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Self-Selected Intensity by Controlled Hypertensive Older Women During a Weight Training Session

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Abstract: *The aim of this study was to verify the self-selected load by hypertensive older women during an acute weight training session. 16 sedentary and hypertensive older women (70.56 ± 7.54 years) performed two one-repetition maximum tests (1RM) in different days and performed a weight training session with self-selected intensity based on descriptor +3 (good) from the feeling scale. Mean loads in each exercise were: bench press 51.47% 1RM; leg extension 37.93% 1RM; lat pull down 56.80% 1RM and leg curl 55.16% 1RM. There were significant differences in all comparisons between 1RM and self-selected loads in all exercises. The results demonstrate that hypertensive older women self-selected intensity below the recommended limit for their physical and medical condition. Despite the very low intensity in the leg extension, it is believed that the natural training responses lead to an increase of load gradually during the sessions. However, high intensities at the beginning of the training may impact in an opposite decision, causing an increase in the high levels of sedentarism and consequently of chronic diseases.*

Keywords: *Affect, Hypertension, Self-selection, Weight training.*

I. Introduction

The American College of Sports Medicine and American Heart Association [1] recommend that sedentary and hypertensive individuals starts an exercise program including weight training, which helps not only to improve physical fitness, as well as many clinical aspects, composing part of non-drug intervention of several chronic diseases, including hypertension [2]. The guidelines suggests that initial intensity reaches values of up to 60% of the load obtained in one-repetition maximum test (1RM), however, many subjects engaged in physical activity programs neglect the strength assessment and choose their loads according to their individual preference. This practice can lead the individual to underestimate or overestimate its maximum capacity, using loads below or above the recommended and therefore compromise the positive relationship to the objective (dose-response) [3].

Hardy & Rejeski [4] validated the Feeling Scale with the proposal to have a quantitative criterion to self-select the exercise intensity through subjective responses of pleasure/displeasure and comfort/discomfort. They theorized that if a given load when associated with a positive affective state produce physiological changes equally to the model of imposed load that often does not provide pleasurable sensations to the practitioner, it could imply in improved adherence of the individual to exercise, since many investigations have pointed to a negative link between the imposition of the intensity and the early dropout of subjects in training programs [5-10].

Considering that people usually seek to perform pleasurable activities and avoid uncomfortable sensations [11], the low adherence can be attributed to the fact that high intensity have shown an association with reduced pleasure or increased discomfort during activity [12]. Investigate the aspects related to adherence become relevant in so far as studies indicate a high prevalence of early dropout in the first few months of participation [13, 14].

The vast majority of studies that have sought a better understanding of the issues around the self-selection focused their investigations on dynamic activities using ergometers in diverse populations [2, 15-18]. Considering the benefits of weight training for hypertensive individuals, verify the methodological appropriateness of their loads application, taking into consideration the self-selection, may provide backing a new proposal for prescription of physical activity for this population. Based on this, the aim of this study was to verify the self-selected load by hypertensive older women during an acute weight training session.

II. Methods

2.1 Subjects

Sixteen sedentary older women diagnosed with hypertension, with controlled blood pressure treated with medication and without any musculoskeletal limitation were recruited from local community centers and from the university campus via recruitment flyers and emails to participate in the study.

All subjects received individual explanations about the research objectives and procedures that would be submitted in addition to the possible benefits and risks linked to the execution of this study and conditioned their participation voluntarily by signing an informed consent in accordance with the Declaration of Helsinki for research involving humans. All procedures were approved by the Ethics Committee in Research of the State University of Rio Grande do Norte, receiving record in the National Council of Research Ethics.

2.2 Procedures

The procedures of this research were conducted in nine encounters. The first six sessions were assigned to familiarization with the exercise routine and the feeling scale. It was subsequently conducted a one-repetition maximum test (1RM) which was performed again after 96 hours, seeking greater reliability in the measure obtained. The tests were conducted following the recommendations of the American Society of Exercise Physiology [19].

Finally, was performed a weight training session with self-selected intensity through feeling scale where the load should be perceived as +3 (good), corresponding to a comfortable condition of exercise. Three sets of 10 repetitions were performed on each exercise with a rest interval of one minute between series and two minutes between exercises. All of them were previously informed that at the starting of each series, if they realized that the load was not consistent with the previously established, could stop the exercise and make the proper adjustments.

All sessions occurred at least 48 hours among them, always between 7am and 10am, in air-conditioned location with temperature of 22ºC and relative humidity of 60%. All exercises were performed in Righetto machines (Pro Free Style, Campinas, SP, Brazil).

2.3 Measures

For sample characterization, body weight and height were measured on a scale with an attached estadiometer (Filizola ®, São Paulo, SP, Brazil). The Body Mass Index (BMI) was calculated by dividing body weight by the square of height in meters.

The feeling scale proposed by Hardy & Rejeski [4], an instrument consisting basically of a 11-point scale, with bipolar items, ranging from +5 (very good) and -5 (very bad), descriptor of negative responses (displeasure/discomfort) and positive (pleasure/comfort), was used as self-selection intensity parameter during the training session.

The training load, characterized as the outcome variable of the present study, was considered the one that the elderly self-selected at the beginning of each exercise, being maintained throughout all three series.

2.4 Statistical Analyses

To analyze normality and data distribution the Shapiro-Wilk test was performed. Data were presented with measures of central tendency and dispersion such as mean, standard deviation, minimum and maximum of the variables as well as measures of frequency. The comparison between the average of loads obtained in the 1RM tests and average of self-selected loads was performed using the Student t test for paired samples. A significance level of $p < 0.05$ was adopted.

All statistical procedures carried out in this study were performed using the software SPSS (Statistical Package for the Social Sciences, 20.0 ink Chicago, IL, USA) for Windows.

III. Results

The subjects' anthropometric and physiological characteristics are shown on Table 1.

Table I. Participant characteristics.

Variables	Mean	±	SD
Age (years)	70.56	±	7.5
Body Weight (kg)	64.43	±	9.1
Height (cm)	1.57	±	0.1
BMI (kg/m²)	26.67	±	5.6
HR rest	66.38	±	3.8
SBP	118.90	±	5.3
DBP	78.06	±	2.4

BMI = Body Mass Index; HRrest = Rest Heart Rate; SBP= Systolic Blood Pressure; DBP= Diastolic Blood Pressure. Data are expressed as Mean ± SD.

The load values obtained in each exercise both in the 1RM test as in the training session with self-selected intensity are shown in Table II. The highest and the lowest average percentage of load found were, respectively, 56,80% 1RM (Lat Pull Down) and 37,93% 1RM (Leg Extension).

Table II. Loads obtained in 1RM tests and training session in each exercise.

Exercises	Variables	Mean	±	SD	Min	Max
BENCH PRESS	1RM Load (kg)	11.56	±	3.12	6.00	18.00
	Self-selected Load (kg)	5.96	±	1.91	2.00	8.00
	% 1RM		51.47			
LEG EXTENSION	1RM Load (kg)	63.41	±	16.43	40.00	95.00
	Self-selected Load (kg)	23.10	±	7.70	10.00	35.00
	% 1RM		37.93			
LAT PULL DOWN	1RM Load (kg)	34.70	±	5.96	20.00	45.00
	Self-selected Load (kg)	19.71	±	5.01	10.00	25.00
	% 1RM		56.80			
LEG CURL	1RM Load (kg)	44.72	±	9.74	30.00	60.00
	Self-selected Load (kg)	23.82	±	5.31	10.00	35.00
	% 1RM		55.16			

The Student's t test for paired samples showed statistically significant differences in all comparisons between 1RM and self-selected loads in all exercises (Figure 1).

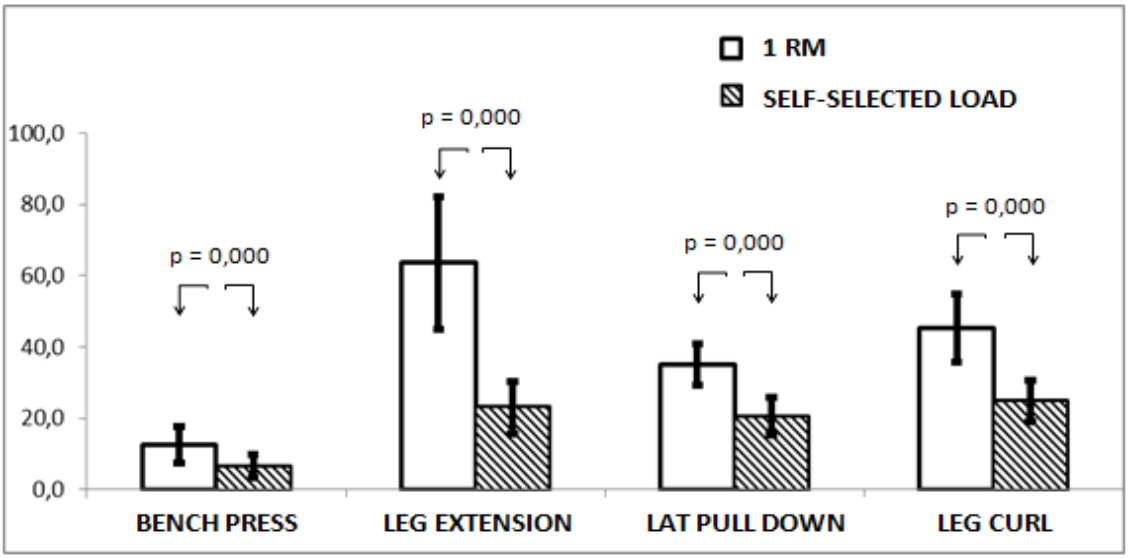

Figure 1. Comparison between the mean loads of 1RM tests and self-selected loads.

IV. Discussion

For hypertensive and sedentary elderly, the AHA [1] recommends performing weight training at an intensity of up to 60% of 1RM, characterized as the maximum percentage for a moderate effort. Nevertheless, previous studies have been well established that the imposition of a load in the initial stages of a training program, have been one of the main reasons for early dropout of activity [20-22]. It is also evident that most practitioners do not takes parameters for intensity control, opting to self-select the load according to their preference, avoiding very high efforts [20, 23].

Recently, several studies have searched to verify the effects of a training session with self-selected intensity on physiological parameters, trying to observe if this load would reach what the international guidelines recommend as ideal [9, 21, 24]. However, depending on the physical activity level and the clinical condition of the practitioner, these recommendations are not always followed once the frequency, intensity and duration suggested may influence the adherence [25].

In a review, Ekkekakis [26] showed that in the majority of studies, subjects self-selected intensities below or near the ventilatory thresholds and lactate threshold suitable for their physical condition, which represents important information, since intensities above this could reduce the responses of pleasure. The results of the present study pointed intensity values very close to the limits established by the AHA which are directly related to the satisfaction and pleasure in physical activity, and thus extend the length of permanence and

improve the relationship between the subject and training.

Considering the maximum intensity suggested for hypertensive initiate a weight training program, the results of this study support the trustworthiness of the feeling scale, since the mean self-selected loads ranged from 37,93% in the Leg Extension to 56,80% in the Lat Pull Down. Assessing older women, Elsangedy et al. [9] found similar results to the present study, with intensities ranging from 33,0% 1RM (Leg Extension) to 51,7% 1RM (Elbow Extension), and concluded that the strategy of self-selected intensity can provide larger benefits due to the absence of testing and has a positive relationship with a better adherence of individuals to a physically active life.

Focht [27] found similar results to those of the present study verifying that sedentary women self-selected ~56% 1RM during a weight training session. Glass & Stanton [28] evaluating untrained woman, also found intensities below 60% 1RM, with loads which reached 57% of maximum strength. However, none of these studies used the feeling scale as a parameter to self-select the load.

The search for answers about the self-selection of the intensity has led to findings whose origins can be based in hedonic and self-determination theories, where people are more likely to make behavioral choices that increase pleasure and, instead, tend to avoid behavioral choices that induce displeasure. Likewise, consistent with self-determination theory, the loss of autonomy in defining exercise intensity may have a negative impact, with potentially negative implications for adherence [29].

Although this research has been based on a single exercise session, Williams et al. [30] demonstrated that it was sufficient to predict the permanence in physical activity for at least the following 12 months, considering that positive affective responses can intrinsically motivate the individual and thus interfere the future behavior of the practitioner in the activity. The intensity obtained in the present study also does not seem to be a concern, once the literature reports reduction of blood pressure in women for up to 10 hours after a training session with 40% 1RM [31] and substantial strength gains in elderly women from training programs with intensities of 40% [32] and 20% [33] 1RM that, although generated discrete strength gains, these intensities tend to increase as a natural response of the individual. However, high intensities early in training may negatively impact on adherence, causing an increase in the high levels of world inactivity and, consequently, of the chronic diseases [20, 34].

V. Conclusions

In summary, the use of feeling scale appears to be a positive proposal for prescription of physical exercise for older hypertensive since the intensity values associated with a pleasurable affective response circled the values established by the guidelines for this population. Studies investigating this methodology in terms of time of permanence in exercise programs will give us more information about their effectiveness in variables such as gain and maintaining muscle strength, decreased body weight and hemodynamic responses, considering special populations such as hypertensives.

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