
**ISSN Print:** 2394-7500
**ISSN Online:** 2394-5869
**Impact Factor:** 5.2
IJAR 2017; 3(7): 1404-1410
www.allresearchjournal.com
Received: 05-05-2017
Accepted: 17-06-2017

**Usha Sujit Nair**
Associate Professor, SAI, LNCPE, Trivandrum, Kerala, India

**Sreejit K**
Research Scholar, SAI, LNCPE, Trivandrum, Kerala, India

**Corresponding Author:**
**Usha Sujit Nair**
Associate Professor, SAI, LNCPE, Trivandrum, Kerala, India

# Effect of mindfulness training on emotional regulation and physical working capacity of cyclist

**Usha Sujit Nair and Sreejit K**

**Abstract**
The aim of this study was to investigate the effect of mindfulness training on emotional regulation and Physical Working Capacity of national level cyclists who were undergoing training in LNCPE Thiruvanathapuram as part of National Games 2015. The subjects were 30 National level cyclist who were undergoing the National Camp at SAI- LNCPE Thiruvanathapuram Kerala between the age group was 20 to 30 years. They were randomly divided into two groups an Experimental group (N = 15) and Control group (N = 15). The experimental group underwent the mindfulness training program twice a week for eight weeks. Paired-t test revealed significant improvement in emotional regulation following mindfulness training. Percentage gain in the sub-scales of emotional regulation of cognitive reappraisal increased 34.227% ($P< .000$) and expressive suppression 24.562% ($P< .000$), Anaerobic power increased only by 2.342% ($P< .008$) and in the Physical Working Capacity by 10.57% ($P< .001$) following mindful training. It was concluded that 8-week Mindfulness training has resulted in an increase in emotional regulation and physical working capacity.

**Keywords:** Mindfulness, emotional regulation, anxiety, and stress

## Introduction
Mindfulness is a form of self-awareness training adapted from Buddhist mindfulness meditation Mindfulness means 'paying attention in a particular way: on purpose, in the present moment and non-judgmentally'. It has been described as a 'journey of self-development, self-discovery, learning, and healing' Kabat-Zinn, (1990) [13]. It is simply being aware of what is going on, as it is arising, connecting deeply and directly with this and relating to it with acceptance; a powerful act of participatory observation and mindful responses. Both perform leading roles in which the performance and well-being of subordinates depend on the leader's ability of taking responsibility and decision making that is shown to be influenced by mindfulness Fiol & O'Connor, (2003) [9].

Mindfulness practices comprise a process of self-regulation differentiated by the following distinct but interrelated components: attention regulation, body awareness, emotion regulation (reappraisal and extinction), as well as change in perspective on the self Hölzel *et al*., (2013) [4]. Mindfulness is a multifaceted construct, leading to a five-facet model of mindfulness; the facets are "observe," "describe," "act with awareness," "non-judge," and "non-react" Baer (2006) [2].

Mindfulness is increasingly being used in clinical psychology, and the salutary effects have been impressively documented under a range of conditions Hofmann *et al*. (2010) [21]; Chiesa and Serretti (2010) [8]. The scientific evidence of the efficacy of mindfulness-based interventions is so broad that it has been proposed as a common factor across several schools of psychotherapy. Martin (1997) [18].

Mindfulness focuses on teaching the self to direct one's attention to the present moment in a non-judgmental and accepting manner. Baer, Smith, Hopkins, Krietemeyer, & Toney, (2006) [2]. From a cognitive perspective, mindfulness involves learning to observe internal and external events such as images, thoughts and emotions as no more than that Kaufman, Glass, & Pineau, (2018). In other words, thoughts, emotions, and other internal and external events simply are they do not inherently possess any meaning or evaluative implications. A goal of mindfulness is to learn to accept such events without perceiving them as absolute reality that needs to be acted upon This mindful focus becomes an alternative to focusing on worry about past and future events that can undermine sport performance Salmon *et al*., (2004) [22].

Learning how to reliably achieve a state of mindfulness can allow a performer who is experiencing a dysfunctional performance state to shift into a more functional performance state.

Over the past decade, research on the benefits of mindfulness on psychological wellbeing has grown extensively (Charoensukmongkol, 2014). Meditation is defined as "practices that self-regulate the body and mind, thereby affecting mental events by engaging a specific attentional set" Cahn & Polich, (2006) [6]. Research has found that mindfulness-based meditation produces several beneficial outcomes such as reducing stress. Grossman, Niemann, Schmidt & Walach, (2004) [11], improving well-being Brown & Ryan, (2003) [5]; improving physical health (Grossman, *et al*., 2004) [11], and reducing pain, anxiety and depression (Kabat-Zinn, *et al*., 1992; Teasdale *et al*., 2002) [15, 23].

Emotion regulation refers to a variety of strategies that can be implemented at different points during the emotion-generative process to influence which emotions arise, when and how long they occur, and how these emotions are experienced and expressed (Gross, 2007). The connection between mindfulness and improved emotion regulation is certainly an intuitive one, given the emphasis on the nonjudgmental acceptance of thoughts and emotions that is at the core of this practice (Kabat-Zinn, 1990) [13]. Mindfulness promotes the early awareness and nonjudgmental acceptance of emotional stimuli; it allows people to engage in regulation early in the time course of stimulus processing, before intense emotional responses occur.

The Mindfulness-Acceptance-Commitment-based (MAC) approach which is an integration of Acceptance and Commitment therapy and Mindfulness-Based Cognitive therapy was developed for athletes. It emphasizes non-judging, mindful awareness and acceptance of in-the-moment inner experiences instead of controlling and reducing internal experiences. The MAC approach believes that it is possible to improve performance while experiencing negative internal states. All internal states are seen as normal part of human existence and sports. Gardner and Moore (2004) [10].

Mindfulness and acceptance were combined in a psychological skills training program for golfers. The long-distance runners exhibited significant improvement in their mile times from pretest to follow-up, with significant correlations between change in runner's performance and trait variables. Bernier Marjorie, *et al*. (2009) [3] results suggest that Mindful Sport Performance Enhancement is a promising intervention associated with long-term changes in trait variables that contribute to optimal athletic performance. Thompson. Rachel W. *et al*. (2011) four weeks of Mindfulness Meditation Therapy has an effect shooting performance on Hypothalamic Pituitary Adrenal - Axis by decreasing the level of Salivary Cortisol as a reliable physiological marker of Pre-Competition Stress. John Shaji, *et al*. 2011) [12].

Cycling, as a sport, includes a variety of different types of bicycles and environmental settings for several different cycling specialties. These include mountain biking, track cycling, BMX and cyclo-cross, although by far the best-known competitive cycling specialty is road cycling. Competitive road cycling is a sport practiced worldwide with the Tour de France being one of the world's biggest sporting events. To illustrate, approximately 10-12 million spectators visited the different stages of the Tour de France in 2016 with the stages being broadcasted in 190 countries worldwide (Le Tour, 2016). There are road cycling competitions all around the world across a broad spectrum that ranges from youth and junior competitions to elite professional competitions.

A variety of terrains and competitive situations in combination with many uncontrollable variables (weather conditions, wind direction) makes road cycling a complex sport Lucia *et al*., (2001) [17], Atkinson *et al*., (2003) [1]. Factors that determine a cyclists' performance include race-specific nutritional and training strategies and race-specific inherent physiological ability. Other factors influencing a cyclist's power output and speed include tactical factors such as rider position, pacing strategy, and an aerodynamical factor such as bike design (Atkinson *et al*., 2003) [1].

Due to the large training volume and high number of competitions in competitive road cycling, there is a high physiological and psychological demand placed on the cyclists Lucia *et al*., (2001) [17]. Therefore, there must be a balance between training, competition and recovery in order to maximize performance at specific time points during the competitive season. Inadequate recovery may cause athletes to experience decrements in performance.

However, without sufficient recovery after demanding training and competitions phases, the athlete can go in to non-desirable states as non-functional overreaching or the overtraining syndrome (Meeusen *et al*., 2013) [19]. During the training process, athletes are constantly exposed to systematic and repetitive exercise stimuli with the goal of inducing adaptation and maximising performance at specific time points during the season. Other goals of the training process may include delaying the onset of fatigue, increasing power output, refining motor coordination or reducing the risk of injury (Mujika, 2001) [20].

Understanding how mindful training would have an impact on emotional regulation and Physical Working Capacity of cyclists was the fundamental purpose of this research.

**Participants**

The Participants were thirty National level cyclist from Kerala who were undergoing training for the National games 2015 at Sports Authority of India, Thiruvananthapuram. Their age ranged from 20 to 30 years of age. Ten of them were females.

The variables selected were Emotional Regulation, Anaerobic power and Physical working capacity. Anaerobic power was assessed using the cycle ergometer test. The objective was to achieve 100rpm in minimum possible time, the time taken to reach 100rpm was recorded and also to achieve maximum rpm and continued for long till they could main at 100 rpm. Recovery heart rate will be measured with the help of heart rate monitor. Physical working capacity was tested using PWC170 Cycle Test.

**Instrument**

Emotional regulation Questionnaire (ERQ) (Gross, J.J., & John, O.P. (2003) has 10-item scale designed to measure respondents' tendency to regulate their emotions in two ways: (1) Cognitive Reappraisal and (2) Expressive Suppression. Respondents answer each item on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7

(strongly agree). Construct validity of ERQ was confirmed and internal consistencies (Cronbach's alpha) of the two subscales were (cognitive reappraisal .81 and expressive suppression .73).

**Intervention**

The Mindfulness training was held at SAI, LNCPE Trivandrum Kerala. The experimental group performed the prescribed exercises four times a week for a period of 8 weeks. Each session lasted was for 45-50 minutes where the meditation skills were taught. They had to be oriented to mindfulness. They were made to realize and feel each part of the body. The body scan was a 25-min exercise in which attention was directed sequentially to numerous areas of the body while the participant was lying down with eyes closed. Sensations in each area had to be carefully observed. In sitting meditation, participants were instructed to sit in a relaxed and wakeful posture with eyes closed and to direct attention to the sensations of breathing. Hatha yoga postures were used to teach mindfulness of bodily sensations during gentle movements and stretching. Participants also practiced mindfulness during ordinary activities like walking, standing, and eating. For all mindfulness exercises, participants were instructed to focus attention on the target of observation (e.g., breathing or walking) and to be aware of it in each moment. When emotions, sensations, or cognitions arose, they had to be observed nonjudgmentally. When the participant noticed that the mind had wandered they took note of it and had to regain their mindfulness. Thus, participants were instructed to notice their thoughts and feelings but not to become absorbed in their content (Kabat-Zinn, 1982) [14].

The study employed an experimental design using a quantitative approach to emotional regulation and mindfulness of cyclists. The investigator was present in the camp of the cyclists and was observing them. The scholar administered the questionnaire personally to the participant and got it completed in his presence. The data was statistically analyzed by using descriptive statistics and paired t- test to find out the significant difference. The level of significance chosen was $P<0.01$ and $P<0.05$. Data analyses were conducted using the Statistical Package for Social Sciences (SPSS – version 16).

**Results**

Means, standard deviations, percentage gain and t test was computed for emotional regulation, anaerobic capacity and physical working capacity which is presented in Tables 1-4 and figures 1-5 respectively.

**Table 1:** Mean scores of experimental and control group in emotional regulation (Cognitive reappraisal facet)

| Group | | N | Mean | SD | MD | % Gain | t | p |
|---|---|---|---|---|---|---|---|---|
| **Experimental** | Pre mid | 15<br>15 | 22.00<br>24.60 | 2.95<br>2.26 | 2.60 | 34.227 | 3.85 | 0.002** |
| | Mid post | 15<br>15 | 24.60<br>29.53 | 2.26<br>3.97 | 7.53 | | 6.82 | 0.00** |
| | Pre post | 15<br>15 | 22.00<br>29.53 | 2.95<br>3.97 | 4.93 | | 6.34 | 0.00** |
| **Control** | Pre mid | 15<br>15 | 23.20<br>22.93 | 2.39<br>2.08 | 0.26 | - 2.327 | -1.46 | 0.16ns |
| | Mid post | 15<br>15 | 22.93<br>22.66 | 2.08<br>2.28 | 0.26 | | -1.07 | 0.30ns |
| | Pre post | 15<br>15 | 23.20<br>22.66 | 2.39<br>2.28 | 0.53 | | -1.65 | 0.12ns |

** Significant at 0.01 level, ns-not significant P>0.05

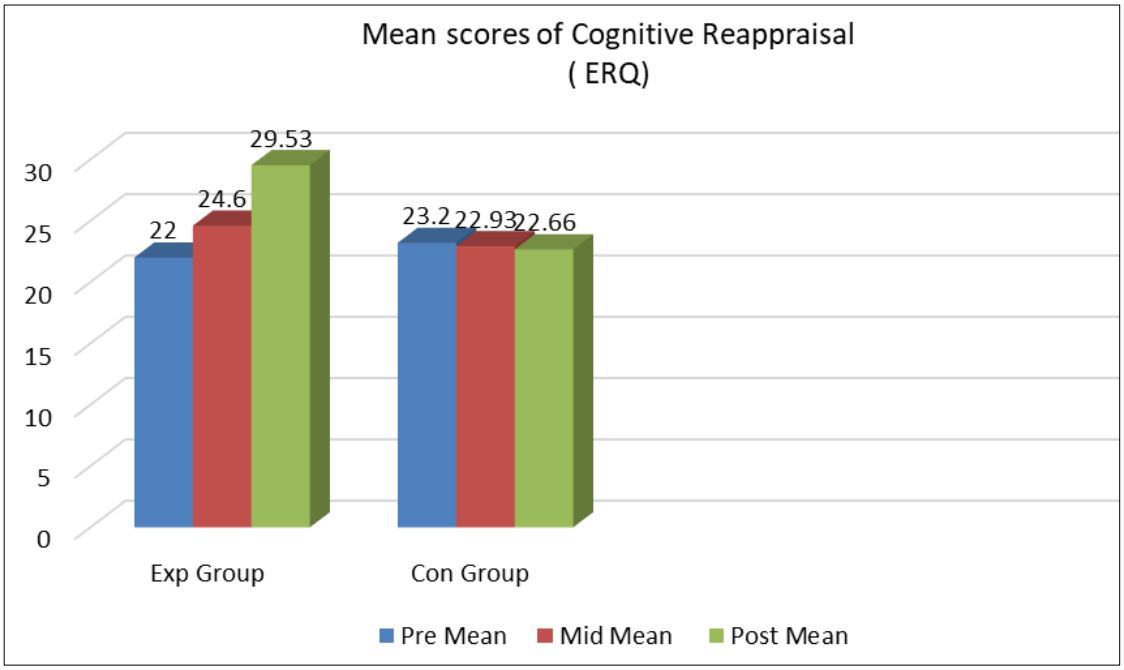


**Fig 1:** Mean scores experimental group and control group in emotional regulation (Cognitive reappraisal facet)

**Table 2:** Mean scores of experimental and control group in emotional regulation (Expressive suppression facet.)

| Group | | N | Mean | SD | MD | % Gain | t | P |
|---|---|---|---|---|---|---|---|---|
| Experimental | Pre-mid | 15<br>15 | 16.00<br>17.66 | 2.29<br>3.28 | 1.66 | 24.562 | 1.86 | 0.08ns |
| | Mid-post | 15<br>15 | 17.66<br>19.93 | 3.28<br>1.86 | 3.93 | | 6.49 | 0.00** |
| | Pre-post | 15<br>15 | 16.00<br>19.93 | 2.29<br>1.86 | 2.26 | | 2.44 | 0.02* |
| Control | Pre-mid | 15<br>15 | 14.13<br>14.73 | 4.71<br>4.68 | 0.60 | - 3.326 | 1.05 | 0.30ns |
| | Mid-post | 15<br>15 | 14.73<br>13.66 | 4.68<br>4.15 | 1.06 | | -2.16 | 0.05ns |
| | Pre-post | 15<br>15 | 14.13<br>13.66 | 4.71<br>4.15 | 0.46 | | -1.33 | 0.20ns |

ns: not significant (P>0.05), ** Significant at 0.01 level,* Significant at 0.05 level

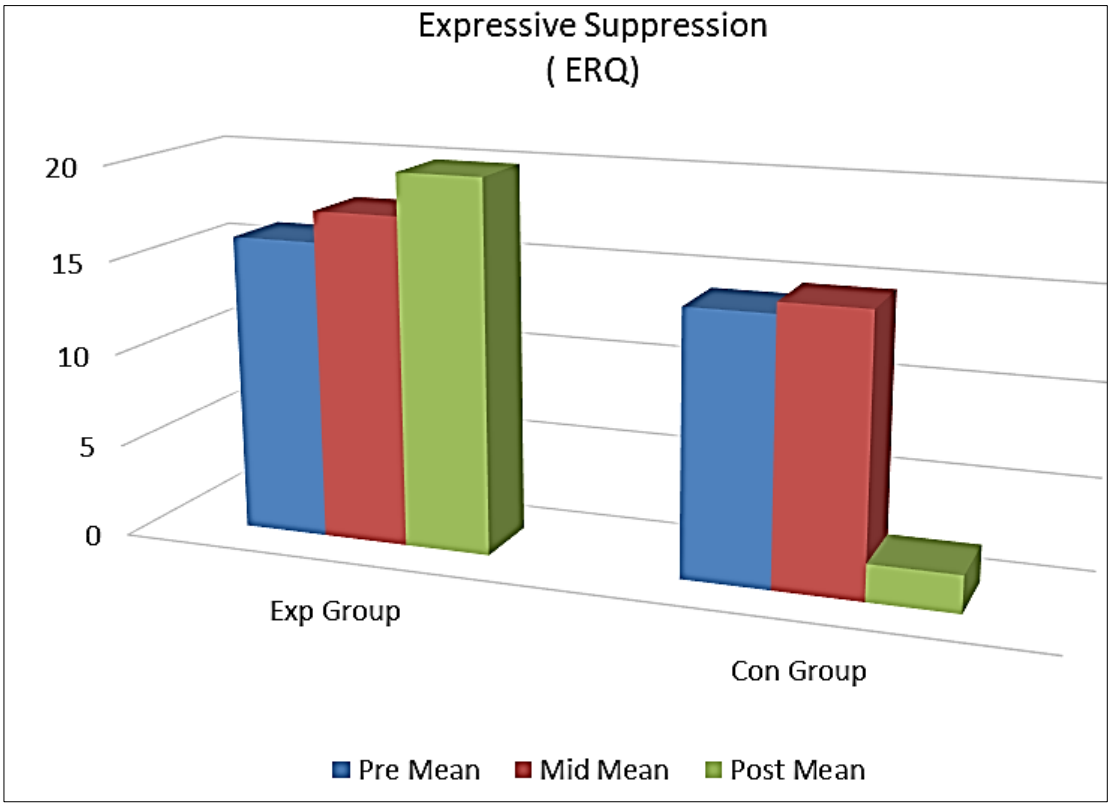


**Fig 2:** Mean scores of experimental and control group in emotional regulation (Expressive suppression)

**Table 3:** Mean score of experimental and control group in anaerobic power

| | | N | Mean | SD | MD | % Gain | T | P |
|---|---|---|---|---|---|---|---|---|
| Experimental | Pre-mid | 15<br>15 | 34.15<br>34.35 | 7.91<br>7.90 | 0.49 | 2.342 | 1.58 | 0.137 NS |
| | Mid-post | 15<br>15 | 34.35<br>34.95 | 7.90<br>7.74 | 0.80 | | 3.83 | 0.002** |
| | Pre-post | 15<br>15 | 34.15<br>34.95 | 7.91<br>7.74 | 0.74 | | 3.10 | 0.008** |
| Control | Pre-mid | 15<br>15 | 29.56<br>29.61 | 7.39<br>7.42 | 5.73 | 1.184 | 2.23 | 0.04 NS |
| | Mid-post | 15<br>15 | 29.61<br>29.91 | 7.42<br>7.74 | 0.35 | | 2.32 | 0.03 NS |
| | Pre-post | 15 | 29.56<br>29.91 | 7.39<br>7.74 | 0.29 | | 1.96 | 0.07 NS |

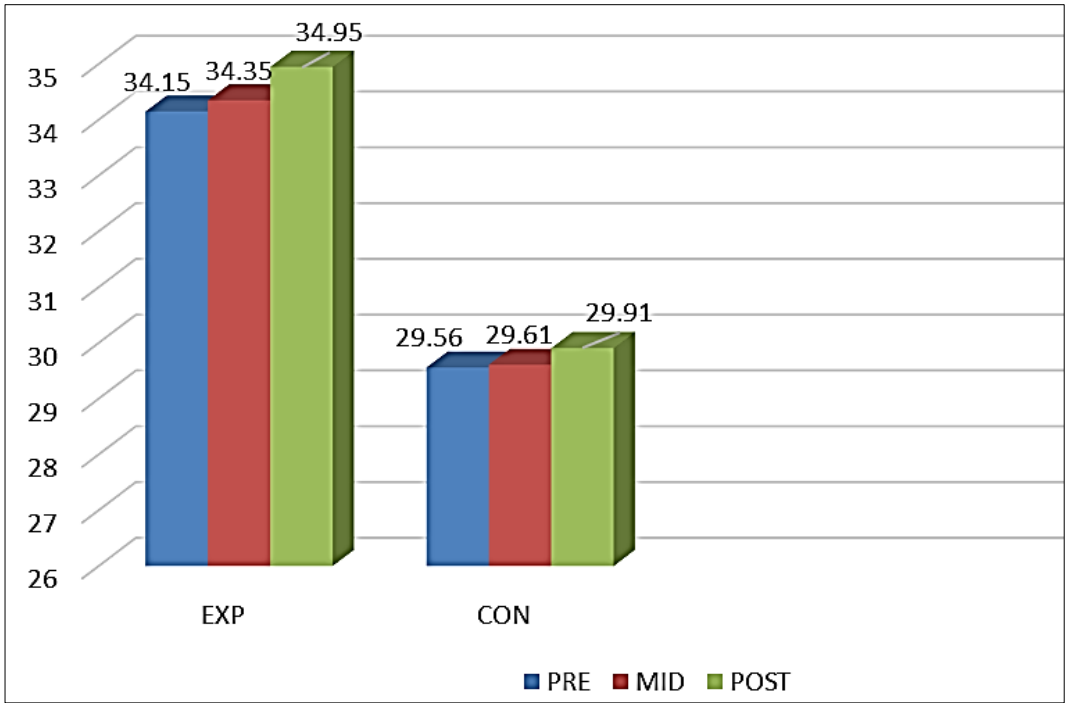


**Fig 3:** Mean scores of experimental and control group in anaerobic power

**Table 4:** Mean scores of experimental and control group of physical working capacity

| Group | | N | Mean | SD | MD | % Gain | t | P |
|---|---|---|---|---|---|---|---|---|
| Experimental | Pre-mid | 15<br>15 | 231.88<br>249.15 | 45.02<br>47.13 | 17.27 | 10.570 | 4.57 | 0.00** |
| | Mid-post | 15<br>15 | 249.15<br>256.39 | 47.13<br>46.41 | 7.23 | | 1.04 | 0.31ns |
| | Pre-post | 15<br>15 | 231.88<br>256.39 | 45.02<br>46.41 | 24.51 | | 2.98 | 0.01** |
| Control | Pre-mid | 15<br>15 | 219.58<br>221.30 | 45.17<br>45.36 | 1.71 | 1.288 | -1.85 | 0.08ns |
| | Mid-post | 15<br>15 | 221.30<br>222.41 | 45.36<br>45.44 | 1.11 | | -1.79 | 0.09ns |
| | Pre-post | 15<br>15 | 219.58<br>222.41 | 45.17<br>45.44 | 2.82 | | -2.01 | 0.06ns |

ns: not significant (P>0.05), ** Significant at 0.01 level

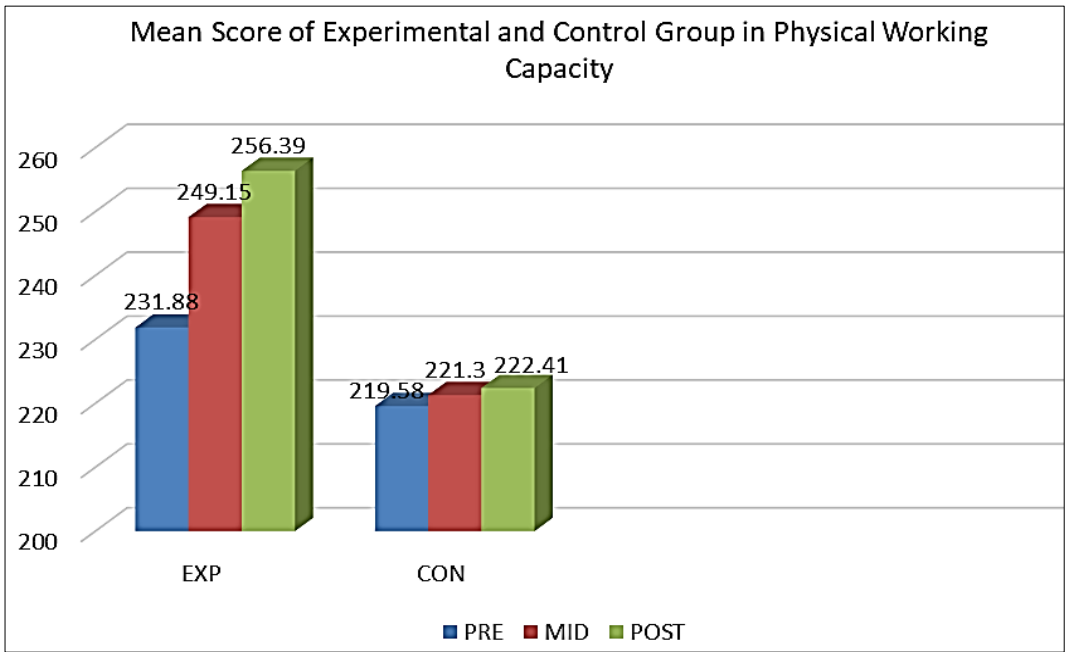


**Fig 4:** Mean scores of experimental and control group of physical working capacity

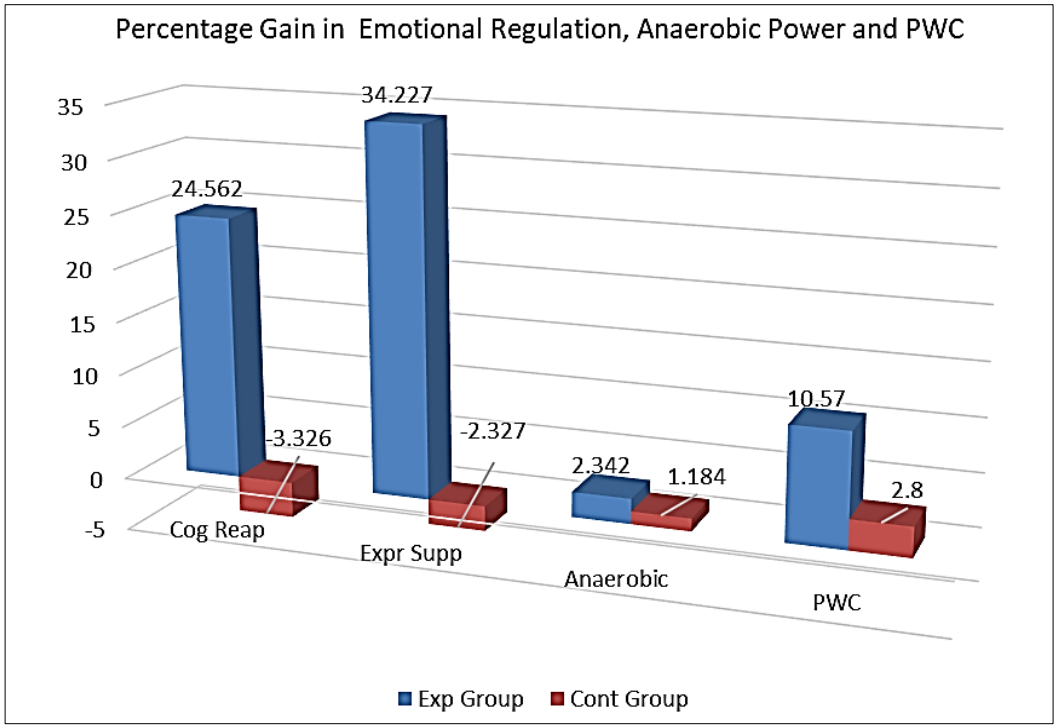


**Fig 5:** Percentage gain in emotional regulation (Cognitive reappraisal facet, expressive suppression facet) anaerobic power and physical working capacity of cyclists

**Discussion of findings**

Significant changes were seen in emotional regulation, physical working capacity in cyclists following Eight weeks of mindfulness training.

Significant improvement was seen in emotional regulation following 8 weeks of mindfulness training. The two sub variables of Emotional regulation are Cognitive reappraisal and Expressive suppression. There was an increase in cognitive reappraisal. This may be probably due to the fact that stressful situations would have been negotiated by taking an optimistic attitude thus reinterpreting what they found were stressful and made affective efforts to repair bad moods, thus leading to an increase cognitive reappraisal. They also experienced to express more positive emotion.

There was a decrease in the expressive suppression following mindfulness training. It may be due to the fact that they started to open up their feelings, express them in group, sharing there emotion which were negative or positive, and expressing their internal feelings. There was change in outlook of the subjects were they stated that they better.

Significant improvement was seen in anaerobic power and Physical working capacity of cyclist following 8 weeks of mindfulness training. The cyclist was also undergoing various physical activities for the upcoming competition and thus it may also improve their performance.

**Conclusion**

The 8 week Mindfulness training to the cyclists did bring about significant improvement in emotional regulation. The anaerobic capacity and physical working capacity also improved following mindfulness training.

**Limitations of the study**

The duration of the training was one factor, besides smaller sample size. Some psychometric tests could have been incorporated.

**Recommendations**

The cyclists should be including mindfulness in their training regime. Once they are aware of being in the present this would enable them to perform better.

**References**

1. Atkinson G, Davison R, Jeukendrup A, Passfield L. Science and cycling: current knowledge and future directions for research. J Sports Sci 2003;21:767-87.
2. Baer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using self-report assessment methods to explore facets of mindfulness. Assessment 2006;13:27-45.
3. Bernier Marjorie *et al*. Mindfulness and Acceptance Approaches in Sport Performance. Journal of Clinical Sports Psychology 2009;4:320-333.
4. Britta Hölzel K, Elizabeth Hoge A, Douglas Greve N, Tim Gard, David Creswell J, Kirk Warren Brown *et al*. Neural mechanisms of symptom improvements in generalized anxiety disorder following mindfulness training Neuroimage Clin 2013;2:448–458. doi: 10.1016/j.nicl.2013.03.011
5. Brown K, Ryan R. The benefits of being present: Mindfulness and its role in psychological well-being. Journal of Personality and Social Psychology 2003;84(4):822-848. doi: 10.1037/0022-3514.84.4.822.
6. Cahn BR, Polich J. Meditation states and traits: EEG, ERP, and neuroimaging studies. Psychological Bulletin 2006;132(2):180–211.
7. Charoensukmongkol P. The contributions of mindfulness meditation on burnout, coping strategy, and job satisfaction: Evidence from Thailand. Journal of Management & Organization 2013;19(5):544-558. doi:10.1017/jmo.2014.8.
8. Chiesa Serretti A. Mindfulness based cognitive therapy for psychiatric disorders: a systematic review and meta-analysis. Psychiatry Res 2011;187(3):441-53. doi: 10.1016/j.psychres.2010.08.011.

9. Fiol CM, Connor EJO. Waking up! Mindfulness in the of bandwagons. The Academy of Management Review 2003;28(1):54-70. DOI:10.5465/AMR.2003.8925227
10. Gardner FL, Moore ZE. A mindfulness-acceptance-commitment-based approach to athletic performance enhancement: Theoretical considerations. Behavior Therapy 2004;35(4):707-723.
11. Grossman P, Niemann L, Schmidt S, Walach H. Mindfulness-based stress reduction and health benefits: A meta-analysis. Journal of Psychosomatic Research 2004;57:35-43.
12. John S, Verma SK, Khanna GL. The effect of mindfulness meditation on HP Aaxis in pre-competition stress in sport performance of elite shooters. National Journal of Integrated Research in Medicine 2011;2(3):15-21.
13. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness. New York, NY: Delacorte Press 1990.
14. Kabat-Zinn J. An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. General Hospital Psychiatry 1982;4:33-47.
15. Kabat-Zinn J, Massion AO, Kristeller J, Peterson LG, Fletcher KE, Pbert L *et al*. Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. The American Journal of Psychiatry 1992;149:936-943.
16. Kaufman KA, Glass CR, Pineau TR. Mindful Sport Performance Enhancement: A treatment manual for long-distance runners. Manuscript in preparation, The Catholic University of America, Washington, DC 2012.
17. Lucia A, Hoyos J, Chicharro JL. Physiology of Professional Road Cycling. Sports Med 2001;31:325-337.
18. Martin JR. Mindfulness: a proposed common factor. Journal of Psychotherapy Integration 1997;7:291–312.
19. Meeusen R, Duclos M, Foster C, Fry A, Gleeson M, Nieman D *et al*. European College Of Sport, S. & American College Of Sports, M. Prevention, diagnosis, and treatment of the overtraining syndrome: joint consensus statement of the European College of Sport Science and the American College of Sports Medicine. Med Sci Sports Exerc 2013;45:186-205.
20. Mujika I, Padilla S. Physiological and Performance Characteristics of Male Professional Road Cyclists. Sports Med 2001;31:479-487.
21. Stefan Hofmann G, Alice Sawyer T, Ashley Witt A, Diana Oh. The Effect of Mindfulness-Based Therapy on Anxiety and Depression: A Meta-Analytic Review. J Consult Clin Psychol 2010;78(2):169–183. doi: 10.1037/a0018555
22. Salmon P, Sephton S, Weissbecker I, Hoover K, Ulmer C, Studts JL. Mindfulness meditation in clinical practice. Cognitive and Behavioral Practice 2004;11(4):434-446.
23. Teasdale JD, Moore RG, Hayhurst H, Pope M, Williams S, Segal ZV. Metacognitive awareness and prevention of relapse in depression: Empirical evidence. Journal of Consulting and Clinical Psychology 2002;70:275-287.
24. Thompson RW, Kaufman KA, De Petrillo LA, Glass CR, Arnkoff DB. One year follow-up of mindful sport performance enhancement (MSPE) for archers, golfers and long-distance runners. Journal of Clinical Sport Psychology 2011;5:99-116.