Influence of Lydiard Training with Tapering on selected Physical and Psychological Variables Among Male Race Walkers

K.Mohan[1], Dr.R.Kalidasan[2]

ABSTRACT

The purpose of the study was to find out the Influence of Lydiard Training with Tapering, on selected physical and psychological variables; namely speed, muscular strength, explosive strength, endurance, cognitive anxiety, somatic anxiety, and self confidence among male race walkers.

To achieve the purpose of the study, twenty male race walkers were randomly selected from various colleges in the state of Tamil Nadu, India. The age of subjects ranged from 18 to 25 years. The subjects had past experience of at least three years in race walking and only those who were the members of respective college teams were taken as subjects. A series of physical fitness tests was carried out on each participant. These included speed assessed by 30m dash; muscular strength assessed by sit-ups; explosive strength assessed by standing broad jump; and endurance assessed by cooper 12 minutes run. The Competitive State Anxiety Inventory-II (CSAI-II) developed by Martens et al (1990) were used to collect the relevant psychological data. The subjects were randomly assigned into two groups of ten each, such as experimental and control groups. The experimental group participated in the Lydiard Training, with Tapering, for 5 days a week, one session per day and for 8 weeks. Each session lasted 90 minutes. The control group maintained their daily routine activities and no special training was given to them. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were analyzed statistically through Analysis of Covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any between groups.

The results of the study showed that there were significant differences between Lydiard Training with Tapering group and the control group. And also, Lydiard training with tapering group showed significant improvement on speed, muscular strength, explosive strength, endurance, cognitive anxiety, somatic anxiety, and self confidence level compared to control group.

1. Ph.D. Research Scholar, Department of Physical Education, Bharathidasan University, Tiruchirappalli-24
2. Asst. Professor (SS), Department of Physical Education, Bharathidasan University, Tiruchirappalli-24

KEY WORDS

Lydiard Training, tapering, cognitive anxiety, somatic anxiety, self confidence

INTRODUCTION

Race walking is a long-distance athletic event. Although it is a foot race, it is different from running where one foot must appear to be in contact with the ground at all times. Arthur Leslie Lydiard was a New Zealand runner and athletics coach. He has been lauded as one of the outstanding athletics coaches of all time and is credited with popularizing the sport of running and making it commonplace across the sporting world. His training methods are based on a strong endurance base and periodisation. Lydiard et al (1999) opine that the Lydiard Training System is based on a balanced combination of aerobic and anaerobic running. Aerobic running means running within one's capacity to use oxygen. Everyone, according to his or her physical condition, is able to use a limited amount of oxygen, each minute. With the right kind of exercise, one can raise one's limit. The maximum limit is called the "Steady State", the level at which one working to the limit of one's ability to breathe in, transport, and use the oxygen. The marathon-conditioning phase of Lydiard's System is known as base training, as it creates the foundation for all subsequent training. Lydiard's emphasis on an endurance base for his athletes, combined with introduction of periodisation in the training of distance runners, were the decisive elements in the world-beating success of the athletes he coached or influenced. Periodisation comprises emphasizing different aspects of training in successive phases, as an athlete approaches an intended target race. After the base training phase, Lydiard advocated four weeks of strength work. This included hill running and springing, followed by a maximum of four weeks of anaerobic training (Lydiard found through physiological testing that four weeks was the maximum amount of anaerobic development needed-any more caused negative effects such a decrease in aerobic enzymes and increased mental stress, often referred to as burnout, due to lowered blood pH). Then followed a co-ordination phase of six weeks in which anaerobic work and volume taper off and the athlete races each week, learning from each race to fine-tune himself or herself for the target race. For Lydiard's greatest athletes, the target race was invariably an Olympic final.

Tapering, a progressive, nonlinear reduction of the training load during a variables amount of time, that is intended to reduce the physiological and psychological stress of daily training and optimize sport performance (Mujika & Padilla 2000). The final preparation for competition is both an art and a science, requiring an understanding of the physiological changes that are occurring and the skills to manage the psychological and emotional state of an athlete, as they near the culmination of a hard

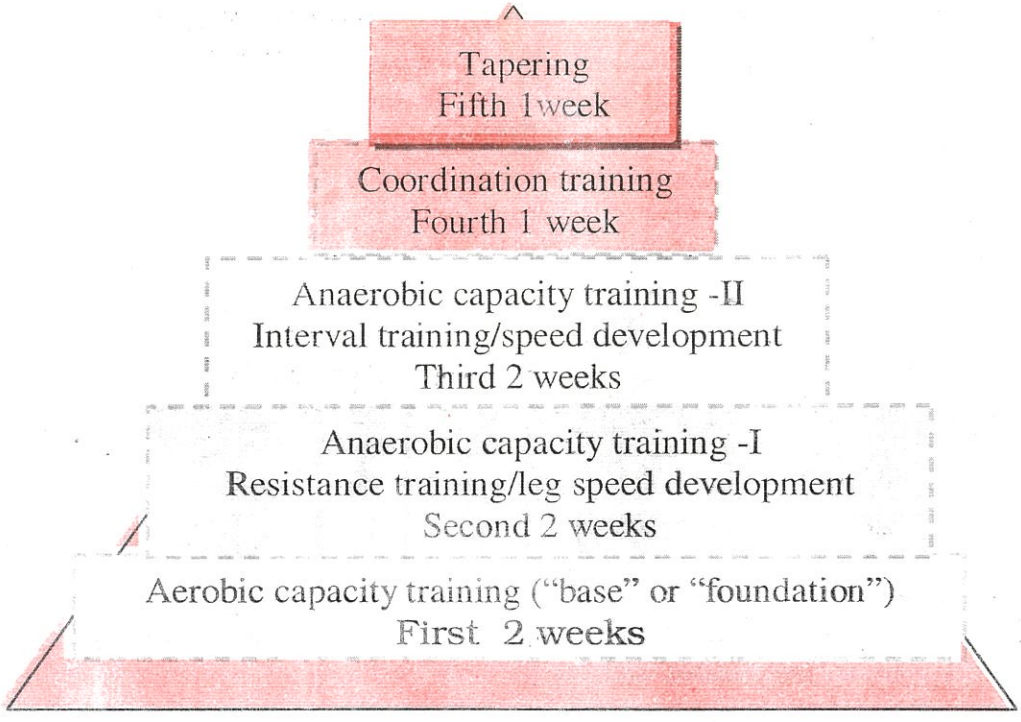
year of training. Tapering phases are often associated with performance-enhancing psychological changes such as reduced perception of effort, reduced global mood disturbance, reduced perception of fatigue, and increased vigour (Hooper et al, 1999). The taper is a segment of time when the amount of training load is reduced, before a competition, in an attempt to peak performance at a target time (Thomas & Busso, 2005).

According to Howley (1943), physical fitness components and specific training package are very important factors for athletes. These components of training package are more important to the athletes in the competition periods and for the development of their technical skills. Physical fitness is one's richest possession and cannot be purchased; it is earned through a daily routine of physical exercise. For many athletes, a year of training comes down to one major race when strength, skill, speed, endurance and tactics all need to come together, at the right time. The purpose of the study was to find out the influence of Lydiard Training with Tapering, on selected physical and psychological variables among the male race walkers.

METHODOLGY

To achieve the purpose of the study, twenty male race walkers were selected from various colleges in the state of Tamil Nadu, India. The age of subjects ranged from 18 to 25 years. The subjects had past experience of at least three years in race walking and only those who were the members of their respective college teams were taken as subjects.

A series of physical fitness tests was carried out on each participant. These included speed assessed by 30m dash; muscular strength assessed by sit- ups; explosive strength assessed by standing broad jump; and endurance assessed by cooper 12 minutes run. The Competitive State Anxiety Inventory-II (CSAI-II), developed by Martens et al (1990), were used to collect the relevant psychological data. The subjects were randomly assigned into two groups of ten each, such as experimental and control group. The experimental group participated in the Lydiard Training with Tapering for 5 days a week, one session per day and for 8 weeks. Each session lasted 90 minutes. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables namely speed, muscular strength, explosive strength, endurance, cognitive anxiety, somatic anxiety, and self confidence before and immediately after the training period. The collected data were analyzed statistically through Analysis of Covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any, between groups.



Training Flow Chart

TABLE-1 : Criterion measures

S.No	Criterion measure	Test items	Unit of measurement
1	Speed	30mts dash	In seconds
2	Muscular strength	Sit-ups	In count
3	Explosive strength	Standing broad jump	In centimeters
4	Endurance	Cooper 12minute run	In distance
5	Cognitive anxiety	Martens, et. al (1990)- CSAI-II	In points
6	Somatic anxiety	Martens, et. al (1990)- CSAI-II	In points
7	Self-confidence	Martens, et. al (1990)- CSAI-II	In points

Table - 2 : Descriptive analysis of selected physical and psychological variables of control and experimental groups

S.No	Variables	Group	Pre-Test Mean	SD (±)	Post-Test Mean	SD (±)	Adjusted Mean
1	Speed	CG	4.67	0.31	4.60	0.25	4.60
		LTG	4.59	0.20	4.37	0.15	4.36
2	Muscular strength	CG	28.20	1.81	29.70	1.05	29.58
		LTG	27.40	1.50	33.10	2.33	33.21
3	Explosive strength	CG	1.67	0.21	1.70	0.30	1.706
		LTG	1.71	0.30	1.94	0.06	1.946
4	Endurance	CG	2320.00	91.89	2595.00	86.44	2594.95
		LTG	2325.00	100.69	2745.00	92.64	2745.04
5	Cognitive anxiety	CG	24.70	1.33	23.20	1.13	23.15
		LTG	25.80	2.14	21.10	1.10	21.15
6	Somatic anxiety	CG	16.20	1.13	16.00	0.81	16.12
		LTG	17.00	0.94	15.00	0.47	14.87
7	Self-confidence	CG	27.40	2.45	26.80	2.20	26.88
		LTG	28.00	2.94	30.40	2.87	30.31

LTG= Lydiard training with tapering group CG= Control group

Pre and post-test mean values, standard deviations and adjusted mean values on selected physical and psychological variables of male race walkers are presented in Table 2. The Analysis of Covariance on selected variables of Lydiard's Training with tapering, and control group, is presented in Table - 3.

Table - 3 : Computation of Analysis of Covariance on selected physical and psychological variables among male race walkers

S.No	variables	Test	Sum of variance	Sum of squares	df	Mean squares	F ratio
1	speed	Pre-test	Between groups	0.03	1	0.03	0.42
			Within groups	1.26	18	0.07	
		Post-test	Between groups	0.27	1	0.27	6.20*
			Within groups	0.80	18	0.04	
		Adjusted means	Between sets	0.27	1	0.27	5.89*
			Within sets	0.79	17	0.04	

S.No	variables	Test	Sum of variance	Sum of squares	df	Mean squares	F ratio
2	Muscular strength	Pre-test	Between groups	3.20	1	3.20	1.15
			Within groups	50.00	18	2.77	
		Post-test	Between groups	57.80	1	57.80	17.63*
			Within groups	59.00	18	3.27	
		Adjusted means	Between sets	61.82	1	61.82	19.12*
			Within sets	54.96	17	3.23	
3	Explosive strength	Pre-test	Between groups	0.008	1	0.008	0.12
			Within groups	1.25	18	0.07	
		Post-test	Between groups	0.28	1	0.28	5.76*
			Within groups	0.89	18	0.05	
		Adjusted means	Between sets	0.28	1	0.28	5.37*
			Within sets	0.89	17	0.05	
4	Endurance	Pre-test	Between groups	125.00	1	125.00	0.01
			Within groups	167250.00	18	9291.66	
		Post-test	Between groups	112500.00	1	112500.0	14.01*
			Within groups	144500.00	18	8027.77	
		Adjusted means	Between sets	112539.24	1	112539.2	13.24*
			Within sets	144454.78	17	8497.34	
5	Congitive anxiety	Pre-test	Between groups	6.05	1	6.05	1.88
			Within groups	57.70	18	3.20	
		Post-test	Between groups	22.05	1	22.05	17.64*
			Within groups	22.50	18	1.25	
		Adjusted means	Between sets	18.11	1	18.11	13.98*
			Within sets	22.03	17	1.29	
6	Somatic anxiety	Pre-test	Between groups	3.20	1	3.20	2.93
			Within groups	19.60	18	1.08	
		Post-test	Between groups	5.00	1	5.00	11.25*
			Within groups	8.00	18	0.44	
		Adjusted means	Between sets	6.66	1	6.66	18.37*
			Within sets	6.16	17	0.36	
7	Self-Confidence	Pre-test	Between groups	1.80	1	1.80	0.24
			Within groups	132.40	18	7.35	
		Post-test	Between groups	64.80	1	64.80	9.88*
			Within groups	118.00	18	6.55	
		Adjusted means	Between sets	58.14	1	58.14	9.17*
			Within sets	107.77	17	6.34	

*Significant at 0.05level of confidences

Table value for df 1 and 18 was 4. 45, Table value for df 1 and 17 was 4.41. The obtained F-ratio of 5.89 for adjusted mean was greater than the Table value 4.41 for the degree of freedom 1, and 17 required for significance at 0.05 level of confidence. The result of the study indicated that there was a significant difference among control and experimental groups on speed. Table 2 also indicates that pre test of control and experimental groups differed significantly; and post test of control and experimental groups had significant difference on speed.

The obtained F-ratio of 19.12, for adjusted mean, was greater than the Table value 4.41, for the degree of freedom 1 and 17 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on muscular strength. Table-3 also indicates that pre test of control and experimental groups did not differ significantly; and post test of control and experimental groups have significant difference on muscular strength.

The obtained F-ratio of 5.37, for adjusted mean, was greater than the Table value 4.41, for the degree of freedom 1 and 17 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on explosive strength. Table 3 also indicates that pre test of control and experimental groups did not differ significantly; and post test of control and experimental groups have significant difference on explosive strength.

The obtained F-ratio of 13.24, for adjusted mean, was greater than the Table value 4.41, for the degree of freedom 1 and 17 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on endurance. Table 3 also indicates that pre test of control and experimental groups did not differ significantly; and post test of control and experimental groups have significant difference on endurance.

The obtained F-ratio of 13.98, for adjusted mean, was greater than the Table value 4.41, for the degree of freedom 1 and 17 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on cognitive anxiety level. Table 3 also indicates that pre test of control and experimental groups did not differ significantly; and post test of control and experimental groups have significant difference on cognitive anxiety.

The obtained F-ratio of 18.37, for adjusted mean, was greater than the Table value 4.41, for the degree of freedom 1 and 17 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on somatic anxiety level. Table 3 also indicates that pre test of control and experimental groups did not differ

significantly; and post test of control and experimental groups have significant difference on somatic anxiety.

The obtained F-ratio of 9.17, for adjusted mean, was greater than the Table value 4.41, for the degree of freedom 1 and 17 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on self confidence level. Table 3 also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on self confidence.

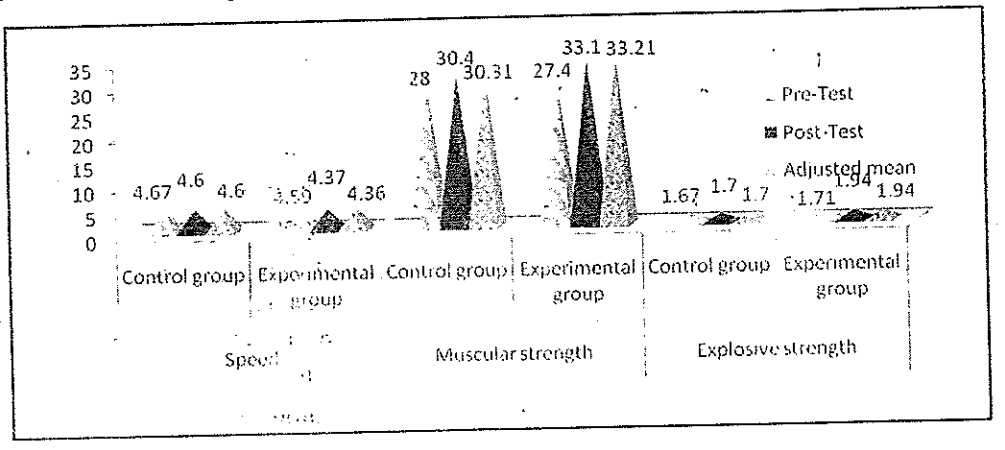


Figure-1 The pre, post and adjusted mean values of speed, muscular strength, explosive strength of both control and experimental groups.

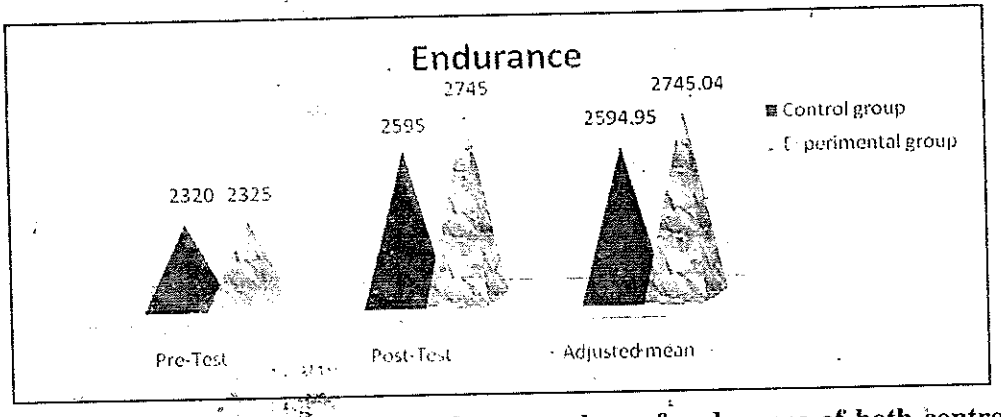


Figure-2 The pre, post and adjusted mean values of endurance of both control and experimental groups.

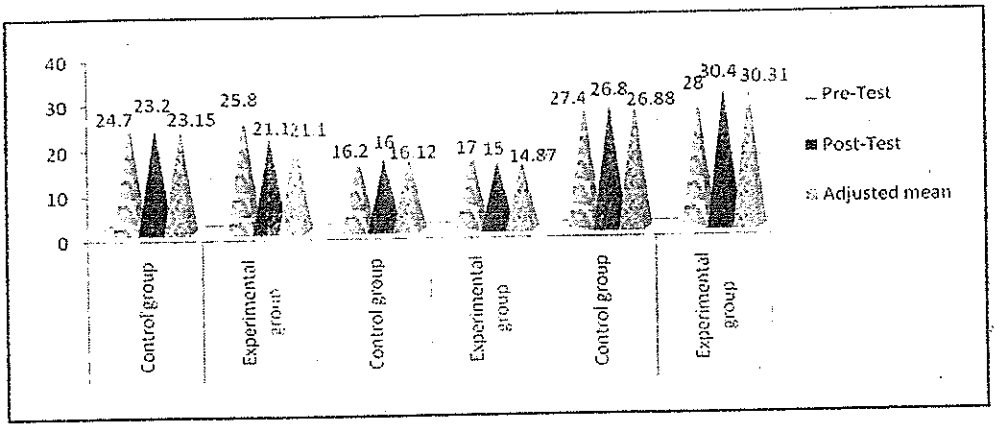


Figure-3 The pre, post and adjusted mean values of cognitive anxiety, somatic anxiety and self-confidence levels of both control and experimental groups.

CONCLUSION

The results of the study indicate that the experimental group which underwent Lydiard's Training with Tapering had showed significant improvement in the selected variables namely such as speed; muscular strength; explosive strength; endurance; cognitive anxiety; somatic anxiety and self-confidence, when compared to the control group. The control did not show significant improvement in any of the selected variables. The past studies on selected physical and psychological variables also reveal (Coutts et al, 2007) that tapering had significant improvement in vertical jump, 3-RM squat and 3-RM bench press and chin-up (max) and 10-m sprint performance. A study by Hooper et al (1999) showed that changes in plasma norepinephrine concentration, heart rate after maximal effort swimming and confusion as measured by the Profile of Mood States (POMS) predicted the change in swimming time with tapering ($r2 = 0.98$); the change in plasma norepinephrine concentration predicted the change in swim time with tapering ($r2 = 0.82$) by itself. The findings by Houmard et al (1994) indicate that 7 days of tapered running improves distance running performance and running economy and a taper regimen of equivalent duration cycle training maintained performance in distance runners

From the analysis of data, the following conclusions were drawn.

1. The experimental group race walkers showed significant improvement in all the selected physical and psychological variables such as speed, muscular strength, explosive strength, endurance, cognitive anxiety, somatic anxiety and self-confidence.
2. The control group race walkers did not show significant improvement in any of selected variables.

REFERENCES

Banister, E.W., J.B. Carter & P.C. Zarkadas (1999). Training theory and taper: validation in triathlon athletes. European Journal of Applied Physiology, 79: 182-191.

Bishop, D. & Edge, J. (2005). The effect of a 10-day taper on repeated- sprint performance in females. Journal of Science and Medicine in Sport 200-209

Bosquet, L., Montpetit, J. & Arvisais, D. (2007). Effect of tapering on performance: a meta-analysis. Medicine and Science in Sports and exercise. 39:1358-1365

Cheuvront, S.N., Kenefick, R.W., Montain, S.J. & Sawka, M.N. (2010). Mechanisms of aerobic performance impairment with heat stress and dehydration. Journal of Applied Physiological 109: 1989-1995

Coutts, A., Reaburn P. & Piva, T.J. (2007). Changes in selected biochemical, muscular strength, power, and endurance measures during deliberate overreaching and tapering in rugby league players. International journals of sports medicine. 28:116-124

Hickson, R.C., kanakis, C. & Davis J.R. (1985). Reduced training duration effect on aerobic power endurance, and cardiac growth Journal of Applied Physiology 58:225-229

Hooper, S.L., Mackinnon L.T. & Howart A, (1999). Physiological and Psychometric variables for monitoring recovery during tapering for major competition. Medical science sports exercise; 31: 741-747

Hopkins, W.G. & hewson, D.J. (2001). Variability of competitive performance of distance runners. Medicine and Science in Sports and exercise. 33:1588-1592

Houmard (1991). Impact of reduced training on performance in endurance athletes. Journal of Sports Medicine 12:380-393

Houmard, J.A., Scott, B.K. & Jstice, C.l. (1994). the effect of taper on performance distance runners. Medicine and Science in Sports and Exercise's 26: 624-631

Lydiard, Arthur & Gilmour, Garth (1978). Run, the Lydiard Way. Auckland: Hodder & Stoughton Ltd. ISBN 0-340-22462-2.

Lydiard, Arthur & Gilmour, Garth (2000). Distance Training for Masters. Oxford: Meyer & Meyer Sport. ISBN1-84126-018-5.

Mujika, I. (1998). The influence of training characteristics and tapering on the adaptation in highly trained individuals international Journal of Sports Medicine 19:439-446

Mujika, I., Goya, A. & Padilla S. (2000). Physiological responses to a 6- day taper in middle-distance runner: influence of training intensity and volume. Medicine and Science in Sports and Exercise's 32:511-517

Mujika, I., Chaouachi, A & Chamari, K. (2010). Precompetition taper and nutritional strategies: special reference to training during Ramadan intermittent fast. British Journal of Sports Medicine 44: 495-501

Mujika, I. & Padilla, S (2003). Scientific bases for precompetition tapering strategies. Medicine and Science in Sports and Exercise's 35: 1182-1187

Thomas, L. & Busso, T. (2005). A theoretical study of taper characteristics to optimize performance. Medicine and Science in Sports and Exercise's 37: 1615-1621

Thomas, L., Mujika, I. & Busso, T. (2009). Computer simulations assessing the potential performance benefit of a final increase in training during pre-event taper. Journal of Strength & Conditioning 23: 1729-1736

Trenell, M.I., Rooney, K.B., Sue, C.M. & Thompson, C.H. (2006). Compression garments and recovery from eccentric exercise: a 31P-MRS study. Journal of Sports Science and Medicine 5: 106-114

Wilson, J.M. & Wilson, G.J. (2008). A practical approach to the taper. Journal of Strength & Conditioning 30: 10-17

***