ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 4| April 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

EFFECT OF ISOTONIC STRENGTH TRAINING ON STRENGTH PHYSIOLOGICAL AND SKILL PERFORMANCE VARIABLES OF MEN HANDBALL PLAYERS

K. Ooraniyan[1], Dr. K. Murugavel[2]

[1]Ph.D, Research Scholar, Department of Physical education, Bharathiar University, Coimbatore, Tamilnadu, India
[2]Senior Professor and Head, Department of Physical education, Bharathiar University, Coimbatore, Tamilnadu, India

ABSTRACT

The objective of this study was to find out the effect of isotonic strength training on strength physiological and skill performance variables of men handball players. To achieve the purpose of this study 40 Intercollegiate handball players were selected from affiliated colleges of Bharathiar university, Coimbatore. The selected subjects were randomly divided into two groups such as Group 'I' underwent isotonic strength (ISTG) (n=20) and Group 'II' acted as control group (CG). The respective training was given to the experimental group for 3 days per week (Monday, Wednesday and Friday) for the period of sixteen weeks. The control group was not be given any sort of training except their routine work. The strength parameter leg strength were measures by wall squat test, physiological variables breath holding time were measures by breath holding fitness test and skill performance variables shooting ability was assessed by Zinn team handball skill battery test. The data collected from the subjects was statistically analyzed with 't' ratio to find out significant improvement if any at 0.05 level of confidence. The result of the leg strength, breath holding time and shooting ability improved significantly due to effect of isotonic strength training with the limitations of (diet, climate, life style) status and previous training the result of the present study coincide findings of the investigation done by different experts in the field of sports sciences.

KEYWORDS: *Isotonic strength training, handball, leg strength, breath holding time and shooting ability.*

INTRODUCTION

Isotonic strength training for strength and conditioning professionals, and it includes a comprehensive discussion of isotonic strength training. The authors explain the principles of isotonic training and provide practical recommendations for designing and implementing effective isotonic training programs. The book covers various aspects of isotonic training, including exercise selection, load and repetition schemes, periodization, and progression. It also discusses the physiological adaptations that occur with isotonic training, such as improvements in muscular strength, power, and endurance. **N. Travis Triplett (2015)**. Overall, this book provides a thorough overview of isotonic strength training and its benefits for athletes and fitness enthusiasts. It is a valuable resource for anyone interested in incorporating isotonic training into their exercise routine or training program. Isotonic exercise is movement that requires muscles to resist weight over a range of motion, causing a change to the length of the muscle. We usually think of muscles shortening in isotonic exercise, as when you lift a dumbbell for a bicep curl or rise into a sit-up. This is called concentric muscle contraction. **Sara (2019)** Eccentric muscle contractions, however, such as steadily extending your arm or lowering to the ground while resisting the pull of gravity are also an important part of isotonic exercise. isotonic exercise is a type of physical activity that involves contracting and lengthening muscles through a full range of motion. **hiral parmar (2023)** The term "isotonic" comes from the Greek words "iso" (equal) and "tonos" (tension), indicating that the tension in the muscles remains constant throughout the exercise. isotonic exercises, the muscles involved in the movement work against constant resistance, typically provided by free weights, weight machines, or the body's own weight. The goal is to create muscle contractions that result in movement and contribute to muscle strength, endurance, and overall fitness.

RATIONALE AND BENEFITS OF ISOTONIC EXERCISE

Isotonic exercise helps to strengthen your cardiovascular system, as it results in increased oxygen consumption, heart rate, stroke volume, cardiac output, and muscular endurance while reducing the risk of heart disease. **Sara (2019)** Isotonic exercise also improves bone density thanks to the consistent stress, which causes new bone to form. Stronger bones means you will be less likely to suffer a broken bone. Isotonic exercise also burns calories and improves important health numbers, such as cholesterol and blood sugar levels. Of course, it also helps to build bigger, stronger muscles, helping you to resist injury from strains, sprains, fractures, and falls. The more you participate in isotonic exercise, the easier it will get. **hiral parmar (2023)**.

HYPOTHESES

It was hypothesized that, the Isotonic strength training would produce significant changes over strength physiological and skill performance variables of men handball players.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 4| April 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

TABLE-1
Characteristics of training groups (N=20) at pre training mean

Variable	TTG	CG
Age (Y)	18-21	18-21
Height (cm)	167.30	165.20
Weight (kg)	68	65

Methods

Forty Intercollegiate handball players were randomly selected as subjects and their age ranged between 18 and 21 years. The subjects are categorized into two groups namely Isotonic strength training group (ISTG) and control group (CG) each group had twenty subjects. The selected criterion variables strength parameter leg strength were measures by wall squat test, physiological variables breath holding time were measures by breath holding fitness test and skill performance variables shooting ability was assessed by Zinn team handball skill battery test.

Isotonic strength training Programme

The training programme was lasted for 60 minutes for a session in a day, 3 days in a week for a period of twelve weeks duration. These 60 minutes included Isotonic strength training for 40 to 50 minutes and 10 minutes warm-up, and 10 minutes warm down. Every four weeks of training 5% of intensity of load was increased from 65% to 80% of work load.

Isotonic Strength Training Schedule

Skills	Drills	Sets	Re	Rest in b/w sets	Total Duration
I-IV	Shoulder press Dynamic squats Walking lunges Bicep curls	2 2 2 2	3 3 3 3	60 sec	60 min
V-VIII	Wall squat Russian twists Squat Crunches or situps	2 2 2 3	3 3 3 3	60 sec	60 min
IX-XII	Back extensions Jogging Pushups Deadlifts	2 2 2 2	3 3 3 3	60 sec	60 min

Statistical Analysis

The means and standard deviations of Isotonic strength training groups were calculated for leg strength, breath holding time and shooting ability for the pre as well as post tests. Statistical significance was set to a priority at $p< 0.05$. All statistical tests were calculated using the statistical package for the social science (SPSS).

TABLE - II
COMPUTATION OF 'T' RATIO ON SELECTED STRENGTH PARAMETERS OF ISOTONIC STRENGTH TRAINING ON EXPERIMENTAL AND CONTROL GROUP
(Scores in Seconds)

Group	Test		Mean	Std. Deviation	T ratio
Isotonic strength training Group	Leg Strength	Pre test	59.13	3.01	23.95*
		Post test	61.50	3.17	
Control Group	Leg Strength	Pre test	59.92	2.56	1.19
		Post test	59.70	2.79	

* The table values significant level 0.05 level (degree of freedom 2.093, 1 and 19)

Table II reveals the computation of mean, standard deviation and 't' ratio on selected variables namely leg strength of Isotonic strength training group. The obtained 't' ratio on leg strength were 23.95 respectively. The required table value was 2.093 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the obtained 't' values were greater than the table value it was found to be statistically significant.

From the computation of mean, standard deviation and 't' ratio on selected variables namely leg strength of Control group. The obtained 't' ratio on leg strength were 1.19

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 4| April 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

respectively. The required table value was 2.093 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the obtained 't' values were less than the table value it was found to be statistically not significant.

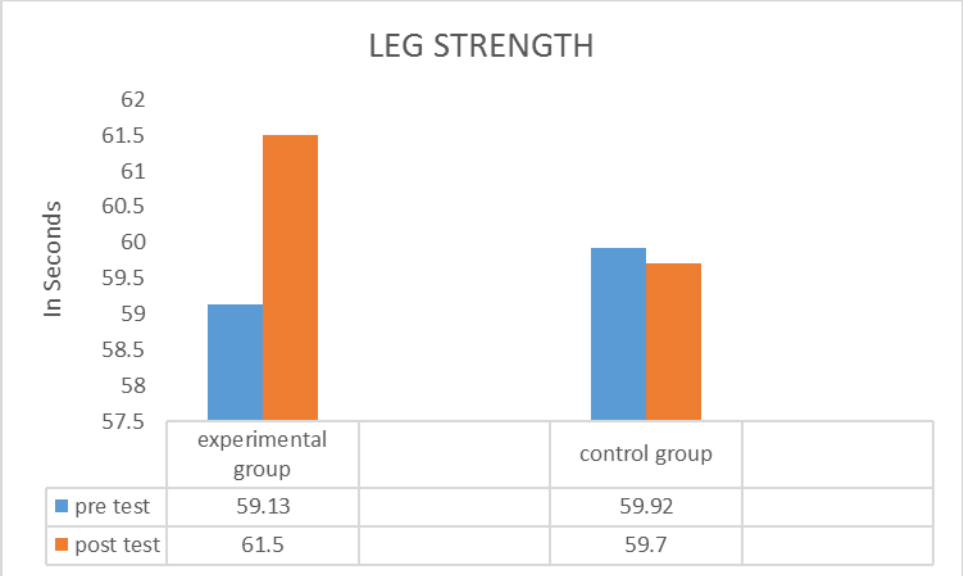

FIGURE-I
BARDIAGRAM SHOWS THE MEAN VALUES OF PRE AND POST TEST ON LEG STRENGTH OF EXPERIMENTAL AND CONTROLGROUPS
(Scores in Seconds

TABLE - III
COMPUTATION OF 'T' RATIO ON SELECTED PHYSIOLOGICAL VARIABLES OF ISOTONIC STRENGTH TRAINING ON EXPERIMENTAL AND CONTROL GROUP
(Scores in Seconds)

Group	Test		Mean	Std. Deviation	T ratio
Isotonic strength training Group	Breath Holding Time	Pre test	34.00	3.35	9.17*
		Post test	38.13	2.41	
Control Group	Breath Holding Time	Pre test	34.06	3.33	0.43
		Post test	34.13	3.14	

*significant level 0.05 level (degree of freedom 2.093, 1 and 19)

Table III reveals the computation of mean, standard deviation and 't' ratio on selected variables namely Breath holding time of Isotonic strength training group. The obtained 't' ratio on Breath holding time were 9.17 respectively. The required table value was 2.093 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the obtained 't' values were greater than the table value it was found to be statistically significant.

From the computation of mean, standard deviation and 't' ratio on selected variables namely Breath holding time of Control group. The obtained 't' ratio on Breath holding time were 0.43 respectively. The required table value was 2.093 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the obtained 't' values were less than the table value it was found to be statistically not significant.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 4| April 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

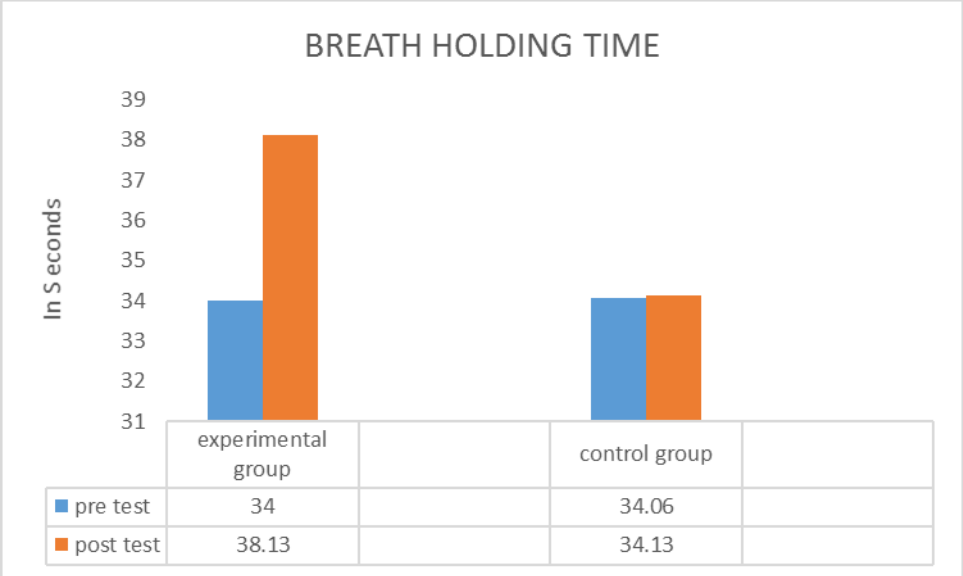

FIGURE-II
BARDIAGRAM SHOWS THE MEAN VALUES OF PRE AND POST TEST ON BREATH HOLDING TIME OF EXPERIMENTAL AND CONTROLGROUPS
(Scores in Seconds)

TABLE - V
COMPUTATION OF 'T' RATIO ON SELECTED SKILL PERFORMANCE VARIABLES OF ISOTONIC STRENGTH TRAINING ON EXPERIMENTAL AND CONTROL GROUP
(Scores in Points)

Group	Test		Mean	Std. Deviation	T ratio
Isotonic strength training Group	Shooting Ability	Pre test	6.36	1.69	23.45*
		Post test	8.80	1.84	
Control Group	Shooting Ability	Pre test	6.43	1.67	0.23
		Post test	6.40	1.94	

*significant level 0.05 level (degree of freedom 2.093, 1 and 19)

Table V reveals the computation of mean, standard deviation and 't' ratio on selected variables namely shooting ability of Isotonic strength training group. The obtained 't' ratio on shooting ability were 23.45 respectively. The required table value was 2.093 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the obtained 't' values were greater than the table value it was found to be statistically significant.

From the computation of mean, standard deviation and 't' ratio on selected variables namely shooting ability of Control group. The obtained 't' ratio on shooting ability were 0.23 respectively. The required table value was 2.093 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the obtained 't' values were less than the table value it was found to be statistically not significant.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 4| April 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

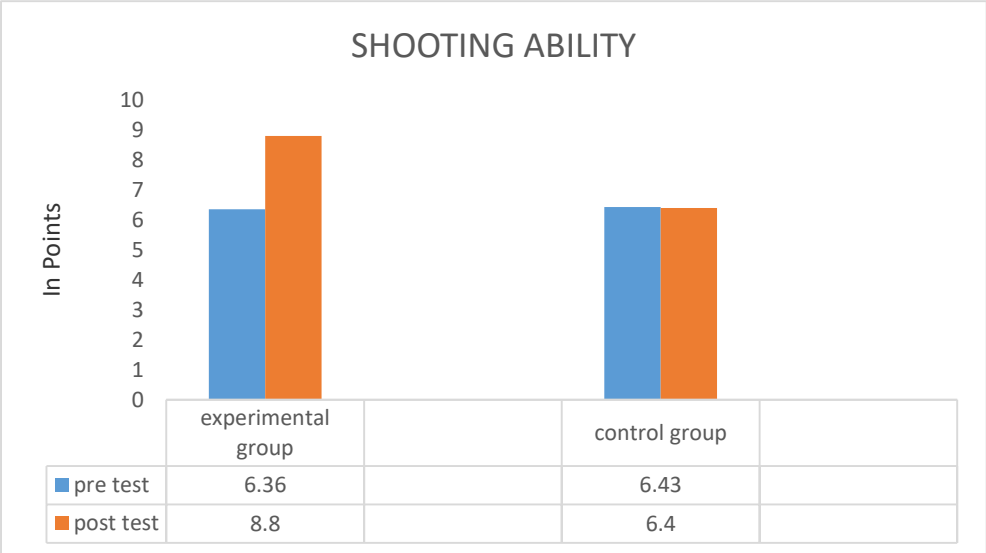

FIGURE-III
BARDIAGRAM SHOWS THE MEAN VALUES OF PRE AND POST TEST ON SHOOTING ABILITY OF EXPERIMENTAL AND CONTROLGROUPS
(Scores in numbers)

DISCUSSION ON FINDINGS

One of the main aims of this study was to determined the effect of isotonic strength training on strength physiological and skill performance variables of men handball players. To make such a determined, the effectiveness of isotonic strength training was questioned. Particular regarding application of isotonic strength exercises are related to the loads the handball players isotonic strength is subjected to during particular training units **(Kvorning, T. (2006); Jonathan, A. (2009)**. The isotonic strength training on strength, physiological and skill performance executes during a training session, and if there is a need to supplement basic training sessions with isotonic strength training. The results of a study by **kumaravelu et al., (2020)** show that the effect of strength, physiological and skill performance exercises on leg strength, breath holding time and shooting ability of isotonic strength training. The data presented in this work differ from the results of our own study, in which we demonstrated a significant increase in leg strength, breath holding time and shooting ability in a group subjected to isotonic strength training. Similar findings have also been reported by other researchers **(Young et al., (2011); Tamilmani et al., (2022); Hermassi 2017; Haddad, 2019)**. Nevertheless, our research shows that well-planned strength, physiological and skill performance. with the focus on leg strength, breath holding time and shooting ability are more effective in developing strength, physiological and skill performance, and at the same time, induce a comparable increase in leg strength, breath holding time and shooting ability as strength, physiological and skill performance. These results are confirmed in another study in which the use of isotonic strength training directed at development of leg strength, breath holding time and shooting ability **(chelly et al., (2017), Hermassi et al., (2019), pavithra et al., (2022)**. Numerous reports have confirmed that this type of exercises should be used in training of handball players targeted at the development of leg strength, breath holding time and shooting ability **(Hermassi et al., 2011; Widodo et al., (2022); Labib 2014)**. However, we shall bear in mind that isotonic strength training proved to be more effective in developing leg strength, breath holding time and shooting ability. Thus, this seems to be the best solution for developing indicated that the leg strength, breath holding time and shooting ability were improved after Isotonic strength training.

Isotonic strength training is an excellent way to simultaneously improve leg strength, breath holding time and shooting ability. While the original study involved stationary bike, one can use the Isotonic strength with almost any activity or Isotonic exercise is movement that requires muscles to resist weight over a range of motion, causing a change to the length of the muscle. We usually think of muscles shortening in isotonic exercise, as when you lift a dumbbell for a bicep curl or rise into a sit-up. This is called concentric muscle contraction. One must try adding Isotonic strength training once a week to see how the body responds. The results of the study indicated that the leg strength, breath holding time and shooting ability were improved significantly after undergoing Isotonic strength training. The changes in the selected variables were attributed the proper planning, preparation and execution of the training package given to the handball players. The findings of the present study had similarity with the findings of the investigations referred in this study.

kumaravelu *et al.*, **(2020)** speculated that isotonic training Program can help regulate on back strength and induce changes leg strength and related as criterion variables.

Tamilmani *et al.*, **(2022)** examined special training programme apart from their regular activity Vo2 max, resting pulse rate, Hemoglobin and Red blood corpuscles which in turn led to the development of physiological variables.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 4| April 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

Young *et al.*, (2011) the relationships between various measures of strength with performance indicators of maximum kicking, and the third part explores the research investigating the effects of isotonic strength training on skill performance.

However, the subjects participated in the control group did not improve their leg strength, breath holding time and shooting ability.

The result of the present study indicates that the Isotonic strength training methods is appropriate protocol to leg strength, breath holding time and shooting ability. The discrepancy between the result and the result of previous studies might be attributed to several reasons, such as the training experience level of the subjects, the training programme, in intensity used and the duration of the training programme.

CONCLUSIONS

Based on the results of the study it is referred that twelve weeks of Isotonic strength training program was found to be most effective training protocol to bring out desirable changes over leg strength, breath holding time and shooting ability of men handball players.

REFERENCES

1. *Senthil kumaran S & Vallimurugan V. (2023). Impacts of Isometric Strength Training with Specific Drills on Enhancing Strength Factors among School Level Basketball Players (APilot Study). International Journal of Research Publication and Reviews, 4(7), 1059-1062.*
2. *Senthil kumaran S & Vallimurugan V. (2023). Enhancing Skill Performance Variables among School Level Basketball Players Through Specific Drills (A Pilot Study). EPRA International Journal of Multidisciplinary Research (IJMR), 9(4), 226-228.*
3. *Vallimurugan, Pavithra & Senthil Kumaran (2022). Combination of Strength and Specific Skill Training on Performance Variables Among College Level Women Basketball Players. EPRA International Journal of Research and Development (IJRD), 7(6), 341-345.*
4. *Marin, D. P., Bolin, A. P., Campoio, T. R., Guerra, B. A., & Otton, R. (2013). Oxidative stress and antioxidant status response of handball athletes: implications for sport training monitoring. International immunopharmacology, 17(2), 462-470.*
5. *Buchheit, M., Leprêtre, P. M., Behaegel, A. L., Millet, G. P., Cuvelier, G., & Ahmaidi, S. (2009). Cardiorespiratory responses during running and sport-specific exercises in handball players. Journal of Science and Medicine in Sport, 12(3), 399-405.*
6. *Hermassi, S., Chelly, M. S., Fieseler, G., Bartels, T., Schulze, S., Delank, K. S., ... & Schwesig, R. (2017). Effects of in-season explosive strength training on maximal leg strength, jumping, sprinting, and intermittent aerobic performance in male handball athletes. Sportverletzung· Sportschaden, 31(03), 167-173.*
7. *Wagner, H., Gierlinger, M., Adzamija, N., Ajayi, S., Bacharach, D. W., & Von Duvillard, S. P. (2017). Specific physical training in elite male team handball. The Journal of Strength & Conditioning Research, 31(11), 3083-3093.*
8. *Wagner, H., Sperl, B., Bell, J. W., & Von Duvillard, S. P. (2019). Testing specific physical performance in male team handball players and the relationship to general tests in team sports. The Journal of Strength & Conditioning Research, 33(4), 1056-1064.*
9. *Massuça, L. M., Fragoso, I., & Teles, J. (2014). Attributes of top elite team-handball players. The Journal of Strength & Conditioning Research, 28(1), 178-186.*
10. *Gusic, M., Popovic, S., Molnar, S., Masanovic, B., & Radakovic, M. (2017). Sport-specific morphology profile: Differences in anthropometric characteristics among elite soccer and handball players. Sport Mont, 15(1), 3-6.*
11. *Luteberget, L. S., Trollerud, H. P., & Spencer, M. (2018). Physical demands of game-based training drills in women's team handball. Journal of sports sciences, 36(5), 592-598.*
12. *Saeterbakken, A. H., Van den Tillaar, R., & Seiler, S. (2011). Effect of core stability training on throwing velocity in female handball players. The Journal of Strength & Conditioning Research, 25(3), 712-718.*
13. *Hermassi, S., Haddad, M., Laudner, K. G., & Schwesig, R. (2019). Comparison of a combined strength and handball-specific training vs. isolated strength training in handball players studying physical education. Sportverletzung· Sportschaden, 33(03), 149-159.*
14. *Buchheit, M., Laursen, P. B., Kuhnle, J., Ruch, D., Renaud, C., & Ahmaidi, S. (2009). Game-based training in young elite handball players. International journal of sports medicine, 251-258.*
15. *Spieszny, M., & Zubik, M. (2018). Modification of strength training programs in handball players and its influence on power during the competitive period. Journal of human kinetics, 63, 149.*
16. *Van Den Tillaar, R., Roaas, T., & Oranchuk, D. (2020). Comparison of effects of training order of explosive strength and plyometrics training on different physical abilities in adolescent handball players. Biology of sport, 37(3), 239-246.*