistency and respecting a certain continuity in order to preserve the adaptations of the organisms and to perpetuate the essential solicitations in a constant way. Truces, periods of physical and mental rest for athletes who still must resume activity gradually during these phases of relaxation. Therefore, the objective of the summer study is to evaluate some specific physical qualities in 18 handballers playing in National Excellence Senior Ladies League for three periods (Preparatory, competitive and winter break) to be able to determine the impact of these truces and to propose compliant solutions. Athletic performance showed significant differences in the tests conducted during the three periods.

Keywords: Handball player, physical qualities, preparatory, competitive period, winter break.

1.Introduction :

The evolution of the physical constraints of high-level sport has led to changes in athletic, technical and tactical training in order to achieve maximum performance, which makes the task of a coach more specific. Developing a training program for a team requires finding consistency and respecting a certain continuity in order to preserve the adaptations of the organisms and to perpetuate the essential requests in a constant manner.

Planning allows training content to be scheduled over time according to the objectives (performance and/or training) and the competition calendar. In particular, it takes into account the training load and rest periods. It is necessary to regularly update your planning, because the fitness of your players, the evolution of competitions and objectives will have an impact throughout the year.

Handball is a perfect illustration of these team sports disciplines, which require its athletes to be in fairly high physical shape. It is a fast, dynamic, offensive and aggressive game both in attack and defense and this whatever the playing position (Bayer, 1993). The handball player is a complete athlete and his perfect physical condition considerably increases his technical potential; but to reach this level, it must be emphasized that he must absolutely submit to a great variation of collective and individual actions such as jumps during shots and passes, as well as training in relaxation, speed, flexibility and skill. (Czerwinski, 1980)

It is also a sport with regular competition (9 to 10 months) comprising several periods during a sports season. In Algeria, women's handball teams playing in national excellence divide their sports year into 5 essential periods: a general preparation phase followed by specific preparation, a pre-competitive phase, the two competition phases (First leg/Return leg) divided by a winter break that generally lasts between 3 and 4 weeks, and finally a slightly longer transition period (July and August-see more) which announces the end of the season.

The break or rest period, a crucial break in which it is necessary to plan both a rest period and a second preparation period in order to gradually resume more intense work but which remains general; and where the athlete could practice activities other than their own discipline. This pushes coaches to ask themselves questions about the structuring of their training and the alternation between training and recovery.

The questions raised revolve around these apprehensions:

How should the truce phase be structured to maintain the athletic form of handball players playing in national excellence in Algeria? Can we ensure a good alternation between rest and work?

The objective of this study is mainly to evaluate some physical qualities specific to the discipline during the different periods of the sports season, to establish a link between the different plans and phases and to see the impact of the breaks by proposing solutions based on maintaining physical fitness during these rest periods while favoring moderate and short sessions mainly used to maintain the players' abilities while establishing good recovery. So, with our research, we plan to answer the questions of whether:

- Would there be significant changes in athletic fitness during the different periods of a sports season?
- Would there be a good alternation between the different phases of preparation, competitions and transition in order to allow athletes to gradually improve their level of physical performance and maintain it while avoiding cases of overtraining?

2. Methodology.

2.1. Experimental approach.

A questionnaire was established for the benefit of coaches and experts in the discipline. In this study, the periodization of training is understood through a few open-ended questions aimed at helping the survey to better understand the process of maintaining the athletes' sporting fitness, which mainly consists of gradually improving or maintaining their physical condition. The majority responded that

they had never individualized training during the breaks. This study was carried out with a team of senior women from an Algerian club playing in the National Excellence division, during the preparatory, competitive (first leg) and winter break periods of the 2022-2023 season. Training sessions were carried out while taking anthropometric measurements and applying the various tests on the players' physical abilities.

2.2. Participants.

Eighteen players playing in the "National Excellence Senior Women" division took part in this study. The frequency of microcycles was 4 to 5 sessions per week with a friendly match during the pre-competitive or competition period on weekends. The mean age, height, body weight, body mass index, wingspan, span, and fat percentage were respectively: 21.67 ± 3.24 years, 169.87 ± 5.5 cm, 67.46 ± 6.80 kg, 23.26 ± 1.59 kg/m², 171.2 ± 6.73 cm, 22.57 ± 1.20 cm, 25.8% MG. No abnormalities or health problems that could affect the assessments or training sessions were noted after the medical examination. With the authorization of the technical and administrative management of the club, the subjects consented in writing to participate in the study, after having read the aim and the protocol.

2.3. Experimental protocol.

Preparatory period, competitive (First leg) and winter break

In order to know the profile of each player, a battery of measurements and tests were carried out from the first week of the preparatory period in addition to the field tests in order to assess physical capacities:

- VO2 MAX (Progressive 20-meter Shuttle race test with 1-minute stop) carried out on the same day the measurements were taken;
- Liveliness (Illinois test) and acceleration (Short sprints).
- Upper limb power test (seated and standing medicine ball throw)
- Lower limb power test (Squat jump using a Myotest)

These same tests were repeated after the first match of the competition and the last week of the winter break to see the evolution of the physical fitness of our players but also the possibility of keeping and maintaining this aspect in order to start the second phase of the championship in the best possible conditions.

2.4. Test tools and protocol:

- The progressive 20-meter Shuttle race test with 1-minute stop.

Between 2 lines spaced 20 meters apart (the width of the handball field), run for as long as possible while respecting a running pace that accelerates every minute (the speed increases by 0.5 km/h; the starting speed is 8km/h). The participants are divided into groups of nine, they must have one foot on the starting line and will go back and forth in the evaluation area. A CD player (MP3) emits sounds administering the pace of the race. The test begins from the first beep with a very light run. When the participant is no longer in agreement, that she is overtaken by 1 or 2 meters of delay and that she can neither maintain them nor catch up on the following passages, the test is over. It is therefore sufficient to report to the reference table the level stated when stopping the test as well as the duration that corresponds to it to estimate the VMA. In our study we were content to record the VO2MAX rates.

- Liveliness by the Illinois test.

The course is part of a rectangle 5 meters wide and 10 meters long. 4 markers are arranged in a rectangle respecting these distances. They will represent the starting, finishing and U-turn points. 4 other cones are placed precisely in the middle of the rectangle, 3.3 meters separating each of them. A player lies flat on her stomach at the starting point, her head facing the starting line, her hands flat at chest level. At the signal, she gets up as quickly as possible and runs the circuit to the finishing line without touching any cones. The timer starts at the starting signal and stops when the athlete's chest crosses the finishing line. Two attempts are allowed. The best time is retained. The test is invalidated if the cone is touched or if she makes a U-turn before one of the lines.

- Short sprints.

A warm-up should be implemented before the evaluation. It includes some starts and accelerations as well as unrecorded attempts. The player stands near the first cone. Leaning forward, legs staggered behind the starting line. The evaluator stands at the opposite cone, one arm in the air. The starting signal is given in two stages (a verbal signal to inform the athlete who must be ready to react "ready!", after a second signal is given visually by lowering the arm, the evaluator starts the stopwatch. The player sets off as quickly as possible over the evaluated distance (15 meters). The stopwatch must be stopped when her chest crosses the finish line. 2 attempts are allowed for each player, the best time of the two is rounded to the nearest decimal place and then recorded.

- Power of the upper limbs.

- Seated medicine ball throw: The player sits with her back to the wall, legs extended on the ground. She grabs the medicine ball by placing her hands on the back of it. The starting position of the ball is against the chest, elbows apart. The athlete then throws the ball as hard as she can, so that it goes vertically as far as possible. The distance traveled by the ball is measured starting from the wall and rounded to the nearest decimal place. 10 cm closest. The best of the three attempts is recorded.
- Standing medicine ball throw: The player stands straight with her back to the wall. She grabs the medicine ball by placing her hands on the back of it. The starting position of the ball is against the chest, elbows apart. The athlete then throws the ball as hard as she can, so that it goes vertically as far as possible. The distance traveled by the ball is measured starting from the wall and rounded to the nearest 10 cm. The best of the three attempts is recorded.

- Lower limb power (squat jump test by Myotest).

The subjects all performed the test according to the same protocol. They previously performed a 5-minute warm-up based on flexion/extension. After starting the Myotest, select the "SautSJ" test and check that the body weight is correct, otherwise adjust it. Place the Myotest on the belt and press "Enter". The start must be done by bending the knees to 90° and remaining still. At the short beep, jump as high as possible without momentum, keeping the hands in contact with the waist. The landing is done in a flexible and cushioned manner. Return to the bent and still position until the next beep. After 5 repetitions, the double beep signals the end of the test Without counter movement. The number of jumps was chosen in order to be able to establish a significant average value without involving the aspect of fatigue that could result from too many repetitions.

Using the Myotest -performance measuring system- we were able to: Calculate the power, strength and speed in the participants (The height of a jump; resistance to fatigue; evaluate the height of the vertical jump and the statodynamic explosiveness of the legs -without counter movement of momentum-). The Myotest calculates the power, strength and speed of a sporting movement using the principle of

accelerometry (measuring acceleration). The sensor contained in the Myotest records the acceleration (variation of speed over time) to which the device is subjected during a sporting gesture. By indicating the weight of the body or the load, depending on the exercise, the Myotest automatically calculates the force developed in Newton (mass x acceleration). The integral of the acceleration makes it possible to calculate the speed in cm per second [cm/s], and the power in Watt [w] is the product of the force by the speed. All the pre-programmed tests and the corresponding results have been verified and validated by the international scientific community. In our study, we took into consideration 4 parameters (height, power, force and speed) during the squat jump.

2.5. Statistical analysis

The results obtained are expressed as means and standard deviations. The normality of the data distribution was verified by the XLSTAT software (version 2022). The T test (Student t-test) was used to establish all comparisons concerning the parameters expressed in analytical results. The significance threshold p was set and symbolized by $p < 0.05$, the 95% confidence interval. The statistical results as well as the graphs were carried out using EXCEL (Microsoft 365 Personal version-2021 microsoft.x22-62082-02-) and XLSTAT (version 2022).

3. Analysis and interpretation of the results.

3-1. Presentation of the results of aerobic endurance, liveliness, acceleration and upper limb power tests during the three periods (Preparatory, competitive and winter break).

Table (01) allows us to visualize the mean; the standard deviation, the range (minimum value - maximum value) and the differences between the means (significant at $p < 0.05$ - Not significant by NS) with Student's t test for paired samples; of the different variables (aerobic endurance, liveliness, acceleration and upper limb power).

The results are illustrated as follows:

Table 1: Performance assessment (VO2MAX, Vivacity, Acceleration, Upper limb power) during the three periods (Preparatory, Competitive and Winter break)

			Périods		
Physicals qualitys	Tests	Résults	Preparatory	Competitive	Winter break
Aerobic Endurance	Navette 20M (LÉGER) (ML.MIN-1KG-1)	Min-Max	35.6 – 41.6	44.6 – 53.6	41.6 – 47.9
		Moyenne ± SD	38.27 ± 1.97	49.19 ± 2.62	44.60 ± 1.86
		T student		p<0.05	p<0.05
vivacity	The Illinois (S. 1/100)	Min-Max	17.5 – 21.5	14.9 – 17.8	16 – 18.5
		Moyenne ± SD	19.66 ± 1.19	16.43 ± 0.80	17.27 ± 0.68
		T student		p<0.05	p<0.05
Acceleation	Short Sprints	Min-Max	2.90 – 3.95	2.65 – 3.25	2.82 – 3.55
		mean ± SD	3.48 ± 0.34	3.01 ± 0.19	3.20 ± 0.20

	(S. 1/100)	T student		p<0.05	NS
Upper limb power	Thrown Sitting (cm)	Min-Max	420 - 530	490 - 600	485 - 580
		mean ± SD	487.44 ±41.10	534.353 ±32.98	518.82 ±24.65
		T student		p<0.05	p<0.05
	Thrown Standing (cm)	Min-Max	480 - 620	520 - 660	500 - 650
		mean ± SD	546.17 ±45.53	581.76 ±42.20	565.58 ±45.06
		T student		p<0.05	p<0.05

➤ **For aerobic endurance (VO2max)**

According to the results obtained during the 20m shuttle test (LEGER), a significant difference (p <0.05) was observed during the two periods (competitive and winter break) with an average value and a difference of 4.50 ml/min/kg Between the competition and rest period.

The 95% confidence interval around the difference between the two averages [pp (38.27) -PC (49.19)] [pp (38.27) -Th (44.60)] does not include the supposed difference that we had chosen (0), which indicates that the difference between the two averages has a low probability of being zero. The information carried by the P-value is similar: p <0.0001, value lower than the level of alpha significance (α = 0.05). This means that we can reject the null hypothesis with a low risk of deceiving ourselves. In other words, the difference in averages is statistically significant.

➤ **For vivacity:**

According to the results recorded during the Illinois test, a significant difference (p <0.05) was observed during the competition period and that of the winter break also with a slight difference of 0.84 seconds between the two periods but a clearness of the Performances recorded at 3.23 seconds between the preparatory period and that of the competition.

The 95% confidence interval around the difference between the two averages [pp (19.66s) -pc (16.43s)] [pp (19.66s) - TH (17.27s)] does not include the supposed difference that We chose (0), which indicates that the difference between the two averages has a low probability of being zero. The information carried by the P-value is similar: p <0.0001, value lower than the level of alpha significance (α = 0.05). This means that we can reject the null hypothesis with a low risk of deceiving ourselves. In other words, the difference in averages is statistically significant.

➤ **For short sprints**

Let test presents a significant difference to (p <0.05) between the two periods (preparatory and competitive) only with a low dissimilarity between the two averages of 0.47S [pp (3.48s) -pc (3.01s)]. Regarding both Period (preparatory and truce), the value of T observed is lower than the critical value which stipulates an non-significant difference ns [to = 1.135 / tc = 2.120- (p> 0.05)].

➤ **For the power of the upper limbs**

According to the results obtained, the T test has significant differences recorded in two launched (seated and standing) to (p <0.05) with a difference of 47cm between the two periods (preparatory and competitive) and 31cm between the two periods (Preparatory and truce) when launched in medicine ball in a sitting position. Also ; A difference in 35Cmentre the two periods (preparatory and competitive)

and 19cm between the two periods (preparatory and truce) during the launch of medicine ball in standing position.

The 95% confidence interval around the difference between the two averages [pp (487cm) -pc (535cm)] [pp (487cm) -TH (518cm) launched seated] [pp (546cm) -PC (581cm)] [Pp (546cm)- th (565cm) launched standing] does not include the supposed difference that we had chosen (0), which indicates that the difference between the two averages has a low probability of being zero. The information carried by the P-value is similar: $p < 0.0001$, value lower than the level of alpha significance ($\alpha = 0.05$). This means that we can reject the null hypothesis with a low risk of deceiving ourselves. In other words, the difference in averages is statistically significant.

II-2. Presentation of the results of the different parameters (height, power, strength, speed) during the Squat Jump jump during the three periods (preparatory, competitive and winter break).

Table (02) allows us to view the average; the standard deviation, the extent (minimum value- maximum value) and the differences between the averages (significant to $p < 0.05$ - not significant by NS) with Student test for paired samples; Different variables (height, power, strength and speed) during the Jump Squat jump test obtained during the three periods (preparatory, competitive and winter break).

Table 2: Presentation of the various parameters during the Jump squat jump during the three periods (preparatory, competitive and winter break)

Tests	Physicals qualitys	Résultats	Periods		
			Preparatory	Competitive	Winter break
Squat jump (Myotest)	Height (Cm)	Min-Max	17 -24	25 – 29	23 - 27
		mean \pm SD	20.824 \pm 1.912	27.765 \pm 1.20	24.588 \pm 1.30
		T student		p<0.05	p<0.05
	Power (W/Kg)	Min-Max	26 - 31	30 – 36	28 - 34
		mean \pm SD	28.235 \pm 1.30	32.821 \pm 1.33	30.529 \pm 1.231
		T student		p<0.05	p<0.05
	strength (N/Kg)	Min-Max	15 - 18	18 - 22	17 - 21
		mean \pm SD	16.235 \pm 1.033	19.882 \pm 1.054	19.118 \pm 0.995
		T student		p<0.05	p<0.05
	Speed	Min-Max	144 – 170	185 – 210	170 - 190
		mean \pm SD	157.00 \pm 8.382	197.353 \pm 7.50	180.529 – 7.383
		T student		p<0.05	p<0.05

According to the results, there is a clear improvement in performance during the competitive period and a slight decrease during the winter break. The t student of significant differences to $p < 0.05$ for all parameters (height-power and speed), even if the results of the quality of force between the two periods (competitive and winter break) are very close [respectively (19.882 N/kg - 19.118n/kg)]. These results are certainly linked to the characteristics of the discipline.

III- Discussion.

The aim of this study was mainly to evaluate some physical qualities during three different periods (preparatory period, competitive period and winter break) in order to determine the level of their improvement but also that of their decrease during the transitional periods.

A VO₂Max (maximum oxygen consumption or volume) is described as the individual's maximum ability to capture oxygen, transport it and use it at the muscular level (Jean-Claude / Amandine LE CORNEC. 2024). The higher it is, the more the athlete has a possibility of maintaining a high intensity in the game while alternating moments of recovery whenever necessary. The results of our subjects demonstrate in fact a significant progression in aerobic endurance between the PP and the PC established by a Shuttle test over 20 meters. This is justified by training and good physical preparation after a transitional period that lasted more than 12 weeks. Its decrease after the winter break, which lasted 4 weeks, is probably due to a drop in performance, knowing that 2 to 3 weeks of total rest can be enough to reduce general endurance performance by 20 to 25%, VO₂Max by 4 to 6% (PrChiha. Le Guide du préparateur physique.,2022).

Concerning speed qualities (vivacity and acceleration), studies report a time of 1.02 sec for the 5m sprint (Gorostiaga et al., 2005) and 4.47 sec for the 30m (Marques and Gonzalez-Badillo, 2006). Our players also achieved different performances during the tests carried out during the three phases. An average improvement during the competitive period and a slight decrease in performance during the break that can only be explained by the lack of training, the total rest of the athletes and even by weight gain. As studies have already shown, According to FREY (1977), speed is the ability that allows on the basis of the mobility of the processes of the neuromuscular system and the properties that we muscle them to develop strength, to accomplish motor actions in a minimum period of time in given conditions. It is generally accepted that speed training, well organized, can increase the gain of this quality by 15 to 20% (Jean Ferré and Philippe Leroux indicate. Preparation for sports educator diplomas Volume 1 Anatomical and Physiological Bases of muscular exercise and training methodology., 2016).

Regarding the quality of power of the upper limbs, our results show an improvement in performance during the competitive phase and still an insignificant decrease during the winter break if we compare them with each other. On the other hand, these results contradict those of Gorostiaga et al. (2005) who recorded an increase in the maximum strength of the upper limbs and shooting speed in Spanish handball players, due to the application of a strength training program during the sports season, which contributes to the improvement of the maximum and explosive strength of the upper body. The improvement of the strength and power of the upper limbs of the body is of capital importance in handball (Van Den Tillaar and Ettema, 2003; Visnapuu and Jürimäe, 2009) because it gives the advantage to perform and sustain the different attack or defense actions such as shots, blocks, counters, etc. For the lower limb performances, the results of our handball players changed during the three periods. We recorded an improvement in height, power, strength and speed assessed by myotest during the squat jump, between the preparatory period and the competitive period. However, the performances of our athletes decreased during the winter break. This negatively influences their handball prowess because muscle power - especially the leg extensor muscles - represents an important factor for success at the top level (Gorostiaga et al., 2004; Laffaye et al., 2005). The lack of improvement in strength and power is due to the workloads used in the training program that could be insufficient to cause an increase in performance (Ingebrigtsen et al., 2013). In order to maintain their power level or improve it further, it would therefore be necessary to apply greater loads.

Conclusion:

Handball is a dynamic and demanding collective sport that requires a wide variety of physical qualities such as strength, speed, agility and endurance. To reach their full potential in competition, handball

players must train rigorously and systematically by following physical preparation programs adapted to their sport.

Our study has shown that three periods of training annual training are significantly distinguished in the sense that the performance of our handball players improve during the competitive period after several training sessions but decrease during transition periods, something that is normal because These are cycles which correspond to the phase of the loss of the sporting form (Said & Nabila Mimouni. Charges modeling in the process of training., 2015).

However, our handball players can very well keep in shape during these rest periods which can vary between 3 to 12 weeks by remaining active. An intermediate orientation is recommended between that of an essential total rest in order to completely regenerate the mental possibilities, and A passive rest that could affect above all athletes who for any reason have not been able to provide the work provided during the previous macrocycle. This rest phase activates non -specific work because the whole ensures the maintenance of the main components of the training state while restaurants the physical and mental possibilities of the athlete (Said & Nabila Mimouni. Modeling of charges in the training process., 2015).

So we recommend coaches or physical preparers to accentuate a maintenance program for their athletes, but also the possibility of practicing other disciplines of cycling, swimming or beaches without forgetting the lifestyle that mainly touches the Power supply, hydration and sleep. Also, it is preferable to develop continuous training sessions, but especially intermittent training sessions with short fractions of high intensity effort (Wagner H et al. 2014). For qualities of muscle and power, it is necessary for rapid throws and injury prevention. We recommend bodybuilding (lying down, squats and rotation of the trunk), using balloons of different sizes or pulleum systems, plyometry exercises (sprints with direction of steering and jumps), as well as reinforcement exercises Stabilizing muscles (Wagner H et al. 2014). The improvement of the force, the power and the speed of the lower limbs can be inhibited by the training of endurance at a moderate intensity applied during the season (Gorostiaga et al., 2005; 1997;

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