STUDIA UBB EDUCATIO ARTIS GYMN., LX, 2, 2015, pp. 19 - 29
(RECOMMENDED CITATION)

METHODOLOGICAL ISSUES CONCERNING THE PRACTICE OF WEIGHT TRAINING IN GYMS OF CLUJ-NAPOCA: DENSITY WORKOUT

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ABSTRACT. Correct planning of physical activities ensures efficiency and reduces the risk of injury due to excesses. Many people have the erroneous impression that you always need high intensity workout in order to develop your body (Wilmore & Costill, 1999). Planning the density of your workout, along with other effort's parameters, plays an important role in the success of weight training workouts. The major objective of this study was the analysis of workout density from the methodological standpoint. This workout density was assessed including people who participated at weight training during their leisure time. As a secondary objective, we built a benchmark index for objective quantification of workout density that is specific for weight training. The vast majority of practitioners have included in their training sessions a number of exercises between 6 and 10 (61.25%) and a number of sets between 11 and 40 (88.75%), with the highest percentage between 21 and 30 sets (36.25%). The density of sets per exercise was calculated by reporting the number of sets to number of exercises. We have thus obtained a set/exercise index (Is/e) between 1.25 and 5.75.Comparing the overall duration of each workout to the number of sets we obtained a density per workout index (IDA) between 0.75 and 9.

Key words: *fitness, weight training, exercise, density, workout.*

REZUMAT. ***Aspecte metodice privind practicarea antrenamentului cu greutăți în sălile de fitness din Cluj-Napoca: densitatea în programul de antrenament.*** Planificarea corectă a antrenamentului cu greutăți asigură eficiență în pregătire și reduce riscul accidentărilor. Multe persoane au impresia eronată că în aceste antrenamente este nevoie mereu de intensități ridicate și volum de lucru mare pentru a dezvolta organismul (Wilmore & Costill, 1999).

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Planificarea densității efortului joacă, alături de ceilalți parametri ai efortului, un rol important în reușita programelor de antrenament cu greutăți pentru populație. Obiectivul major al acestui studiu reprezintă analiza din punct de vedere metodic a densității ședințelor de antrenament cu greutăți la populația care participă la acest tip de activitate fizică în timpul liber, în sălile de fitness. Ca obiectiv secundar este propunerea unui indice de referință pentru cuantificarea obiectivă a densității efortului specifică antrenamentului cu greutăți practicat în sălile de fitness. Marea majoritate a practicanților și-au inclus în ședințele de antrenament un număr de exerciții cuprins între 6 și 10 (61.25%) și un număr de seturi cuprins între 11 și 40 (88,75%), cu procentul cel mai mare între 21 și 30 de seturi (36,25%). Densitatea de seturi pe un exercițiu a fost calculată raportând numărul de seturi din partea fundamentală la numărul de exerciții din partea fundamentală. Am obținut, astfel, un indice set/exercițiu (Is/e) cuprins între 1,25 și 5,75, cu unitate de exprimare în „seturi/exercițiu". Raportând durata totală a fiecărui antrenament la numărul de seturi din partea fundamentală am obținut un indice de densitate pe antrenament (IDA) cuprins între 0,75 și 9. Acest indice are ca unitate de exprimare „minute/set".

Cuvinte cheie: *fitness, antrenament cu greutăți, efort fizic, densitate, program antrenament.*

Introduction

A weight training program is a composite of several variables that can be combined in a variety of choices to get the desired effect (Ratamess Jr., 2012). The identification of these variables and their proper planning is essential to predict a beneficial outcome for weight training workouts (American College of Sports Medicine, 2007). Correct planning of physical activities ensures efficiency and reduces the risk of injury due to excesses. "Top fitness is mandatory for shaping the heart of a future champion but not the heart of a future octogenarian. That is, a future champion needs the full cardiac adaptation of the peak training effect, whereas a future octogenarian needs healthy coronary arteries" (Sharkey, 1988, p. 5).

Many people have the erroneous impression that you always need high intensity workout in order to develop your body (Wilmore & Costill, 1999). Planning the density of your workout, along with other effort's parameters, plays an important role in the success of weight training workouts.

The density can be defined in terms of the ratio of exercise duration and length of the rest that follows that effort. A practical approach in relation to the density in weight training workouts is the number of exercises included in your training sessions related to training duration or number of sets per time unit.

The amount of energy consumed during weights exercises and energy systems involved in the muscle contraction are directly related to exercise intensity and duration of sets (Bompa, 1995). Including multiple sets for an exercise requires optimal choice of rest interval between them. The rest between sets has the role to allow the body to achieve adequate recovery before the next set. Time of rest interval has a significant impact on the performance and on the force development through weight training workouts (Pincivero, 2001).

The time spent to recover between sets will influence the extent of replenishment for energy reserves until a new set is performed. According to Pincivero (2001), after an execution of a set, almost half of creatine phosphate deposits recover between 1 and 3 minutes, but full recovery may take up to 6 minutes, sometimes even more. Implications of break duration on restoring energy deposits in weight training are (after Bompa, 1995, p. 72):

- A 30 seconds break between sets enables the recovery of creatine phosphate deposits at a rate of about 50%;
- A one-minute break between sets is not sufficient to fully restore muscle resources when running multiple sets of 15-20 repetitions per set;
- A pause of 3-5 minutes or more, sometimes, allow entirely recovery of creatine phosphate deposits.

Thus, the shorter the interval between sets the harder creatine phosphate reserves will be restored. With longer interval between sets, greater weights can be used in the next set (Ratamess Jr., 2012) or the number of repetitions performed with the same weight (Richmond & Godard, 2004; Willardson & Burkett, 2006; quoted by Ratamess Jr., 2012, p. 211). Rest intreval between sets directly influence the performance of each set (American College of Sports Medicine, 2007). "Greatest reductions in performance were seen with 30-second rest intervals and performance was maintained the best with 5-minute rest intervals" (Ratamess, Falvo, Mangini, Hoffman, Faigenbaum & Kang, 2007; cited by Ratamess Jr., 2012, p. 211), and muscular development was higher using rest intervals of two to three minutes instead of 30-40 seconds (Ratamess Jr., 2012).

Other factors influencing the planning of rest between sets in weight training are: desired anatomical adaptations of the workout, fitness levels and experience of trainee, the complexity of exercise and the number of muscles involved in performing the exercise, muscle size involved in the execution of exercise and the time necessary to move from one machine to another in fitness gyms (Ratamess Jr., 2012).

In weight training, depending on the objectives followed, we can opt for complete recovery or incomplete recovery between sets, but tolerance of the trainee to increasingly shorter rest intervals develops over time. It is mandatory to choose rest intervals that are consistent with the individual's level of training and with its general physical condition, since the accumulation of lactic acid and its removal is directly influenced by previous training.

Objectives of the study

The major objective of this study was the analysis of workout density from the methodological standpoint. This workout density was assessed including people who participated at weight training during their leisure time. We analysed the number of exercises in the workout, the number of sets per exercise, and the rest intervals proposed by practitioners in the beginning of workout compared with the real rest intervals measured by researcher during workout.

As a secondary objective, we built a benchmark index for objective quantification of workout density that is specific for weight training.

Materials and methods

The research was conducted from 14 August 2013 to 20 August 2014 in Cluj-Napoca's weight training gyms. The subjects are practitioners of all gyms where weight training is done, and where we were granted access. We registered between 4 and 6 practitioners in every gym. 155 practitioners were interviewed. 47.74% refused participation to our study, and 52.26% accepted permission. A practitioner didn't use weights in the day that we recorded his workout. Total number of registered subjects (subjects who used specific weight training exercises) was 80 (51.61% of respondents). To build the sample we used a non-random sampling as a member of the population probability of being selected in the sample could not be determined. For each of the 80 subjects was recorded only one session of training.

The data needed for research were recorded on a sheet of observation before and during the workout. The items recorded were: workout time, number of weight exercises, number of sets in the workout, rest intervals proposed by practitioners and rest intervals recorded by us.

Results

Of the 80 subjects 68.75% (55 subjects) were male and 31.25% (25 subjects) female, aged between 18 and 60 years. We present in Table no. 1 a distribution of subjects on age levels. In Chart no. 1 it can be seen percentages on age levels for our subjects.

Table 1. Distribution of subjects by age levels

	≤ 20 years	21-25 years	26-30 years	31-35 years	36-40 years	41-45 years	46-50 years	≥ 50 years
Subjects	7	22	23	10	7	2	1	8
Percentage	8.75	27.5	28.75	12.5	8.75	2.5	1.25	10

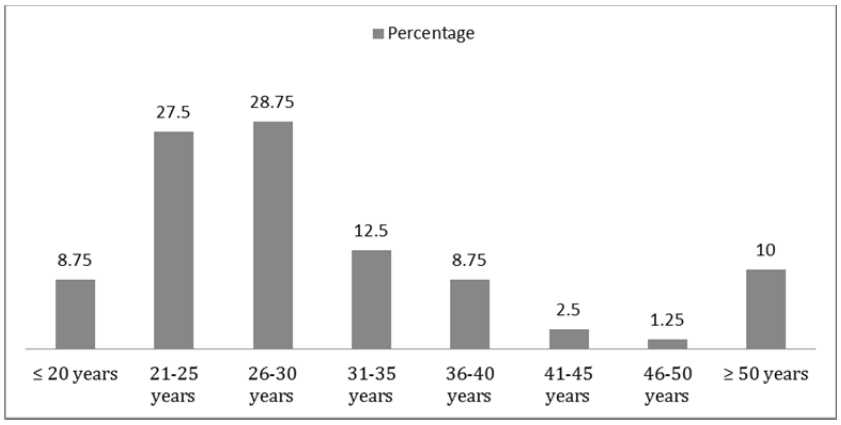

Fig. 1. Distribution of subjects by age levels

Levels of education (completed studies) are shown in Table no. 2.

Table 2. Distribution by level of education

	Gymnasium	High School	Faculty	Master
Subjects	6	25	28	21
Percentage	7.5	31.25	35	26.25

The registered workout time was between 26 minutes and 133 minutes, with an average of 70.05 minutes. In Chart no. 4 it can observe the workout time distribution.

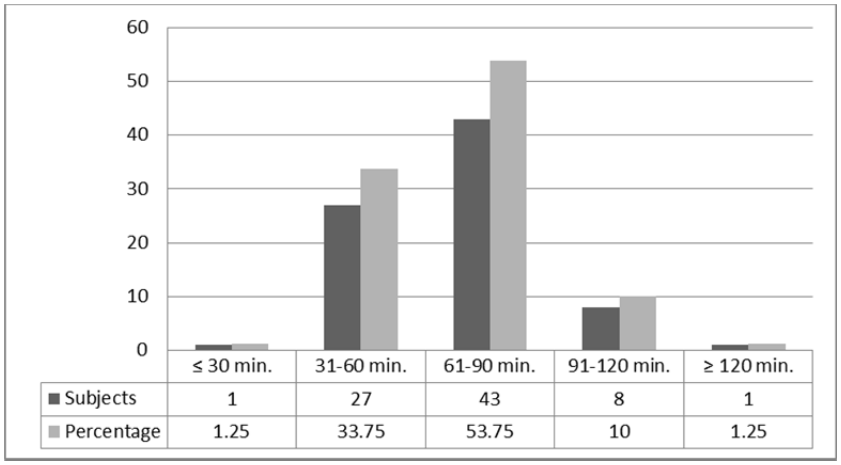

Fig. 2. Workout time distribution

In all the 80 workouts we counted only those exercises that are specific to weight training. We excluded cardio exercises (treadmill or bicycle). We counted also the number of sets, even if they were used as warm-up sets.

Minimum number of exercises in a training session was 3 and the maximum was 18. Chart no. 3 presents a distribution for exercises used.

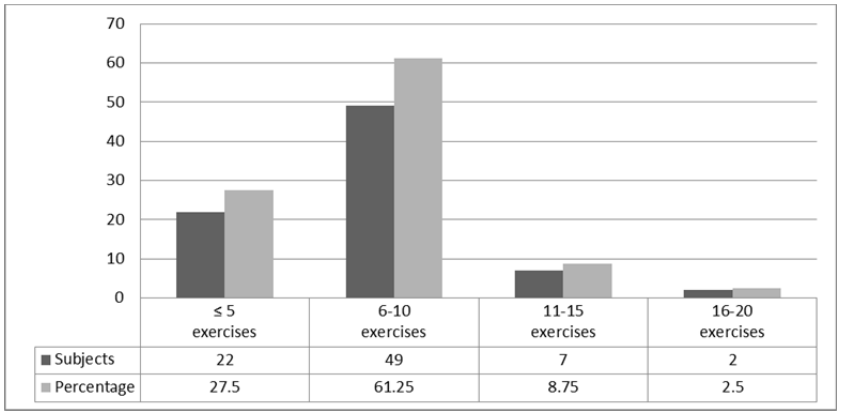

Fig. 3. Distribution of exercises number

The minimum number of sets in training sessions was 10 and the maximum was 73. In Chart no. 4 we can observe this distribution.

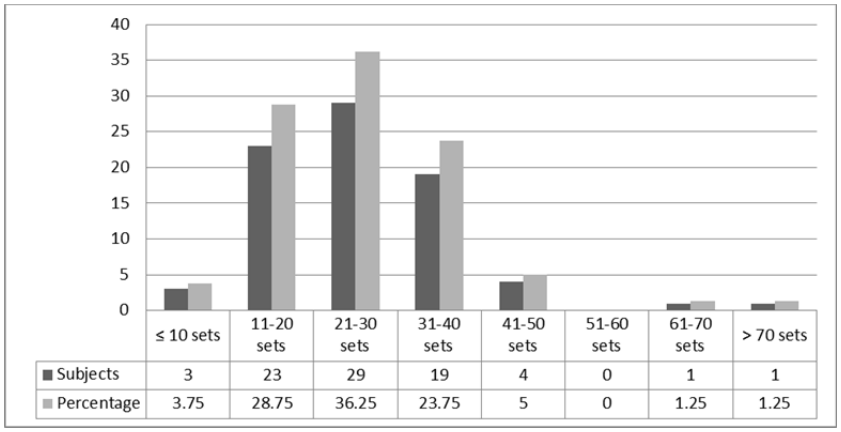

Fig. 4. Distribution for sets used in training

The density of sets per exercise was calculated by reporting the number of sets to number of exercises. We have thus obtained a set/exercise index ($I_{s/e}$) between 1.25 and 5.75. Staggering levels can be tracked the Chart no. 5.

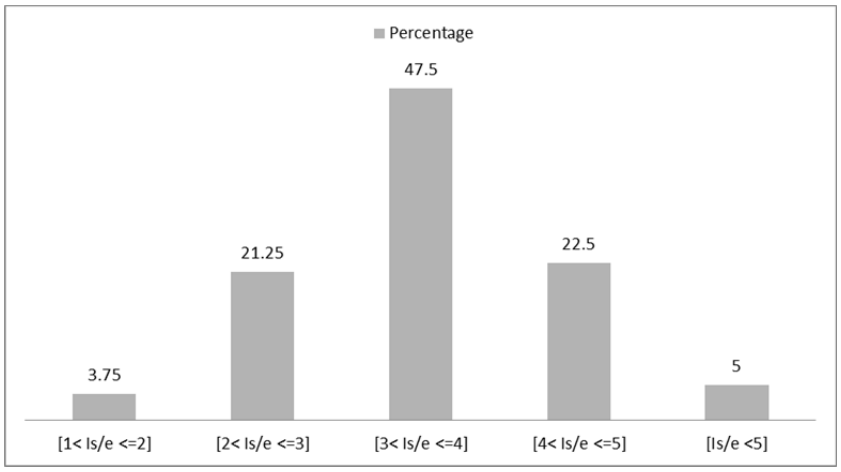

Fig. 5. Distribution of set/exercise index

Comparing the overall duration of each workout to the number of sets we obtained a density per workout index (I_{DA}) between 0.75 and 9. Chart no. 6 shows the distribution of this index.

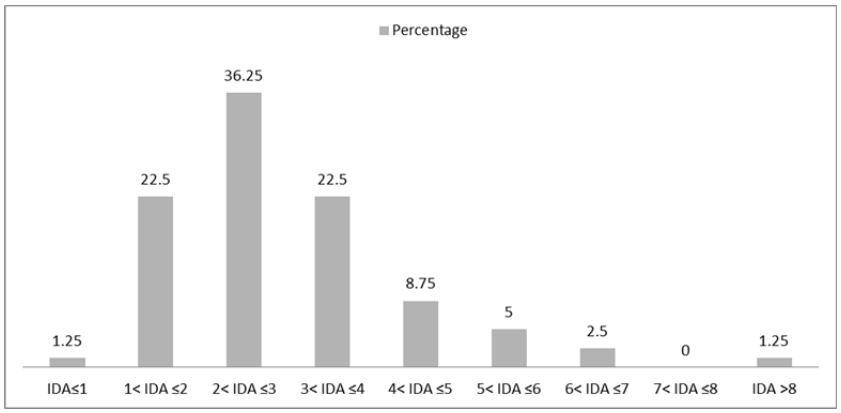

Fig. 6. Distribution of workout density index

Regarding the rest intervals that practitioners have proposed between exercises and between sets, it varied between 0 and 300 seconds between exercises and from 0 to 180 seconds between sets. Not all practitioners have proposed to follow a precise rest between workstations. Of the 80 practitioners in the study only 77.50% have set exact time for rest intervals only for some workstations of their workouts. Only 61.25% of practitioners have proposed specific time for their rest intervals between all of their workstations in the training session, and 22.50% have not proposed a specific time for rest intervals. Chart no. 7 shows this distribution.

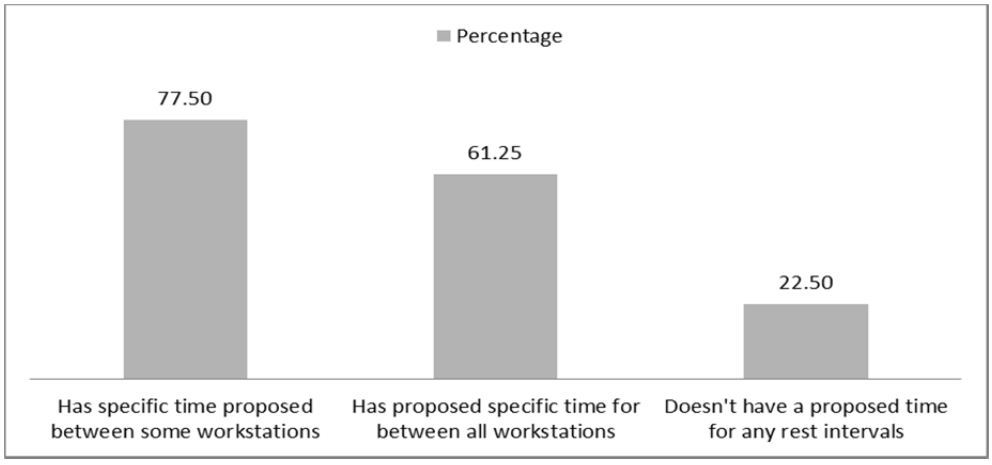

Fig. 7. Specific rest intervals between workstations

Minimum suggested duration for rest intervals between workstations, measured by us, was between 1 second and 109 seconds. The maximum duration of rest intervals between workstations, measured by us, ranged between 80 seconds and 667 seconds.

Of the 62 practitioners (77.50%) who proposed specific rest interval between, at least, some workstations only five practitioners (8.06%) were able to meet the proposed rest intervals for more than 90% of their intervals (see Chart no. 8). If we compare the number of practitioners who have succeeded to meet previously proposed rest intervals to the total number of registered subjects, the percentage of those who have exceeded the 90% of their rest intervals is lower, only 6.25%.

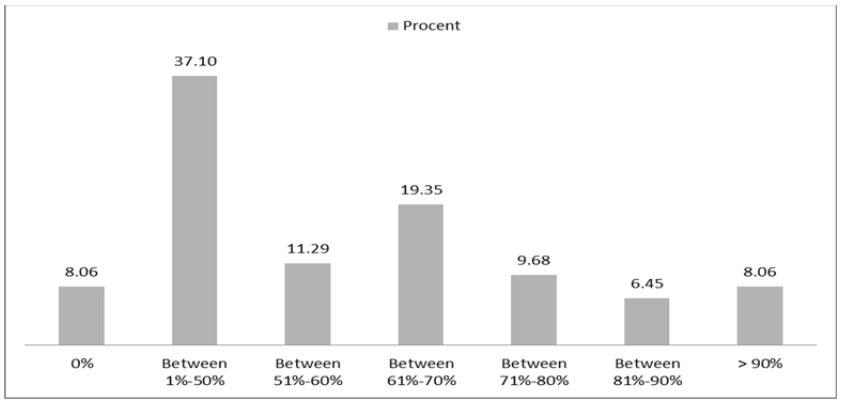

Fig. 8. The percentage of rest intervals that were met

Discussions

Practitioners have completed their weight trainings between 26 minutes and 133 minutes, with an average of 70.05 minutes. It is found that over 50% of practitioners had workouts with weights between 61 and 90 minutes. 87.50% of the subjects were trained between 31 and 90 minutes. American College of Sports Medicine (ACSM) recommends for most participants in physical activities training workouts between 20 and 60 minutes (American College of Sports Medicine, 1990). Many practitioners have found that 20-30 minutes of weight training combined with 20-30 minutes of cardio is a productive combination to achieve optimum levels of fitness (Westcott, 1996).

The vast majority of practitioners have included in their training sessions a number of exercises between 6 and 10 (61.25%) and a number of sets between 11 and 40 (88.75%), with the highest percentage between 21 and 30 sets (36.25%). ACSM recommends for the vast majority of practitioners the range of 8-10 exercises for weight training sessions ((American College of Sports Medicine, 2005). An advanced training program can include up to 20 exercises for a training session (Baechle & Groves, 1998).

The minimum number of sets per exercise for the highest percentage of subjects was 3 sets/exercise (33.75%). Some of them worked with a minimum of 4 sets/exercise (27.50% of practitioners). These were the first two values, in order of size. As regards the maximum number of sets for an exercise, almost half of practitioners (48.75%) chose to work with 4 sets/exercise. Several studies have shown that the best results, for trained individuals, were obtained when working with a number between 4 and 8 sets for muscle group, while the most effective for beginners are 4 sets/muscle group (Ratamess Jr., 2012).

The index set/exercise ($I_{s/e}$) has not exceeded 5.75, with an average of 3.69. Moreover, many subjects (47.50%) had an index between 3.01 and 4. The interval 2,01-5 is associated with a percentage of 91.25%. The index of workout density (I_{DA}) is an index that we propose to compare two weight training sessions. The lower is the value of this index; the higher is the density in weight training session. Many practitioners (81.25%) had an index between 1.01 and 4; the highest percentage (36.25%) was recorded on the level of 2.01 to 3.

Regarding the duration of rest intervals between workstations, it appears that only a proportion of 63.75% worked with rest intervals previously established and the rest (36.25%) hadn't planned the rest intervals between workstations. Of all registered subjects, only 6.25% were able to achieve the rest intervals planned, for a rate of over 90% of their total intervals included in workout.

Conclusions

1. Most practitioners have a proper approach of total workout time.
2. Number of exercises used in training sessions, for most practitioners, respects the recommendations of literature.
3. Most practitioners work with a number of 3-4 sets per exercise. It is an approach that we have seen in all the gyms where we made measurements.
4. The set/exercise index had an average value of 3.69. For almost half of subjects this index had a value ranged between 3.01 and 4. This means that almost half of subjects have included at least 3 sets for each exercise and not more than 4 sets per exercise.
5. The workout density index had, for a large number of practitioners, values between 1.01 and 4. More than a third of subjects had values ranging from 2.01 to 3.
6. The small number of practitioners who were able to meet the rest intervals planned in advance forces us to conclude that workout density during their sessions is not the one that they have planned. From this point of view, their training sessions lack of quality.
7. A good workout density in weight training involves, as a first step, accurate planning of rest intervals between workstations. For a better density we recommend using a personal stopwatch and a notebook with the planning of whole training session.

Acknowledgment

The content of this article is part of the PhD research conducted in Sport Science and Physical Education.

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