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RESEARCH ARTICLE

IHE TRAININGS CAN REDUCE THE BASELINE BLOOD PRESSURE AND HEART RATE IN YOUNG HEALTHY ADULTS:- "A COMPARATIVE STUDY AMONG MALE AND FEMALE SUBJECTS"

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ABSTRACT

Background: Isometric handgrip exercises is a simple, cheap and feasible form of physical exercise which can be performed at the person's convenience at any time or place and it may reduces the resting blood pressure & heart rate.The psychological behavior, physical activities and hormones may alter the effect of IHE exercises and it provides data difference between different Sex. ***Aim & Objective:-*** To evaluate the changes in baseline parameters BP & HR ,and compare them between male & female after the exercise training. ***Materials and Methods:*** The Comparative study was conducted in the Department of Physiology , Jhalawar Medical College, Rajasthan,for a period of 3 months,After obtaining approval and clearance from the institutional ethical committee, we conduct study on 72 medical students(40 male & 32 female)in the age group of 19 to 25 years.IHE Test performed by handgrip spring dynamometer and MVC are Recorded by Full grip of dynamometer from dominant hand for a brief duration of 4 - 5 second.Each time 3 squeeze of maximum voluntary contraction(MVC) are recorded and mean of these three readings was taken as maximal isometric tension(Tmax). Protocol consisted of five 3-min bouts of IHE exercise at 30% of Tmax separated by 5 min rest periods. Exercise was performed 3 times/wk for 3 months. ***Results:*** The DBP decreased significantly but No significant changes was seen in HR, and SBP in all female volunteers in Comparison to male in which SBP & DBP decreased significantly but No significant changed seen in HR.The DBP decreased from (74.1875± 8.23 to 72.1563±6.37) mm hg in all female subjects. ***Conclusions:*** A Descriptive Comparative Study of 3-month IHE training, significantly decreased DBP in female volunteers in Comparison of male groups Where SBP & DBP was decreased significantly but No significant changes was observed in HR.

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INTRODUCTION

Isometric handgrip exercises is a simple, cheap and feasible form of physical exercise which can be performed at the person's convenience at any time or place using simple equipment like Handgrip dynamometer & Simple Smiley Ball.The isometric handgrip exercise is also used to detect underlying hypertension and assess cardiovascular risk.IHE test can be a simple and effective screening test to identify individuals who are at risk of developing HTN.Early detection allows for interventions that can help prevent future complications (1). Hypertension and Diabetes are major health care burdens of life. We need to evaluate the risk factors of these two types of major health problems.Hypertension (HTN) is one of the most prevalent and powerful risk factors for cardiovascular disease. Hypertension is a long term medical condition in which the blood pressure in the arteries is persistently elevated and it is a major health care burden worldwide.

Females has a lesser chance of having high blood pressure,due to hormonal effects like estrogen. The Estrogen receptors present in PVN & NTS have a key role in control of sympathetic activity, reactive oxygen species and enhance nitric oxide production (2,3). Thus Estrogen are also involved to enhance the vasodilatation and antioxidant activity to improve cardiac health. Isometric exercises is potent stimulus for the sympathetic nervous system and Our study hypothesized that IHE training would cause significant depletion of SBP, DBP & HR. It has been shown that hypertension causes endothelial dysfunction resulting in reduced endothelial dependent, nitric oxide-mediated vasodilatation, Thus It improves endothelial dysfunction by enhancing shear-mediated bioavailability of nitric oxide and increasing antioxidant activity (NO is endothelial –derived relaxing factor EDRF) (4).

AIM & OBJECTIVES: To evaluate the effect of the IHE exercises training on HR & BP in young healthy volunteers aged 19- 25 yr, and determine the changes in baseline

parameters and compare them between male & female after the exercise training.

MATERIAL AND METHODS

A Comparative study was organized in the Department of Physiology at Jhalawar Medical College, Rajasthan.After obtaining approval and clearance from the Institutional Ethical Committee,the study was conducted on 72 first-year MBBS Students subjects (40 male and 32 female) aged 19–25 years. The sample size was divided into two groups and the data was obtained separately from the first and second group.The procedure was Explained to the volunteers in detail and informed consent was taken before the study. Isometric handgrip exercise training performed by handgrip spring dynamometer, maximum voluntary contraction (MVC) obtained from dominant hand after having a full grip of spring dynamometer And exert maximum effort in a brief 4–5 s duration. Three MVC was recorded by squeezing each time using a hand grip spring dynamometer, and the Maximal isometric tension (Tmax) recorded by means of These three readings. The isometric Exercise training protocol Includes five three-minute bouts of IHE exercise performed At 30% of Tmax and a 5-min break was taken between each reading. The exercise was recommended 3 times a week for three months. The HR and BP were measured before and after the intervention separately in groups,using an Omron Digital BP Instrument, with a follow-up period of 3 months. The Weightlifter, Athletes, and subjects suffering from hypertension, smokers, on medication or having any acute or chronic illness were excluded from the study.

STATISTICAL ANALYSIS: Statistical analysis was performed with SPSS version 17.00 software, Data was reported as Mean ± SD, t-tests and One-WayAnova test were used for comparison of parameters from baseline.The P-value was considered significant at 0.05.

RESULTS

A 3 months Comparative study of IHE training Conducted on 72 healthy Subjects. The sample size of training included two groups of 32 female and 40 male young healthy volunteers. We found significant reduction In diastolic blood pressure but No significant change in SBP & HR in all Young female Volunteers. In female subjects DBP decreased significantly from (74.18± 8.23 to 72.15±6.37) mmhg. The SBP decreased from (108.43 to 107.34) mmhg and HR decreased from(92.40 to 88.75) b/m which was not statistically significant.These Descriptive types of comparative Study significantly reduced SBP & DBP In Male subjects but NO significant changes were seen in HR. SBP decreased from (128.52± 12.6 to 116.52± 7.6) mmhg and DBP decreased from (77.75 ± 8.0 to 74.65 ± 7.0)mmhg.The HR decreased from (88.65 to 86.02) b/m.

Table 1: Displays the baseline parameters for SBP, DBP, and heart rate in all healthy adults (n= 72)both in male & female.These parameters decreased At the completion of the 3-month IHE training.

Table 2:- Displays the baseline parameters SBP,DBP, and heart rate , Separately for Male & Female (n= 40)&(n= 32) that shows data difference of BP & HR.

Graph: Showing distribution of parameters SBP, DBP , & HR from baseline to completion of IHE exercises training separately in male & female.

Picture: Showing Isometric handgrip exercise performed by individuals.

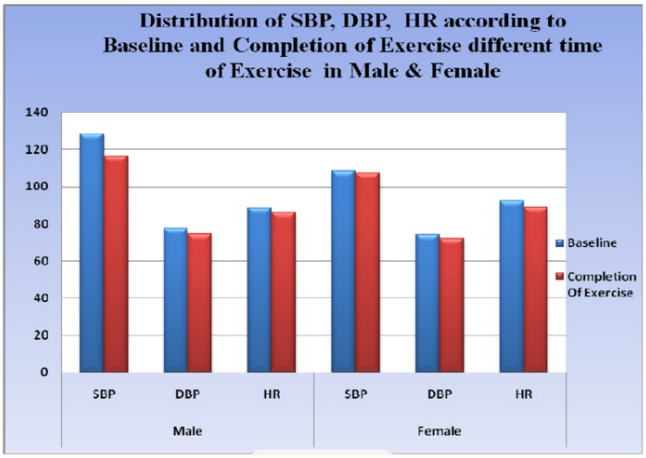

Table 1. Showing baseline parameters in all healthy adults (n= 72) both in male & female

Parameters	Baseline (n=72) mean± Sd	At completion Of exercises (n=72) mean±Sd	t value	p value
SBP(mmhg)	119.59±16.41	112.44±9.83	6.038	<0.0001*
DBP(mmhg)	76.16± 8.28	73.54± 6.81	5.499	<0.0001*
HR (b/m)	90.31± 14.64	87.23± 9.79	2.516	0.014*

DISCUSSION

In our study we found a significant reduction in diastolic blood pressure from (74.18± 8.23 to 72.15±6.37)mmhg in female volunteers, but NO significant changes were observed in SBP & HR. In Male subjects we found significant reduction in SBP & DBP but No significant changes were seen in HR. SBP decreased from (128.52± 12.6 to 116.52± 7.6) mmhg and DBP decreased from (77.75 ± 8.0 to 74.65 ± 7.0) mmhg. The HR decreased from (88.65 to 86.02) b/m.Similar studies have also been conducted by Danielle C & Bentley et al. A pilot study among postmenopausal women: All participants (n=17) completed training of 8 week at High-intensity handgrip training with high self-reported adherence (96.9%).

Table 2. Showing baseline parameters Separately for Male & Female (n= 40) & (n= 32)

	Male(n= 40) mean ± sd				Female(n=32)mean ± sd			
Parameters	Baseline	At completion	t value	p value	Baseline	At Completion	t value	p value
SBP(mmhg)	128.52± 12.6	116.52± 7.6	9.071	<0.0001*	108.43±13 .6	107.34± 9.9	0.71	0.481
DBP(mmhg)	77.75± 8.0	74.65±7.0	5.853	<0.0001*	74.18± 8.2	72.15±6.3	2.40	0.022*
HR(b/m)	88.65± 15.0	86.02± 10.2	1.637	0.110	92.40± 14.0	88.75± 9.1	1.90	0.066

BP (mmhg) SBP: Systolic blood pressure, DBP: Diastolic blood pressure, HR: Heart rate,(b/m)* P < 0.05: statistical significant difference.

The result of study suggested improvement in grip strength (2.7±2.4kg, P<0.05) , and reduced resting systolic BP (-5.1±7.7 mmHg, P<0.05) and improved HR complexity (sample entropy: 0.24±0.31, P<0.05), without significant changes to resting diastolic BP, HR, or arterial stiffness (5).Another study done by Mark B Badrov et al. They assessed 32 women before and after 4 and 8 weeks of 3×/week (n = 12) or 5×/week (n = 11) IHG training (four, 2-min unilateral contractions at 30 % maximal voluntary contraction), or 0×/week control (n = 9). IHG training decreased systolic BP in the 3×/week (94 ± 6 to 91 ± 6 to 88 ± 5 mmHg, pre- to mid- to post-training; P < 0.01) and 5×/week (97 ± 11 to 90 ± 9 to 91 ± 9 mmHg, P < 0.01) groups,No changes were observed in diastolic BP, mean arterial BP, or any indices of HRV in any group (all P > 0.05).(6).All the above studies have concluded that IHE training reduced the resting SBP but NO significant change in DBP & HR in all female.these studies evaluate the changes in HR & BP for a few weeks but our 3 month study also presents the data difference between male & female.Females have a lesser chance of having high blood pressure,due to hormonal effects like estrogen.

The Estrogen receptors present in PVN & NTS have a key role in control of sympathetic activity, reactive oxygen species and enhance nitric oxide production (2,3). Thus Estrogen are also involved to enhance the vasodilatation and antioxidant activity to improve cardiac health. Apart from this, women are more emotional than men, these kinds of effects also alter the resting blood pressure & heart rate,the physical activities both in male and female compensate for the emotional effects. Thus it is possible the reduced blood pressure is due to hormones in females and heart rate is not changed significantly in both genders.Isometric resistance training has repeatedly shown to be an effective exercise modality in lowering resting blood pressure (BP), yet associated mechanisms and sex differences in the response to training remain unclear. Exploration into potential sex differences in the response to isometric resistance training is necessary, as it may allow for more optimal and sex-based exercise prescription, thereby maximizing the efficacy of the training intervention and these types of exercise improves endothelium-dependent vasodilation in men and women, without significant sex differences in the magnitude of response (7). In addition, A short-term isometric handgrip training reduced SBP & DBP in middle-aged females the Possible reasons for these reductions may have been related to a decreased activation of the hypothalamic–pituitary–adrenal axis and/or the sympathetic nervous system associated with the relaxation technique (8). Future research is also needed for better evaluation and results. It is essential to scientifically evaluate the data difference between genders.

CONCLUSION

A Comparative Descriptive type of 3-month isometric handgrip exercise training, significantly decreased diastolic blood pressure in all female volunteers in Comparison of male groups Where SBP & DBP was decreased significantly but No significant changes was observed in HR and it might be a simple, cheap and feasible form of physical exercise which can be performed at the persons convenience at any time or place using simple equipment.

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I would like to thank my parents and wife and also Jhalawar medical College for providing me permission for study and cooperation.

LIMITATION OF OUR STUDY

The limitations of our study include relatively small size specimens and limited follow-up- duration. We have not measured nitric oxide level in blood to understand the mechanism of action of decrease in blood pressure in all training participants. More research of larger size specimens are needed to better evaluate its impact on cardiac health outcomes.

CONFLICT OF INTEREST AND FUNDING

We have not had any conflict of interest during this exercise training. We have not compromised the decisions or actions of exercise training because of any individual's personal interests-family, friendship, financial or social reasons.

ABBREVIATION

Isometric Handgrip Exercises (IHE); Blood Pressure (BP); Diastolic blood pressure (DBP); Systolic blood pressure (SBP); Heart Rate(HR); Maximum Voluntary Contraction (MVC); maximal Isometric tension (Tmax); Nitric oxide(NO); endothelial relaxing factor (Edrf).

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