

PHYSIOLOGICAL PARAMETERS RESPONSE TO HYDRAULIC RESISTANCE TRAINING OF COLLEGE STUDENTS: A STUDY OF WOMEN HEALTH

K. Mano Sakthi¹, Dr. K. Divya²

¹Ph.D. Research Scholar, Alagappa University College of Physical Education, Karaikudi

²Assistant Professor, Alagappa University College of Physical Education, Karaikudi

Abstract

Objective: Whom sports for health aims to ensure a healthy and safe event for women. The study aims to determine college women students' physiological responses to hydraulic resistance training. Although this hydraulic resistance training effect can reflect the resting pulse rate, systolic pressure and diastolic pressure, resistance exercise may be safer for all populations, especially for untrained women.

Methods: They were randomly divided and assigned into two groups of fifteen each as the experimental group (HRTG) 1(n=15) and control group 1 (n=15). The data were collected before and after the training of 8 weeks, paired sample t-test was used to find the significant difference between the groups.

Results: The Statistical analysis of the HRTG, the control group of paired sample t-test. The obtained t-test of significant improvement in resting pulse rate is 41.01, systolic pressure is 40.44, and diastolic pressure is 31.59 of post-test was more significant than the table value of the degree of freedom 2.76 (14) required for the significance at 0.05 level. The hydraulic resistance training group responded to the training with a more positive influence on physiological variables, when compared hydraulic resistance training group better than the CG.

Conclusion: It concluded that the study significantly improved the hydraulic resistance training and improved their resting pulse rate, systolic pressure and diastolic pressure and enhanced their daily activity level of fitness and improved lifestyle.

Keywords: hydraulic resistance training, resting pulse rate, systolic and diastolic pressure.

INTRODUCTION

The World health organization (WHO) describes the sociocultural factor of Women's health as an unequal power relationship between men and women; women and girls face increased vulnerability to malnutrition and the use of unsafe cooking fuels; another project of WHO sports for health; aims to ensure the tournament a healthy and safe event.

The Physiological Adaptations to Velocity-Controlled Resistance Training; Isokinetic dynamometry has revealed some specific physiological adaptations to different training velocities: an increase in torque and power that is greater at or near the velocity of training (Bell & Wenger, 1992).

Address for correspondence: K. Mano Sakthi

Ph.D. Research Scholar, Alagappa University College of Physical Education, Karaikudi

Access this article online

Quick Response Code:



Website:
www.pnrjournal.com

DOI:
10.47750/pnr.2023.14.01.007

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: pnrjournal@gmail.com

How to cite this article: K. Mano Sakthi, K. Divya, PHYSIOLOGICAL PARAMETERS RESPONSE TO HYDRAULIC RESISTANCE TRAINING OF COLLEGE STUDENTS: A STUDY OF WOMEN HEALTH, J PHARM NEGATIVE RESULTS 2023; 14(1): 33-37.

The study compared the acute physiological responses to circuit weight training with the responses to a combined circuit training (weight training and treadmill run). It concluded that CCT seems adequate to produce cardiovascular improvements and more significant energy expenditure for both men and women, while CWT group classes are sufficient only for unfit women (Ugrinowitsch, C, n.d.). In this cohort study by Scherr et al. (2013), 2,560 Caucasian men and women completed incremental exercise tests on treadmills. Borg's rating of perceived exertion psycho-physical tool assesses exercise's personal effort (Scherr et al., 2013). Cornelissen et al., 2010, invested in endurance training on systolic pressure and heart rate at rest of maximal exercise; it found endurance training at a lower and higher intensity to reduce SBP significantly (Cornelissen et al., 2010). Katch et al., 1985, The study evaluated the reliability of repetition number (reps) and respiratory gas parameters (VO₂, VCO₂, VE). Heart rate (HR) for shoulder (SE), chest (CE), and leg (LE) exercise performed maximally on a single-unit, 3-station hydraulic resistance exercise machine (Hydra-Fitness, Belton, TX) (Katch et al., 1985). The metabolic responses during hydraulic resistance exercise: Thirteen college-age men underwent a treadmill (TM)-graded VO₂max exercise test on 1 d and a 24.5-min hydraulic resistive exercise circuit the following day. (Ballor et al., 1987). The study aims to determine college women students' physiological responses to hydraulic resistance training. If this hydraulic resistance training effect can reflect the resting pulse rate, systolic pressure and diastolic pressure, resistance exercise may be safer for all populations, especially for untrained women.

METHODS

Ethics and ethical values extend to all spheres of human activity. They apply to our dealings with each other, with animals and with the environment (Rahman, 2016). Based on this, For the study, thirty college women students aged 18 to 23 years from Alagappa University College of Physical Education, Karaikudi, and Tamil Nadu, were selected and participated in eight weeks of hydraulic resistance training. The Facility accepts the protocol and the related threats to the Facility and authorizes the research project to proceed. The Alagappa University College of Physical Education, Institution implemented the research project at the Facility upon approval. The following table 1 shows the characteristics of the subjects.

Table 1 Characteristics of the Subject

	Subjects
Sample Size	30
Age	18 to 22 yrs
Weight	55 to 68 kg
Height	159 to 169 cms

BMI	22.4 to 26.6 kg/m ²
-----	--------------------------------

Training Procedure

The participants provided inscribed, informed consent to contribute to the study. Moreover, no participants remained injured for six months before the first test or during the training program. The supplements are not involved in their diets, and participants were not taking steroids or other drugs that could affect physical performance or hormonal balance during the study. The study involved 12 weeks of hydraulic resistance training, Ladder training and was given alternative days for 50 minutes a day (Sakthi & Divya, 2022). The Hydraulic training took place at an academy fitness centre where the participants exercised for 50 minutes per session. Three times per week for six weeks is an excellent workout schedule. Each session was led by trained fitness instructors and supervised by the researchers. The exercise program consisted of stretching and warm-up exercise (10 minutes), HDT (30 minutes), and cool-down and relaxation exercise (10 minutes). The training thrice days a week and one day rest between the sessions was done. The exercises used hydraulic resistance machines with the following exercises: chest press and pull, Shoulder press and Pull, low back flexion and extension, leg adduction and abduction, leg press and elbow extension, and flexion. During the initial stage, participants performed at least 1 set of each exercise and performed 2 to 3 sets once they became accustomed to the exercise in the subsequent stages.

Measures

An appropriate individual heart rate for each level of endurance performance was best determined in the laboratory. It is carried out by increasing the runner's speed in stages on a treadmill and by measuring the oxygen uptake, the lactic acid concentration in the blood and corresponding variations in the heart rate. In addition, the study concentrated on the physiological parameters of resting pulse rate measured by palpation method at the wrist in the unit measurement of beats per minute. Finding heart rate during exercise is key to knowing if exercise is not passionate enough, too intense or just right (What to Know About Your Heart Rate and Pulse, n.d.).

It measured the blood pressure (systolic and diastolic pressure) by digital blood pressure monitors in the unit of measurement in mmHg. They discussed the blood pressure measurements in different circumstances and special populations such as infants, children, pregnant women, elderly persons, and obese subjects (Ogedegbe & Pickering, 2010).

Statistics

To elaborate on the reputation of the Statistical File for the Social Sciences, widely known as SPSS in social sciences, as an in-effect tool for quantitative data analysis ((PDF) SPSS: An Imperative Quantitative Data Analysis Tool for Social Science Research, n.d.). The data of each group was analyzed using mean and standard deviation by SPSS. A

participation t-test compares both groups' pre-training and post-training scores. Differences between the two groups for physiological variables were determined using a paired "t" test. A significance value of ≤ 0.05 to establish the significance criteria, and a value of less than 0.05, indicating a significant difference between the compared values, was

accepted. Finally, they discussed obtained results. Table 2 shows the physiological variables paired with samples t-test of experimental and control group values.

RESULT

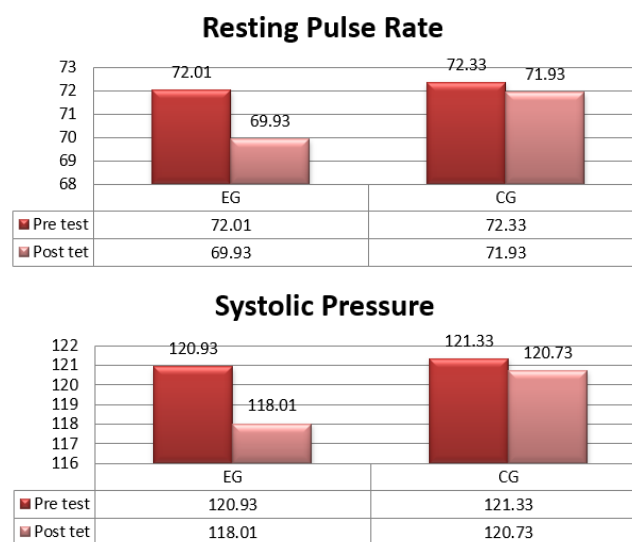
Table -2 MEAN, STANDARD DEVIATION AND PAIRED SAMPLE T-TEST VALUES ON PHYSIOLOGICAL VARIABLES OF EXPERIMENTAL AND CONTROL GROUP

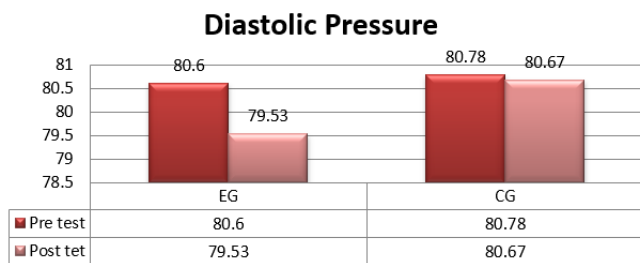
Group	Variables	Mean±SE	N	Std. Deviation	T ratio	p-value
Experimental Group	Resting Pulse Rate	72.01±.984	15	.845	10.02*	.004
		69.93± 1.669	15	1.100		
	Systolic Pressure	120.93± .349	15	.228	16.14*	.001
		118.01± .165	15	.276		
	Diastolic Pressure	80.60± .218	15	1.352	2.97*	.010
		79.53± .284	15	.640		
Control Group	Resting Pulse Rate	72.33±.724	15	.724	1.70	.111
		71.93± .309	15	1.163		
	Systolic Pressure	121.33± .287	15	1.113	1.96	.070
		120.73± .267	15	1.033		
	Diastolic Pressure	80.78± .256	15	.990	.824	.424
		80.67± .232	15	.900		

* Significant at 0.05 level of confidence Table value for df (14) at 0.05 level = 2.76.

The study's objective was to observe that there would be a difference in the physiological variables of participants during the hydraulic resistance training group and control group. It hypothesized that the number of physiological variables would be more significant during the hydraulic resistance training group than in the control group. The Paired sample t-test was used to find the hypothesis. The resting pulse rate showed that the experimental group improved significantly ($p < 0.05$). The pre and post-test Mean + SE recorded were 72.01+ .984, 69.93+ 1.669, and 72.33+ .724, 71.93+ .309 in experimental and control groups, respectively. It's explained as a positive effect of training on resting pulse rate in the experimental group. Reimers et al., 2018 Resting heart rate (RHR) is positively related to mortality. Regular exercise causes a reduction in RHR. The systematic review aimed to assess whether regular exercise or sports impact the RHR in healthy subjects by taking different sports. The systolic pressure test result showed that the experimental group was in this variable after training ($p < 0.05$). the pre and post-test Mean + SE recorded were 120.93+ .349, 118.01+ .165 and 121.33+ .287, 120.73+ .267 in experimental and control respectively. The diastolic pressure results documented significant improvement in the experimental group ($p < 0.05$). The pre and post-test Mean + SE recorded were 80.60+ .218, 79.53+ .284 and 80.78+ .256, 80.67+ .232 in the experimental and control group, respectively.

The Pre and Post-test mean values graphically represented the hydraulic training group and control groups on resting heart rate, systolic pressure, and diastolic pressure in figures 1, 2 and 3.





DISCUSSION

In agreement with our hypothesis, the current study aimed to determine the effect of hydraulic resistance exercise structure during an 8-week training program on the physiological variables. The study to directly improve their resting pulse rate, systolic pressure and diastolic pressure when using a hydraulic resistance exercise protocol. The calories performing a HIIT session with an HRS than spending the same amount of time performing a steady-state exercise session(Falcone et al., 2015).

Few studies have focused on men's and women's physiological responses to circuit weight training (CWT). The purpose of the study was to determine the effects of gender on cardiovascular and metabolic responses to CWT and consequent recovery(Ortego et al., 2009). Across the exercise session, men revealed greater absolute and relative Vo₂, relative lean body mass Vo₂, systolic BP (SBP), RER, and recovery Vo₂ compared to the female subjects. The present study provides greater insight into gender differences in cardiovascular and metabolic responses to circuit weight training and these gender differences for developing CWT protocols for men and women (Ortego et al., 2009).

Subjects then participated in 3 familiarization sessions, during which they followed a videotaped routine that consisted of a series of functional resistance exercises performed continuously. Performing dynamic functional exercises continuously resulted in energy expenditure values, but not relative VO₂ values, that meet the American College of Sports Medicine recommendations(Lagally et al., 2009).

In this way, we sought out the significant difference between the hydraulic resistance training group and the control group so that the result might reflect the physiological variables of resting pulse rate, systolic pressure and diastolic pressure. Also, impact the individual performance of exercise to improve the body composition and overall health fitness.

CONCLUSION

The hydraulic resistance training programme gave the perfect significant difference in physiological variables of resting pulse rate, systolic pressure, and diastolic pressure compared to the hydraulic resistance training group and the

control group of college women students.

Funding

The project supported no funding agencies. The manuscript was one of the chapters of the Doctor of Philosophy project by the Research Scholar of Ms K.Manosakthi and the Supervisor and guide of Dr K.Divya, Assistant Professor, Alagappa University, Karaikudi, Tamil Nadu, India.

Author Information

Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamil Nadu- 630003, India.

Ms K.ManoSakthi, Research Scholar, Dr K.Divya.

Contributions

Ms K.Manosakthi and Dr K.Divya have given good-sized contributions to the idea or the layout of the manuscript; Ms K.Manosakthi amassed the data, Ms K.Manosakthi and Dr K.Divya analyzed and interpreted data. In addition, all authors have participated in drafting the manuscript, and Dr K.Divya revised it critically. Finally, all authors studied and accepted the last model of the manuscript.

Ethical Declarations

Ethics approval and Consent Participation

The project entitled "Isolated and Combined Effect of Hydraulic and Ladder Training on Selected Physical Physiological and Biochemical Variables of College Women Students" was approved on 15 November 2019 by the Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamil Nadu, India. Therefore, this manuscript was created, and all participants gave their written consent to participate in the experiments according to the principles outlined in the Declaration of WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. Furthermore, all methods were performed according to relevant guidelines and regulations.

ACKNOWLEDGMENT

The authors thank the college women students who participated in this investigation. In addition, the authors thank the individuals and institutions that participated in this investigation. This study was part of the research project at alagappa university college of physical education under the guidance of D.K.Divya, Supervisor and supporter, Assistant professor, alagappa University, Karaikudi, Tamil Nadu. The authors thank the Alagappa University fitness centre equipment was provided and guided the student and thank the karaikudi lap technician for helping to take the pre and post-test lap tests to provide accurate data to find their level of performance. The authors declare no conflict of interest.

REFERENCES

- Ballor, D. L., Becque, M. D., & Katch, V. L. (1987). Metabolic

- responses during hydraulic resistance exercise. *Medicine and Science in Sports and Exercise*, 19(4), 363–367.
2. Bell, G. J., & Wenger, H. A. (1992). Physiological Adaptations to Velocity-Controlled Resistance Training. *Sports Medicine*, 13(4), 234–244. <https://doi.org/10.2165/00007256-199213040-00002>
 3. Cornelissen, V. A., Verheyden, B., Aubert, A. E., & Fagard, R. H. (2010). Effects of aerobic training intensity on resting, exercise and post-exercise blood pressure, heart rate and heart-rate variability. *Journal of Human Hypertension*, 24(3), 175–182. <https://doi.org/10.1038/jhh.2009.51>
 4. Falcone, P. H., Tai, C.-Y., Carson, L. R., Joy, J. M., Mosman, M. M., McCann, T. R., Crona, K. P., Kim, M. P., & Moon, J. R. (2015). Caloric Expenditure of Aerobic, Resistance, or Combined High-Intensity Interval Training Using a Hydraulic Resistance System in Healthy Men. *The Journal of Strength & Conditioning Research*, 29(3), 779–785. <https://doi.org/10.1519/JSC.0000000000000661>
 5. Katch, F. I., Freedson, P. S., & Jones, C. A. (1985). Evaluation of acute cardiorespiratory responses to hydraulic resistance exercise. *Medicine and Science in Sports and Exercise*, 17(1), 168–173.
 6. Lagally, K. M., Cordero, J., Good, J., Brown, D. D., & McCaw, S. T. (2009). Physiologic and metabolic responses to a continuous functional resistance exercise workout. *Journal of Strength and Conditioning Research*, 23(2), 373–379. <https://doi.org/10.1519/JSC.0b013e318181eb1c9>
 7. Ogedegbe, G., & Pickering, T. (2010). Principles and techniques of blood pressure measurement. *Cardiology Clinics*, 28(4), 571–586. <https://doi.org/10.1016/j.ccl.2010.07.006>
 8. Ortego, A. R., Dantzler, D. K., Zaloudek, A., Tanner, J., Khan, T., Panwar, R., Hollander, D. B., & Kraemer, R. R. (2009). Effects of gender on physiological responses to strenuous circuit resistance exercise and recovery. *Journal of Strength and Conditioning Research*, 23(3), 932–938. <https://doi.org/10.1519/JSC.0b013e3181a07884>
 9. (PDF) SPSS: An Imperative Quantitative Data Analysis Tool for Social Science Research. (n.d.). Retrieved 14 November 2022, from https://www.researchgate.net/publication/355986638_SPSS_An_Imperative_Quantitative_Data_Analysis_Tool_for_Social_Science_Research
 10. Rahman, S. (2016). Ethical Issues of Fair Subject Selection in the Research. *Bangladesh Journal of Bioethics*, 6, 37. <https://doi.org/10.3329/bioethics.v6i3.27619>
 11. Reimers, A. K., Knapp, G., & Reimers, C.-D. (2018). Effects of Exercise on the Resting Heart Rate: A Systematic Review and Meta-Analysis of Interventional Studies. *Journal of Clinical Medicine*, 7(12), 503. <https://doi.org/10.3390/jcm7120503>
 12. Sakthi, K. M., & Divya, K. (2022). Isolated and combined effect of hydraulic and ladder training on TCL, LDL and HDL cholesterol among college women students. *International Journal of Health Sciences*, 3566–3577.
 13. Scherr, J., Wolfarth, B., Christle, J. W., Pressler, A., Wagenpfeil, S., & Halle, M. (2013). Associations between Borg's rating of perceived exertion and physiological measures of exercise intensity. *European Journal of Applied Physiology*, 113(1), 147–155. <https://doi.org/10.1007/s00421-012-2421-x>
 14. Ugrinowitsch, C. M., A. G. (n.d.). Acute physiological responses to different—ProQuest. Retrieved 19 October 2022, from <https://www.proquest.com/docview/202676081?pq-origsite=gscholar&fromopenview=true>
 15. What to Know About Your Heart Rate and Pulse. (n.d.). Retrieved 12 November 2022, from <https://my.clevelandclinic.org/health/diagnostics/17402-pulse--heart-rate>