Integrated strength-speed training based on second base stealing in baseball

Entrenamiento integrado de fuerza-velocidad en función del robo de segunda base en el béisbol

Treino integrado de força-velocidade em função do roubo de segunda base no beisebol

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Abstract

The implementation of strength and speed exercises in sports such as baseball, which require power training as a fundamental tool to perform the horizontal impulse necessary to accelerate forward and thus maximize performance in players. In response to the demand for this capacity, it is recognized as the objective of this study to design an integrated strength-speed training based on second base stealing in baseball. The verification is planned by defining two groups: control and experimental, in two moments: pre and posttest. The experimental stage takes place during the preseason, consisting of a sample of 20 players with 20.84 years of age and 79.82 kg, on average. Analytical-synthetic, inductive-deductive, historical-logical, systemic-structural-functional methods were used as theoretical methods and content analysis, observation and measurement as empirical. For linear velocity measurement, the variables analyzed are the 30-yard test and the maximum squat force tests. The results achieved indicated significant improvements in the experimental group in the two tests carried out, with % of increases equal to 3.48 and 7.46 % respectively. There were no significant differences between the results achieved in the pre and post-test of the GC, which was carried out in baseball training. It is shown that moderate intensity plyometric exercise training based on squat exercises using the non-fatigue training method, favors greater sprint acceleration in baseball.

Key words: Strength, speed, plyometrics, stealing bases, baseball

Resumen

La implementación de ejercicios de fuerza y velocidad en deportes como el béisbol, requiere de entrenamiento de la potencia: importante herramienta para realizar el impulso horizontal necesario para acelerar hacia adelante, y aplicable para maximizar el rendimiento en los jugadores. En atención a la demanda de esta capacidad, se reconoce como objetivo del presente estudio: diseñar un entrenamiento integrado de fuerza-velocidad en función del robo de segunda base en el béisbol. Se planifica la comprobación bajo la definición de dos grupos grupo: control y experimental, en dos

momentos: pre y post test. La etapa experimental se desarrolla durante la pretemporada, conformada por una muestra de 20 jugadores con 20.84 años de edad y 79.82 kg de peso promedio. Se emplearon como métodos teóricos: el analítico-sintético, inductivo-deductivo, histórico-lógico, sistémico-estructural-funcional y como empíricos el análisis de contenido, la observación, la medición. Para la medición de la velocidad lineal las variables analizadas fueron el test de 30 yardas y los test de fuerza máxima de *squat*. Los resultados alcanzados indicaron mejoras significativas en el grupo experimental en los dos test realizados, con porcientos de incrementos iguales a 3.48 y 7.46 respectivamente. No se apreciaron diferencias significativas entre los resultados alcanzados en el pre y el post test del grupo control, el cual realizó un entrenamiento propio del béisbol. Se demuestra que el entrenamiento de ejercicio pliométrico de moderada intensidad sustentado sobre la base de ejercicios de *squat*, utilizándose el método de entrenamiento no fatigante, propicia una mayor aceleración de *sprint* en el béisbol.
Palabras clave: Fuerza, Velocidad, Pliometría, Entrenamiento Integrado, Robo De Bases, Béisbol.

Resumo

A implementação de exercícios de força e velocidade em desportos como o beisebol, que requer o treino de potência, que é uma ferramenta importante para realizar o impulso horizontal necessário para acelerar para frente, aplicável para maximizar o desempenho dos jogadores. Em resposta à demanda por essa capacidade, o objetivo deste estudo é desenhar um treino integrado de força-velocidade baseado no roubo de segunda base no beisebol. A verificação está planeada definindo dois grupos: controle e experimental e em dois momentos: pré e pós teste. A fase experimental ocorre durante a pré-época, composta por uma amostra de 20 jogadores com 20,84 anos de idade e peso médio de 79,82 kg. Os métodos analítico-sintético, indutivo-dedutivo, histórico-lógico, sistêmico-estrutural-funcional foram utilizados como métodos teóricos e a análise de conteúdo, observação e mensuração foram utilizados como métodos empíricos. Para a medição da velocidade linear, as variáveis analisadas são o teste de 30 jardas e o teste de força máxima de agachamento. Os resultados alcançados indicaram melhorias significativas no grupo experimental nos dois testes realizados, com % de aumento igual a 3,48 e 7,46%, respetivamente. Não foram observadas diferenças significativas entre os resultados alcançados no pré e pós teste do GC, que realizou um treino de beisebol. Mostra-se que o treino de exercícios pliométricos de intensidade moderada sustentada com base em exercícios de agachamento usando o método de treino não fatigante promove maior aceleração de *sprint* no beisebol.
Palavras chaves: Força, Velocidade, Pirometria, Roubo De Bases, Beisebol, Formação Integrada.

Introduction

The incorporation of power training during the maximum strength phase in the preparation process of baseball players in the different categories, leagues or organizations in which they participate, is a matter to be addressed by virtue of improving sprint speed and the explosiveness. In the training of said motor capacity, the development of certain factors such as specific strength and technique are decisive for obtaining maximum performance. (López *et al.*, 2014).

Speed as motor capacity is an essential component in both team and individual sports; and is classified as an important action in sports performance (García y Peña, 2016). It is also one of the five physical tools or abilities of modern baseball. (Coleman y Amonette, 2015); and in most cases it is present in a large part of all the decisive actions of this sports discipline, such as a capture when placing runners on base to score runs (García *et al.*, 2019a).

In the training of said motor capacity, the development of certain factors such as specific strength and technique are decisive for obtaining maximum performance. (López *et al.*, 2014).

In the specific case of Baseball, according to Reynaldo(2017): strength and speed have the mission of preparing players based on principles, methods and means that will facilitate their development and compliance. All this through a pedagogical process organized by areas; and projecting the promotion of integrality in offensive and defensive game situations with tactical intentionality. It also finds space in Major League Baseball (o *Major League Baseball* [MLB]), and in other professional leagues that require a unique combination of athletic skills. Combining these abilities increases power output and speed potential.

Base running in baseball is an aspect of the game that attracts a lot of attention (Fox, 2006), since the runner's ability to steal a base provides many advantages offensively. Safe arrival at the base during a robbery attempt requires the player's ability to cover the distance between bases in a short period of time; reaching base before catcher throws (Brunfeldt *et al.*, 2015).

A successful stolen base passes the runner, eliminates a force play at second base (Ficklin *et al.*, 2014), and decreases the options for double plays for defensive players in any situation; either by hit or by mistake (Ficklin *et al.*, 2014).

The average expectation of scoring a run for a team according to studies carried out in the MLB is 0.56, without out and without runners on base. If the player reaches first base, this value increases to 0.95; and with a successful second base steal attempt, this value will increase to 1.19 (Lederer, 2006). But if this player is caught stealing, the run expectation is reduced to 0.30 with 0 runners on and one out. So for stolen bases to be effective, a team needs three successful stolen bases for every failed attempt (Lederer, 2006). Along with these sabermetric analyses, proper technique and footwork is also a crucial element.

A study carried out by Jefe (2016), with 9 collegiate baseball players from Division I of the NCAA (National Collegiate Athletic Association) studied the effects of 3 different base-stealing techniques on sprinting capabilities, CS (crossing step), JS (jab step) and DS (back step), completing a distance of 5m. The results obtained in this study showed significant effects: the magnitude of the negative displacement during the DS, with a heel drop of 0.08 m, compared to the CS and JS. As the length of the negative heel drive increases during the DS, the subject's velocity decreases.

Therefore, a shorter drop is more effective than a longer drop. The reason for the faster sprint speeds through 5m using a smaller DS result from the direction of the ground reaction force (GRF), aiming in an optimized direction and enhanced by horizontal and vertical forces.

Despite the evidence of the multiple advantages that base stealing provides in baseball, even specialists are dazzled by big home runs of considerable dimensions or fastballs that exceed 100 mph. Base running is then in the background, which is an optimal way to improve the offensive production of any team in a short term. (Bartelli, 2018). In addition to being one of the most important and under-emphasized aspects of the game of baseball, stealing bases is overlooked. Since, in general, little time is spent in training sessions on how to improve those skills, since it requires the unique combination of athletic skills.

In response to the demand for this offensive ruble according to its priority nature, as it is one of the main supports for the good performance of the players in this sport, it is recognized as the ***objective*** of the present investigation: to design an integrated strength-speed training based on stealing second base in baseball.

Sample and methodology

Participants

The sample used was chosen intentionally and consisted of a total of 20 male baseball players under 23 category from Matanzas (20.84 ± 0.72 years, 79.82 ± 5.21 kg). They were organized into two groups: a control group and an experimental group.

The experimental group undertook individualized bipodal plyometric jump training and finished with 10-30 yard free sprints. The DS base stealing exit technique was applied, according to its insertion throughout the entire preparation

process; incorporated into the normal balance of charges. Non-specific methods of resistance exercises with weights for the lower limbs of squats and the use of the non-fatiguing training method (NF) are added to it.

The so-called cluster training has been chosen, proposed by Folland *et al*. (cited in Pareja *et al.*, 2017), without constituting a complement or additional workload (in addition to his usual training, five times a week and a competition match).

The control group undertook their usual training in using the CS base stealing tee technique: five times a week, plus the competitive game on the weekend. All the players were subjected to identical tests under equal conditions and had to train a minimum of three weekly frequencies (approximately 9 to 12 h/week) during the three months of the preseason, which lasted 8 weeks (week). Before the start of the study, all the subjects voluntarily signed the informed consent, having previously read it.

Instruments

Two measurements per participant were recorded throughout the field test: 30 yards (yd); widely used and disseminated in the evaluation of baseball players for its reliability and validity and two measurements that were carried out progressively in the squat maximum strength tests:

- *Displacement speed test (30 yd):* it was carried out following the protocol of Reynaldo (2017). Time was counted in seconds (s) and thousandths of a second (ms), using a CASIO electronic chronometer with a precision of 0.1 c/s and an error of ± 0.001 s.
- *Test of 1 maximum repetition (1RM*) of squat: it was carried out according to the protocol of Thomas *et al.* (2007). It was measured through the maximum weight or resistance lifted in kilograms (kg), with which only one repetition can be done.

Research Methods

It is necessary to emphasize the use of the methods of the theoretical and empirical level. Among the first, the analytical-synthetic was specified, used to support the research topic, based on bibliographic analysis. The authors recognize the multiple relationships and components of the problem, approached separately to later integrate them into a whole as it is presented in reality. This route allowed the

interpretation of the information that was collected after consulting various authors:

- the inductive-deductive: it provided the determination of the problem and the differentiation of the tasks to be carried out during the investigative process, plus the design of the training. In addition to providing the establishment of the relationships between the facts that were analyzed and the explanations and conclusions that were reached in the present investigation
- the historical-logical: it was used to verify the existence of antecedents that use this type of activities and at the same time allowed to inquire about the process of physical preparation (speed and strength)
- the systemic-structural-functional: Taking into account that the task as a basic level in the realization of the objective, must be structured as a system that favors the work aimed at improving the process addressed in the application of the methods of science. The second comprised content analysis, which was required to analyze and assess the Comprehensive Athlete Preparation Program and the use of means (exercises) for the development of lower limb muscle strength as support for increased speed. in the acceleration phase 30 yards.
- observation: allowed to verify the initial state or starting point of the players in relation to said distance equivalent to a base in baseball, through parameters and indicators considered in the guide prepared for this purpose and the measurement in two moments. : pre and post test, under the control and recording of the times performed.

Statistical analysis

For the statistical treatment of the data, the software STATGRAPHICS PLUS Version 5.1 was used. Hypothesis tests were applied to determine the existence or not of significant differences in the results obtained between the experimental group and the control group, for the two moments (pre and post test). The effectiveness of the run in the 30 yd of the baseball players under 23 category of Matanzas, is calculated from the percent (%) increase (Incrt) according to Guzhalovkij (cited in García *et al.*, 2019b) based on the following equation

(ec):

$$\%Inc = \frac{\bar{x}_1 - \bar{x}_2}{0{,}5 * (\bar{x}_1 + \bar{x}_2)} * 100 \qquad \text{(ec. 1)}$$

Where:

$\bar{x}_1$ y $\bar{x}_2$: are the means of each sample

Training

There are different types of exercises that promote base stealing in baseball, where the principle of complementarity in sports plays an important role. By combining methods or means of training that provide among them the elements that the other lacks, a superior quality is given rise. Hence, in sprint training, methods and means of general, specific and competitive training are combined throughout the season.

Planning sprint speed training based on stealing second base as one of those great challenges, has as its most prominent components strength, power, explosiveness, acceleration and maximum sprint speed when it comes to performance in this element within the offensive technical direction.

Sequence of strength-speed exercises as a function of stealing second base in baseball

The objective of integrating strength exercises into sprint training routines to favor the acceleration phase is subject to the progression of bipodal plyometric jumps with less complex movements and less impact (Hansen y Kennelly, 2018), since they require a stable landing, coordination, balance and greater control of the hips and knees; in addition to preparing the body for sudden movements and providing improvements in power and elasticity necessary for sprint actions (Hansen y Kennelly, 2018).

Side hurdles and sprint jumps: The lateral fences are placed in the form of a line, one continuation of the other. Perform zigzag lateral jumps with a fall to one side and to the other of the hurdles, with great flexion of the hips and elevation of the knees. On landing, the contacts should be short and fast, taking advantage of the elastic response of the feet and lower legs. At the end of the last jump, start the sprint covering a distance of between 10-30 yards, with correct execution technique throughout the race.

Muscles involved

Primary: Gluteus maximus, gluteus minimus, quadriceps (rectus anterior, vastus lateralis, femoris, vastus medialis), soleus, and gastrocnemius.

Secondary: rectus abdominis, iliopsoas, hamstrings (biceps femoris, semitendinosus and semimembranosus).

Bounding and sprint: Move the knee forward while the rear leg is vigorously extended during the flight phase. The front leg prepares for light contact with the ground and a strong sweeping movement through the midfoot. While the rearmost leg moves forward and up with the knee bent. During the execution of the exercise: increase the stride frequency and gradually transform the jump into a natural running action, ensuring that the transition occurs smoothly. The sprint is completed covering a distance between 10-30 yards.

Muscles involved

Primary: Gluteus maximus, gluteus minimus, quadriceps (rectus femoris, vastus lateralis, femoris, vastus medialis), hamstrings (biceps femoris, semitendinosus, and semimembranosus).

Secondary: transversus abdominis, internal oblique, external oblique, rectus abdominis, deltoids, soleus, gastrocnemius.

Skip to the drawer and sprint: The goal of the box jump is to improve power. It is performed with an efficient submaximal and maximal jump and light contact with the surface of the box with the metatarsals when rebounding forward. During the descent, contact with the ground is made with the metatarsals quickly and elastically. The sprint is completed covering a distance between 10-30 yards.

Muscles involved

Primary: gluteus maximus, gluteus medius, quadriceps (rectus anterior, vastus lateralis, femoris, vastus medialis), soleus, and gastrocnemius.

Secondary: rectus abdominis, iliopsoas, hamstrings (biceps femoris, semitendinosus and semimembranosus).

High hurdles jumps and sprint: A greater effort is required during the takeoff phase. This should be at maximum intensity, with a forceful extension of the hips and elevation of the knees. During the landing phase, the feet are placed in dorsiflexion

to ensure a springy, rigid landing on the metatarsals. At the end of the last jump, start the sprint covering a distance of between 10-30 yards.

Muscles involved

Primary: gluteus maximus, gluteus minimus, quadriceps (reptus anterior, vastus lateralis, femoris, vastus medialis), soleus, and gastrocnemius.

Secondary: rectus abdominis, iliopsoas, hamstrings (biceps femoris, semitendinosus and semimembranosus).

low hurdle jumps and sprint: Emphasis should be placed on quick, active contact with the ground in metatarsal support, to work the muscles and tendons of the calves and feet, at a fast but even pace. The horizontal speed must be high. The last jump is concluded with the sprint, covering a distance between 10-30 yards.

Muscles involved

Primary: soleus, gastrocnemius.

Secondary: gluteus maximus, gluteus minimus, quadriceps (reptus anterior, vastus lateralis, femoris, vastus medialis), hamstrings (biceps femoris, semitendinosus, and semimembranosus).

Multiple-hop and sprint: Position yourself with a slight bend in the knees and execute a small counter-movement to generate greater force production in the legs and strong hip extension. In the landing phase, place both feet in front of the center of the body, conserving momentum and transforming the vertical and horizontal force.

The feet make relative contact with the ground in plantar support, to absorb landing forces through the quadriceps, gluteals and lower back safely. Propulsion is generated for the next jump by maintaining moderate knee flexion on consecutive landings and takeoffs, without losing horizontal speed and length. The sprint is completed covering a distance between 10-30 yards.

Muscles involved:

Primary: Gluteus maximus, gluteus medius, quadriceps (reptus anterior, vastus lateralis, femoris, vastus medialis), hamstrings (biceps femoris, semitendinosus, and semimembranosus), erector spinae (spinalis, longis dorsi, iliocostalis).

Secondaries: deltoids, rectus abdominis, iliopsoas, soleus, gastrocnemius.

Squat exercise sequence

Squat training is included in the exercises of the National Strength and Conditioning Association (NSCA, 2021). They are based on the basis of static exercises, which in turn are usually executed under special conditions. In the case that occupies this research, they are based on the non-fatiguing (NF) training method, also called ''cluster training''. It consisted of 4x6 repetitions, with 12 seconds of rest between each repetition and 2 minutes between series.

Squat: It is performed with a stop at an angle of no less than 45º, taking into account the weight on the crowbar and the stage in which the training is. It oscillates between 80 and 90%.

Slow Squats: Generally the first 2 or 3 rounds can be ascending or descending as appropriate, mainly during the preparatory period. It may be subject to changes within training.

Results

The results obtained in the pre and post test evaluations reveal that the control group reduces their values in the 30 yards to 0.14 m/s; with a slight percent increase (% Incrt) of 1.30%.

When contrasting the results obtained against the evaluation scale, for the 30 yards proposed by Reynaldo (2017) (Table 1) and modified by the author, these are evaluated as bad (M). For its part, the experimental group improved in the 30-yard dash by 0.40 m/s, for 3.48 %Incrt. It goes from the regular scale (R) or a value of 30 points, to the average scale (P) or a value of 50 points, as represented in Table 1. This places them very close to the desired values for optimal performance, according to the parameters established by the MLB for the selection of talents (MLB cited in García y Carreño, 2021).

Table 1: Parameters established in the proposed 30-yard evaluation scale

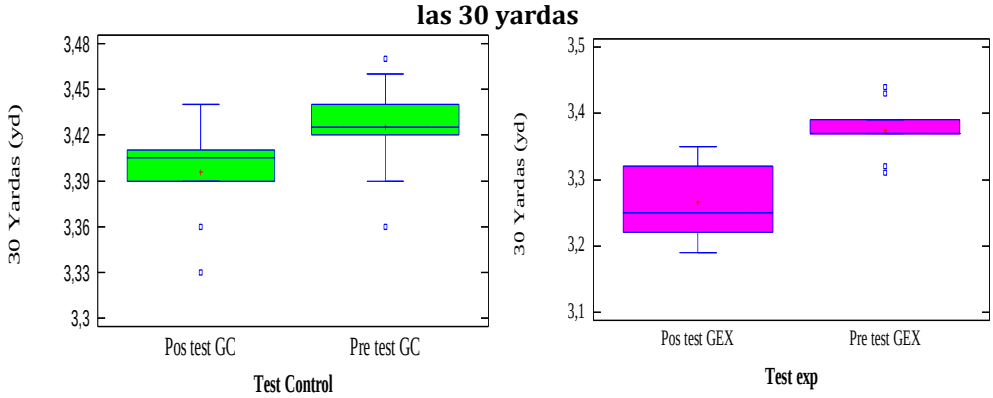
Points	Time	Evaluation
80	≤ 3.20	**E**
70	3.21-3.23	**MB**
60	3.24-3.26	**SP**
50	3.26-3.30	**P**
40	3.31-3.34	**BP**
30	3.35-3.39	**R**
20	≥ 3.40	**NP**

Legend: (E) Excellent; (MB) Very good; (SP) Above Average; (P) Average; (BP) Low Average; (R) Regular; (NP) Not prospect

Source: Taken from Reynaldo (2017)

The control group does not present significant differences between the pre and post test, since a probability value (p-value 0.0657) greater than the significance level (0.05) is obtained. Meanwhile, the experimental group shows significant improvements in their performance in the 30-yard dash, since the probability value (p-value 0.0001) is less than the significance level (0.05). The effectiveness of the exercises proposed during the preseason is 95% confident (Figure 1).

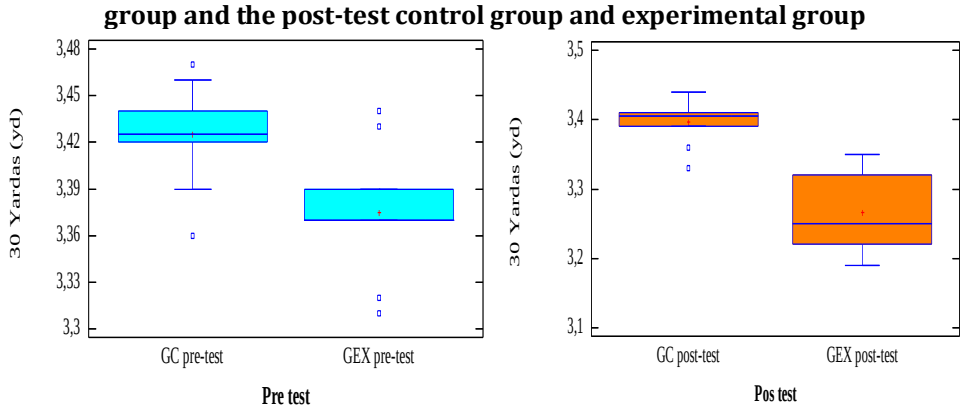
Figura 1: Resultados del pre test y el post test del grupo control y el grupo experimental en las 30 yardas



Source: Own Elaboration

When comparing the behavior of the 30-yard test between the pre-test control group and experimental group and the post-test control group and experimental group, significant differences are denoted in both cases, since probability values equal to 0.0068 and 0.0000 respectively are obtained, lower than the significance level (0.05) for 95% confidence. In the first case, the subjects of the control group did not have the influence of the training of the previous season and in the second case the contribution of the resisted work associated with the training with sleds and parachutes is demonstrated (Figure 2).

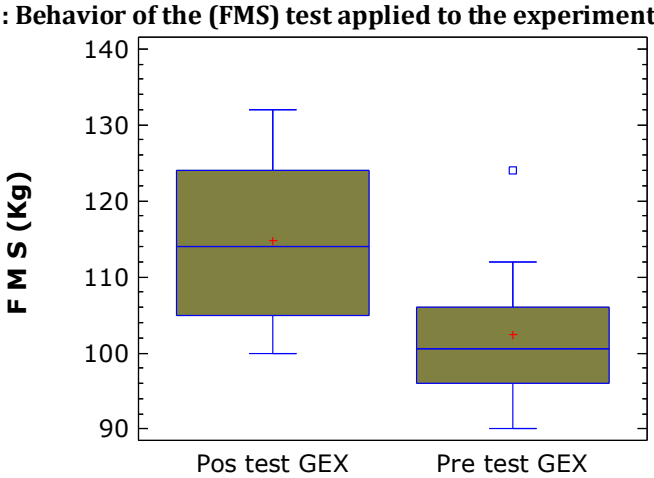
Figure 2: Behavior of the 30-yard test between the pre-test control group and experimental group and the post-test control group and experimental group



Source: Own Elaboration

In the specific case of the behavior of the muscular force of the lower limbs applied to the experimental group, through the squat maximum force test (FMS) (Figure 3): a remarkable 7.46 %Incrt was obtained between the pretest and the test. post test; and the ratio of body weight to FMS was improved from 1.3 to 1.5. Although in this variable this result is still lower than the parameters proposed by Verkhoshansky (2019), where the optimal ratio should be between 1.8 and 2, this is mainly due to the little experience of the investigated subjects with squat exercises.

Figure 3: Behavior of the (FMS) test applied to the experimental group



Source: Own Elaboration

Discussion

The effect of plyometric work when it precedes sprint work, produces positive effects by improving strength and speed values. Said positive effect is only appreciated when this condition reaches its optimum level. In this way, the intensity of the stimulus that causes the positive effect on the successive effect also increases. However, an optimal load and not a maximum load is necessary if the objective is to be achieved.

Around 8-12 plyometric and speed exercises are used, based on bipodal horizontal and vertical multi-jumps: moderate intensity plyometrics suggested by García *et al.* (2019a), with heights between 60-80 cm as proposed (Bompa, 2015); Oriented towards work to promote explosive strength. In this sense, there are authors such as Verkhoshansky (2006), which suggest that the time between the eccentric and concentric phase should not exceed 0.15 s: time in which the accumulated elastic energy would be dissipated.

In order to maintain the levels of strength acquired, its stability can be achieved during the competitive period. If systematic training is not performed, there is a decrease in strength of 5-6% of the extensor muscles and 15%-20% of the flexor muscles (Mirella, 2006). A muscle in a state of complete rest can lose up to 30% of its strength in one week, 60.2% after three months, 81.5% after four months and 88.8% after five months (Cernjavskij cited in Mirella, 2006).

During the early steps in the acceleration phase of stealing bases there is a strong correlation between horizontal momentum and faster accelerations (Kirby *et al.*, 2011). Therefore, the horizontal component of the ground reaction force has to be much larger than the vertical, in order to provide the necessary horizontal momentum to accelerate forward (Čoh *et al.*, 2006).

Although there are some investigations such as those carried out by Callaghan *et al.* (2013) where it is noted that a greater vertical impulse suggests a high vertical force production or a higher rate of vertical force production; there is a range of stride lengths, longer at the beginning than the acceleration within the first 5 yards. While the largest net horizontal impulses by applying the largest net horizontal forces occurred in the 10-yard sprint (Kawamori *et al.*, 2013).

It should be noted that the net production of horizontal momentum is most important immediately after the start of acceleration, where the athlete needs to overcome the inertia of the body from a stationary position.

The general key of this study is the performance of free sprint runs, based on the DS base-stealing starting technique that promotes greater acceleration, preceded by a moderate-intensity plyometric exercise. All this, supported on the basis of squat exercises and the non-fatiguing training method (NF). It has been called ''cluster training'', and allows you to produce greater strength, speed and power. This combination increases the speed potential, since this is one of the main indicators that the player must have to reach an additional base, in addition to the great advantage that an effective reading of the pitcher and catcher provides

On the other hand, this investigation also revealed the positive effects of the integrated speed-strength exercise, since the player generally uses the leading leg to propel himself forward, using smaller and less powerful muscles: the adductors of the hip and hamstrings. According to Bompa y Buzzichelli (2017) these play an

important role in extension powerful acceleration during a sprint, but also flex and support the knee, as well as contain high proportions of fast twitch fibers.

Based on the criteria of Chu y Rho (2016) the hamstring muscles are responsible for acceleration and deceleration during the recovery phase. Another element that characterizes this type of training is that it allows the player to move to the acceleration phase, when he moves with lateral movements in one direction; so a transition movement occurs between a lateral movement and a linear one. Hence the combination of already established linear and multidirectional movement patterns (Craig, 2019). It is then this system of exercises, the key to enhance the stealing of second base in baseball: a mechanism subject to this specific protocol.

Conclusions

1. The implementation of integrated speed-strength training based on stealing second base in baseball is a very convenient tool to maximize sprint performance in baseball players.
2. The combination of these skills increases speed potential, subject to the progression of bipodal plyometric jumps with less complex movements and less impact that must be organized and planned progressively.
3. Individualized training of bipedal plyometric jumps is applied, ending with 10-30 yard free sprints and the use of the DS base-stealing exit technique, together with non-specific methods of strength exercises with weights for the limbs. lower squats; from cluster training.
4. Los The results obtained indicated significant improvements in the 30-yard dash, with 3.48%Incrt, as well as in the maximum squat strength 7.46%Incrt. No significant differences were observed between the results achieved in the pre and post test of the control group, which carried out typical baseball training.

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Declaración de Contribución

The authors declare that there are no conflicts of interest

Contribución de Autoría

Alexis García Ponce de León: Conception of the idea, search and review of literature, preparation of instruments, application of instruments, compilation of the

information resulting from the applied instruments, statistical analysis, preparation of tables, graphs and images, preparation of the database, general advice from the topic addressed, writing of the original (first version), review and final version of the article, correction of the article, authorship coordinator, translation of terms or information obtained, review of the application of the applied bibliographic standard.

Alfredo Emilio Aranda Fernández: Search and review of literature, preparation of instruments, application of instruments, information resulting from the applied instruments, review and final version of the article, translation of terms or information obtained, review of the application of the bibliographic standard applied.