INTRODUCTION

Although physical exercise with body weight was already practiced in ancient Rome for war purposes, it was only in 1785 that physical exercises with body weight integrated in physical education\(^{(1, 2)}\). In 1829, the Swiss Phoktion Heinrich Clias published the book entitled: Kallisthenie - Exercises for Beauty and Strength, characterizing calisthenics as rhythmic practice of exercises with body weight\(^{(3)}\). Subsequently the Swedes\(^{(3)}\) elaborated a table with groups of organized exercises and considering specific objectives for the prescription of the training sessions.

Conceptually, calisthenics is a practice of rhythmic exercises without instruments called “free exercises”\(^{(3)}\). According to Alijas and Torre \(^{(3)}\) in 1936 the three principles adopted for the structuring of Calisthenics were disclosed, they were: selection, precision and totality. Among them, the principle of totality was considered as the basis for the development of the reference table for calisthenics sessions with exercises distributed in three groups: introductory (warm-up exercises), fundamental (consisting of exercises of extension, flexion and lateral of trunk, balance, abs, runs and jumps) and conclusive (consisting of exercises “back to calm”).

Recently some researchers\(^{(4-6)}\) reintroduced exercise with body weight using High-Intensity Interval Training (HIIT). Interestingly, there are still few studies with this type of approach, however, considering the few studies available in the literature it is possible to find different nomenclatures of the proposal, as follows: whole-body training\(^{(6)}\), whole-body calisthenics\(^{(4, 5)}\) and HIIT body work\(^{(2, 7)}\). For teaching purposes, we use the expression “HIIT body work” as a synonym for these nomenclatures.

Until the present moment there are no reports investigating which strategy should be applied to the protocol, considering the control of loads in the training and selection of exercises during the session of “HIIT body work”.

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HIGH-INTENSITY INTERVAL TRAINING

There is a growing number of evidences suggesting that HIIT induces physiological adaptations similar to conventional training, even with lower training volume\(^{(4-9)}\), both in clinical indicators\(^{(8, 9)}\) and in relation to physical fitness\(^{(4-6)}\).

The load control in the HIIT can be inserted considering the duration of the training cycle as well as the number of cycles during the session, being composed of the stimulus duration and recovery time (Figure 1).

The training cycle in HIIT has been distributed in two approaches, with stimuli less than 1 minute and stimuli equal to or greater than 1 minute of duration\(^{7, 10, 11}\).

Regarding the duration of the session in the HIIT protocols, are found variations of 4 and 45 minutes, duration of the stimulus between 20 seconds and 4 minutes and the recovery time between 10 seconds and 4 minutes\(^{4-6, 10, 11}\). In this way, using classic concepts of sports training\(^{12, 13}\), the total session time and the stimulus-recovery relationship can be considered components of the training load.

| Exercises          | Classification |
|--------------------|----------------|
| Jumping Jack       | Simple         |
| Burpee             | Complex        |
| Mountain climber   | Simple         |
| Squat thrust       | Complex        |
| Squat              | Simple         |
| Squat jump         | Complex        |
| Split              | Simple         |
| Alternate          | Complex        |

Figure 1. Example of exercises according to the complexity of the motor gesture.
Conceptually, training load (TL) is the relationship between quantity and quality of work performed in a training session. The TL is considered an important component in physical training programs\(^\text{(10, 11)}\) and can be composed of the components as the stimuli that compose the training session, and monitored internally and externally.\(^\text{(12, 13)}\)

The external load can be considered as the work performed during the training\(^\text{(14-15)}\) being directly related to the variables of volume and intensity of the exercise. In the “HIIT body work” we can characterize as external load the number of stimuli, the total time of the training session as well as the number of movements performed (volume variables) and the stimulus quality and recovery time (intensity variable).

The internal training load, which corresponds basically to the acute physiological responses provided by the exercise\(^\text{(15)}\), is related to the perception of effort, heart rate and maximal oxygen uptake (VO2max), parameters already frequently used as indicators of monitoring in the literature\(^\text{(12-14)}\).

Table 1 shows the stimulus-recovery ratio of some classical studies\(^\text{(16-22)}\) using HIIT protocols. Considering the lack of studies on “HIIT body work”, we intend to clarify about training variables that can be used during sessions of “HIIT body work”.

### TIME VARIABLES

The HIIT Has been used as an efficient strategy for those who seek weight loss and conditioning quickly and efficiently\(^\text{(8, 17)}\). However, the lack of a specific protocol for “HIIT body work” may prevent the development and use of this strategy for this purpose. Considering the statements of the editorial made by Gray\(^\text{(23)}\) the “HIIT body work” can be considered a modality of easy access and low cost, however, its application with efficiency requires a deep theoretical-practical approach of the professional for the appropriate prescription of the training program.

In the only studies available in the literature that used the “HIIT body work”\(^\text{(14-16)}\) was observed the use of the pattern of “all out” load with stimulus time, recovery time and total duration of the session quite varied. The “all out” method is characterized as the maximal intensity possible during the proposed stimulus period\(^\text{(17)}\).

Although the relationship of TL and the level of physical fitness in “HIIT body work” is not defined, variables as stimulus time, recovery time and total session time can be manipulated so that the individual can perform the greatest number of stimuli at the requested intensity independent of the level of conditioning\(^\text{(7, 23)}\). In this perspective, it is possible to consider that the TL can be manipulated, increasing or decreasing the stimulation or recovery time during the training cycles for different profiles of practitioners (beginners, intermediate and advanced) for an organization of the training session considering the time and motor experience in the modality as well as the level aptitude, strategy already used in other studies\(^\text{(23-25)}\).

For a simple organization of the training sessions of “HIIT body work” it is possible to consider that the use of TL with less physiological impact is recommended for beginners, and the recovery time must be longer than the stimulus time. In intermediate individuals is possible to consider TL with greater physiological impact, and the recovery time can be equal to the stimulus time. And for individuals with an advanced profile the TL may be more intense, it is possible to consider the recovery time being less than the stimulus time.\(^\text{(7)}\) In addition, another parameter that deserves attention in this discussion refers to the selection of the exercises used during the sessions of “HIIT body work”.

### EXERCISE SELECTION

The exercise selection during the session of “HIIT body work” is another crucial parameter to the success of the training program\(^\text{(16, 10)}\), mainly due to the complexity of the motor gesture\(^\text{(24)}\), however, there are no studies that investigated the effect of exercise selection on metabolic indicators as well as on the organization of training protocols.

A simple and didactic way of classifying exercises refers to the pattern of movement\(^\text{(24, 25)}\). Considering this approach we can distribute the exercises into two groups: exercises with a single pattern of movement (simple) and exercises with combined movement patterns (complex) (Figure 1).

According to previous studies\(^\text{(25-28)}\), the execution of complex exercises requires higher energy expenditure\(^\text{(25-27)}\) and higher metabolic demand\(^\text{(26, 28)}\). This characteristic can affect the dynamics of the training session considering the quality of the motor gestures, the fatigue and the total energy expenditure of the sessions of “HIIT body work”\(^\text{(25-29)}\).

Thus, based on the proposed classification of movements, it is possible to consider three strategies for the selection of exercises. The first one corresponds to the selection of exercise with less physiological impact, characterized by exercises with simple pattern. The second corresponds to the selection of exercises considering the combination of movement patterns, therefore varying between simple and complex. The third strategy corresponds to the use of only exercises with complex pattern of movement (Figure 1).

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**Table 1.** Stimulus-recovery ratio and total time in HIIT protocols.

| Study | Stimulus time | Recovery time | Total duration of the session |
|-------|---------------|---------------|------------------------------|
| Tabata et al.\(^\text{(14)}\) | 20 sec | 10 sec | 4 min |
| Gibala et al.\(^\text{(17)}\) | 30 sec | 4 min | 18.67 min |
| Osamwet et al.\(^\text{(16)}\) | 1 min | 1 min | 30 min |
| Tucker et al.\(^\text{(19)}\) | 4 min | 4 min | 28 min |
| Tucker et al.\(^\text{(20)}\) | 1 min | 1 min | 32 min |
| Gillen et al.\(^\text{(21)}\) | 20 sec | 2 min | 45 min |
| Rozenek\(^\text{(22)}\) | 1 min | 1 min | 20 min |
Based on the data available in the literature, it is possible to visualize a basic guideline for the elaboration of a program of “HIIT body work” considering the parameters of TL using the “all out” load as internal parameter and the stimulus time, recovery time, total duration of the training session, selection and number of movements per exercise as external training load. A suggestion to monitor the internal load during and after the training session corresponds to the use of the subjective perception of effort with scores varying from 9 to 10 in the adapted scale of Borg independent of the level of physical aptitude and motor experience of the practitioner (table 2), a method already recognized for its specificity in monitoring during training sessions.(30,31)

### FINAL CONSIDERATIONS

The “HIIT body work” can be considered an efficient and safe alternative, as long as its working methodology is operationally feasible when applied in specific training environments such as: gyms, clubs, parks, studios and domicile. Although there is a need for further studies with diverse approaches including our methodology, we believe that the proposal presented in this study can be considered a simple approach for methodological organization of sessions of HIIT body work.

### AUTHOR’S CONTRIBUTION

Each author contributed individually and significantly to the development of this article. AFM: intellectual design, survey of references and writing; JRAMN: survey of references and review of article; AFJ: review of article; DSB: intellectual design and writing.

### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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