



Psychological skills training for managing anxiety and better performance in elite athletes: A review

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Abstract

Objective: present systemic review was to find overview of available literature and find a gap for future studies of psychological training to reduce anxiety in elite athletes.

Data Source: PubMed, PsycINFO, Science Direct and Google Scholars. Study eligibility criteria: The research works of RCT and Non RCT on psychological skill training on elite athletes which published in English language from 2000 to February 2019.

Interventions: Application of various psychological techniques to reduce precompetitive anxiety among elite athletes. Outcome measure: Performance score, salivary cortisol, Heart rate, heart rate variability, tremor meter test, physical fitness test, cortisol plasma testosterone, competitive state anxiety questionnaires, semi structured interview, mental skill questionnaires, Test of performance strategies, Psychological wellbeing scale, mindful Attention Awareness Scale. Positive Affect, Negative Affect Schedule, -Satisfaction with Life Scale. Sport Mental Toughness Questionnaire, Positive Affect, Negative Affect Schedule, Satisfaction with Life Scale. Sport Mental Toughness Questionnaire, Shortened General Attitudes and Beliefs Scale), Sport Anxiety Scale-2, Group Environment Questionnaire, Trait Sport-Confidence Inventory, State-Trait Anxiety Inventory. Self-Talk Questionnaire, Sport Competition Anxiety Test, Self-Compassion Scale. Unfamiliar relaxing music, unfamiliar arousing music, Familiar arousing music.

Results: There were 10 studies used combination of various psychological training of alpha/theta neuro Feedback and mindfulness meditation, Goal setting, self-talk, visualization, imagery, Progressive relaxation therapy. Few studies were conducted with specific techniques and its conducted with a smaller number of subject and objective measures.

Conclusion: There is lots psychological training conducted among elite athletes even though world of athletes still suffering anxiety.

Implications: There was a need of specific behavioral therapy to alter this major issue of precompetitive anxiety

Keywords: mental health training, psychological skill training, mindfulness, meditation, imagery, mental skill training of athletes

Introduction

The world of athletes is running behind a successful performance and meet the expectation of their self, coaches and family members. It develops anxiety prior to competition which affects the psychological state of the athletes. The level of precompetitive anxiety is a contributory factor for successful sports performance of an elite athletes.

The components of pre-competitive are cognitive and somatic anxiety. The definition of Cognitive anxiety is as "negative expectations and cognitive concerns about oneself, the situation at hand and potential consequences", and somatic anxiety defines as "one's perceptions of the physiological-affective elements of the anxiety experience, that is, indications of autonomic arousal and unpleasant feelings states such as nervousness and tension" [1].

The multidimensional anxiety theory explains the relationship between cognitive and somatic anxiety, self-confidence and sports performance. In that cognitive anxiety have negative correlation with sports performance on the other hand optimal level of somatic anxiety helps to effective performance [2].

Cognitive anxiety is not only felt by novice players, even it

felt by elite and experienced athletes also. The causative factors of cognitive anxiety may be varying among the groups. Recently sports training focused on traditional training method of technical skills, physical conditioning with psychological skill to overcome the precompetitive anxiety and enhance performances in competitions. There are many psychological skill training methods are available to train the mental toughness.

Previous studies had conducted with various techniques on various sports persons. So, the aims present systemic review was to find overview of available literature and find a gap for future studies of psychological training to reduce anxiety in elite athletes.

Method

Eligibility criteria

The systemic review was conducted according to PRISMA guidelines. The articles title of 'Psychological skills training for managing anxiety and better performance in elite athletes' were taken. The studies were ranged from 2000 to February 2019 years for review. The studies which has case study,

narrative stories, cross section, pilot study and were excluded,

Information sources

Information was collected from electronic databases PubMed, Psyc INFO, Science Direct and Google Scholars. The search was restricted to randomized and non-randomized controlled study design with free full text in English were collected from data bases.

Search strategy

For searching the relevant literature in electronic database using the key term of mediation, Psychological skill training, relaxation therapy, imagery. The Studies which include psychological intervention on elite athletes as a methodology for team sports and individual sports are included.

Study selection

Both Randomized controlled trials and non-randomized controlled studies were selected for the review. Studies which included the various method of psychological training among elite athletes were selected.

Data collection process

The available articles were searched through online and extracted the data according to the MeSH term and related keywords. Extracted information was cross checked and selected for this review.

Study selection

Eligible relevant studies were scrutinized by title and then by the title and abstract and lastly by the availability of the full text.

Data Extraction

To find out the effectiveness of the intervention mean and standard deviation (SD) of anxiety (anxiety scale) and physiological measurement of anxiety (salivary cortisol, Heart

rate variability), performance score along with other sample characteristics like age, height, weight, body mass index (BMI) was extracted from both the experimental and control group,. Data for author/year, total number of subjects with sports, intervention for both the experimental and control group, follow up along with result were also extracted and compared.

Risk Bias in Individual Studies

Methodological study quality was assessed with the quality of controlled studies was assessed by modified Jadad scale score. In that maximum score is 8 considered as a highest quality, >4 points, it was considered to be of high quality; if the score was 3-4 points, it was moderate quality; and if the score was <3 points, it was low quality.

Study Selection

A total of 882 studies from database in which 214 Pubmed, 200 Science direct, 163 PsychoINFO. 305 Google scholar were obtained by using the keywords mentioned above. and after removal of duplicates and screening of irrelevant titles, abstract only 51 full articles are eligible for present review. Following that 26 articles were excluded because of improper study protocol (n = 6), Case studies (n = 2), Survey (n = 4), other language (n =1), Irrelevant studies (n = 5), not clearly results (n = 3), study inclusion (n = 5). There were twenty-five studies which conducted on pistol, rifle shooting. Taekwondo players, tennis, cricket, volley ball, basketball, swimming, Soccer players included. In that 8 articles conducted as study design of randomized controlled trials, remaining studies were non-randomized studies.

Study Characteristics

The included studies were conducted with subjective subjective and objective outcome measures, results in various sports. The baseline characteristics of each study were tabulated below.

Table 1: Baseline characteristics of included studies

S. No	Author (Year)	Design	No. of participants	Intervention applied	Outcome measures	No of session	Follow up	Statistical test	Results
1	Samadi 2019	Pretest and posttest control group design	17 male professional shooters	Mindfulness intervention group	state-competitive anxiety inventory- 2 (SCAI-2)	6session	Nil	Independent t test	Experimental group have control cognitive anxiety and increased self confidence level but no changes in physical anxiety of both groups
2	Kumar, (2018)	Multiple block randomization	110 male professional shooters	Mindfulness Meditation Therapy (MMT),	Performance score	24 session	Nil	One-way ANOVA	Meditation group has high performance score than control group
3	Zadkhosh <i>et al.</i> ,2018	Pre and post experimental design	45 football players	1) alpha/theta neurofeedback 2) mindfulness meditation)	1) Sport Anxiety Scale, 2) Football skill shooting test, 3)neurofeedback	12 / 30 minutes each	Nil	MANOVA	Both experimental groups shows better in Performances and reduction anxiety
4	Dehghani & Ebrahimi (2017)	Pretest and posttest control group design	22 female volley ball	Goal setting, Relaxation, visualization and self-talk	Sport Mental Toughness Questionnaire,	15 session	Nil	Independent 't' test	Experimental group has increased mental toughness after the psychological skill training programmes.
5	Georgakaki	Pretest and	44 Greek	Positive self-	S-TQ, SCAT,	5	Nil	ANOVA	Intervention group has

	& Karakasidou (2017)	posttest control group design	swimmers	talk training	SCS	sessions			less competitive anxiety and more in self-compassion.	
6	Micoogullari & Ekmekci (2017)	experimental study design	26 soccer players	Goal setting, imagery, self-talk and arousal regulation.	PWBS, SMTQ	16 weeks / 4 weeks for each	Nil	Pearson Correlation. Paired t' test	SMT and PWB were increased and there was positive correlation with both factors.	SMT and PWB were increased and there was positive correlation with both factors.
7	Alanag <i>et al.</i> , 2017	quasi experimental design	15, 10m Air rifle shooters	1. Physical exercise (PE), 2. PE and Cognitive imagery 3. PE with motivational imagery	Sport Imagery Ability Questionnaire, Flow State Scale-2 (FSS-2), Shooting performance	18 session	Nil		Physical exercise with motivational imagery training group reflect better flow rate and performance than Another group.	Physical exercise with motivational imagery training group reflect better flow rate and performance than another group.
S. No	Author (Year)	Design	No. of participants	Intervention applied	Outcome measures	No of session	Follow up	Statistical test	Result	
									Experimental group have improved in maintaining anxiety level, self-confidence, team cohesion	

8	Micoogullari 2016	Experimental study design	48 male soccer players	Psychological skill training,	1. GEQ 2. TSCI 3. STAI 4. Ryff's psychological well-being scale	48 session / 12 weeks	17 week, 25 week	MANOVA , ANOVA	Experimental group have improved in maintaining anxiety level, self-confidence, team cohesion	Experimental group have improved in maintaining anxiety level, self-confidence, team cohesion
9	Micoogullari & Kirazci S (2016)	Pretest and posttest control group design	36 male basketball players	Psychological skill training	GEQ, TSCI, STAI	24 session / 6 weeks	2 weeks	MANOVA for team cohesion, ANOVA for Stress, anxiety	The experimental group has improvement in team cohesion, self-confidence and anxiety.	The experimental group has improvement in team cohesion, self-confidence and anxiety.
10	Ali (2015)	Experimental study	14 males football players	Progressive muscle relaxation program	CSAI-2	20	15 days	Descriptive statistics	The experimental group has reduced anxiety level but its increased follow up.	The experimental group has reduced anxiety level but its increased follow up.
11	Turner <i>et al</i> (2014)	One group intervention study design	15 male elite academy soccer athletes	REBT	SGABS, Social Validation questionnaire	3 work shops	6weeks	MANOVA , Post-hoc Bonferroni	All irrational beliefs showed a temporary Decrease from pretest to posttest. For all variables are return baseline level in the follow-up phase.	All irrational beliefs showed a temporary Decrease from pretest to posttest. For all variables are return baseline level in the follow-up phase.
12	Turner <i>et al</i>	Quasi-	17 male elite	REBT –	SGABS, Social	3 /once	1	Descriptive	Experimental group Was	

	(2014)	experimental single-case A-B design	academy soccer athletes	experimental group. General emotion workshop –	Validation questionnaire	a week	month and 6 weeks after	Statistics	reducing irrational belief and it maintains in follow up also.
13	Coelho (2014)	quasi-experimental design	53 elite volley ball players	Imagery, Relaxation, and Video Modeling	Salivary cortisol	15	no	ANCOVA	Mental training programs were reduced Stress level of athletes.
14	Baltzell & Akhtar 2014	Pre and post experimental design	42 female athletes	Mindful meditation training	PWBS, MAAS, PANAS, SWLS	12 session	No	Independent 't' test	MMTs group has reduce negative Effect in sports.
15	John <i>et al.</i> (2013)	Multiple block randomization	110 healthy elite male shooters	Music therapy	HRV, PS	24	1 week	One - way ANOVA	Experimental group was increased PS and reduced HRV after intervention
16	Moghadam <i>et al.</i> 2013	RCT	40 professional Badminton	Mindfulness training	CSAI MAAS	4 weeks	Nil	ANCOVA	There were better performance and control of anxiety in experimental group.

S. No	Author (Year)	Design	No. of participants	Intervention applied	Outcome measures	No of session	Follow up	Statistical test	Results
17	Adeyeye <i>et al</i> (2013)	Purposive sampling technique.	4 table tennis players	Goal setting, self-talk, visualization	Test of Performance Strategies (TOPS), SCAT – A.	6	Nil	Pearson Moment Correlation , 't' test	Mental-skills training Develops positive effects and increase a performance on Table – tennis players.
18	Bagherpour. <i>et al</i> (2012)	RCT	88 taekwondo players	IE, PMR, combined IE & PRE, control group	Competitive state anxiety questionnaire	24	3 months	ANCOVA	Somatic and cognitive anxiety was reduced in combination group and self-confidence also increased in the same group.
19	Zetou <i>et al.</i> , 2012	Pre and post control design	57 female volley ball players	Instructional self-talk group (IST)	Service performance skill, Self-efficacy	8 session	After a week of post test	ANOVA	Experimental group was increased in service performance and their self-efficacy also.
20	John <i>et al.</i> , (2010)	Multiple block randomization	110 healthy elite male shooters	Music Therapy	Salivary cortisol, Performance score	24	After 1 week	ANOVA	Experimental group has less pre-competition anxiety and increased performance and no significant changes among control group
21	Hatzigeorgiadis <i>et al.</i> , 2008	Experimental design	46 tennis players	Self-talk	The Broer-Miller Forehand Drive test, Self-Efficacy	5 session	Nil	ANOVA	The result revealed that Self-talk training Increasing sports performance
22	Coelho <i>et al</i> 2007	Quasi experimental study	48 tennis male player	Imagery and technical practice. Technical practice	Performance score	24	Nil	One-way ANOVA	Imaging a positive outcome was more powerful with closed skill movements of tennis than

									Open skills movements.
23	Thelwell & Maynad., (2003)	Quasi experimental study	16 l cricketers	Goal setting. Self-talk, Mental imagery, concentration.	Semi structures interview, MSQ Performance score.	12 weeks	nil	Two-way ANOVA	The better performance score & consistency noticed in experimental Group.
24	Gros Lambert Alain <i>et al</i> (2003)	RCT	16 biathletes	Shooting training + Autogenic and imagery training. Classical shooting training.	Tremometer Test, HR, Shooting Performance	48	No	ANOVA	Shooting training with Autogenic and imagery Training group were Improved in Shooting Performance with controlled heart rate, Tremor.
25	Bar-Eli Michael (2002)	RCT	38 junior national level swimmers	Wingate mental training programme	Performance score	14 weeks	No	ANOVA	Mental training group showed better swimming performance than another group

SC – salivary cortisol, SP- sports performance, PS- performance score, MT – music therapy, PRE - progressive muscle relaxation, IE – imaginary Exercises, HR- heart rate response, HRV– Heart Rate variability, SGABS - Shortened General Attitudes and Beliefs Scale), SAS-2 - Sport Anxiety Scale-2, GEQ - Group Environment Questionnaire, TSCI - Trait Sport-Confidence Inventory, STAI - State-Trait Anxiety Inventory. S-TQ - Self-Talk Questionnaire, SCAT - Sport Competition Anxiety Test, SCS - Self-Compassion Scale. PWBS - Psychological Well-Being Scale, MAAS - Mindful Attention Awareness Scale, PANAS - Positive Affect, negative Affect Schedule, SWLS - Satisfaction with Life

Scale. SMTQ - Sport Mental Toughness Questionnaire, DB – diagrammatic breathing, IM – Mental imagery, PP- physical practice. Group environment questionnaire (GEQ), Trait sport-confidence inventory (TSCI), State - Trait Anxiety Inventory (STAI), Ryff's psychological well-being scale (RPWS)

Quality assessment

Table 2 summarizes the quality of the studies included in this review. All the twenty five studies included in this review have modified Jaded scale score of more than 4 out of 8 depicting high quality of the studies.

Table 2: Quality assessment of selected Randomized and Non-Randomized Controlled Trials using Modified Jadad Scale. Higher score implies higher quality.

S. No	Author /year	Modified jaded scale score	Quality of the study	No of studies
1	Kumar 2018, Alanag <i>et al.</i> , 2017, John <i>et al</i> 2013, Moghadam <i>et al</i> 2013, John <i>et al</i> 2010, Gros Lambert Alain <i>et al</i> 2003. Bar-Eli Michael 2002	More than 4 out of 8	High quality	7
2	Samadi 2019, Dehghani & Ebrahimi 2017, Georgakaki & Karakasidou 2017, Micoogullari & Ekmekci 2017, Micoogullari 2016 a & b, Turner <i>et al</i> 2014 a& b, Coelho 2014, Baltzell & Akhtar 2014, Adeyeye <i>et al</i> 2013, Bagherpour. <i>et al</i> 2012, Zetou <i>et al.</i> , 2012, Hatzigeorgiadis <i>et al.</i> 2008, Coelho <i>et al</i> 2007 Thelwell & Maynad. 2003,	3-4 points out of 8	Moderate quality	16
3	Zadkhosh <i>et al.</i> , 2018, Ali 2015	Less than 3 out of 8	Low quality	2

Result

Outcome measure used in the studies

Performance score, salivary cortisol, Heart rate, heart rate variability, tremometer test, physical fitness test, cortisol plasma testosterone, competitive state anxiety questionnaires, semi structures interview, mental skill questionnaires, Test of performance strategies, Psychological wellbeing scale, mindful Attention Awareness Scale. Positive Affect, Negative Affect Schedule, - Satisfaction with Life Scale. Sport Mental Toughness Questionnaire, Positive Affect, Negative Affect Schedule, Satisfaction with Life Scale. Sport Mental Toughness Questionnaire, Shortened General Attitudes and

Beliefs Scale), Sport Anxiety Scale-2, Group Environment Questionnaire, Trait Sport-Confidence Inventory, State-Trait Anxiety Inventory. Self-Talk Questionnaire, Sport Competition Anxiety Test, Self-Compassion Scale. Unfamiliar relaxing music, un familiar arousing music, Familiar arousing music.

Descriptions of included studies in this review: The included studies carried by following intervention: Autogenic imagery training, Music therapy, un familiar relaxing music, Unfamiliar arousing music, Familiar arousing music. Mindfulness meditation therapy, transcendental meditation,

Progressive relaxation exercises, Goal setting, self-talk, visualization, Relaxation, and Video Modeling, Rational Emotive Behaviour Therapy, Biofeedback training,

Details of included studies in this review.

The mindfulness meditation therapy was used in 4 studies [3, 4, 16, 18] on shooters, athletes in various sports, Badminton. Self – talk was studied in 3 studies [7, 21, 23] on swimmers, tennis. Music therapy was used 2 studies on shooters [17, 22]. A study was used Progressive muscle relaxation program [12] on football players. 2 studies were reported Imagery training as an intervention [24, 26]. Rational emotive behaviour therapy was studied in 2 studies [13, 14] on soccer. There were 10 studies used combination of various psychological training of alpha/theta neurofeedback and mindfulness meditation [5], on football players, Goal setting, self-talk, visualization, imagery, Progressive relaxation therapy [6, 8, 15, 19, 20, 25, 27] on soccer, volley ball, tennis, taekwondo, cricketer, swimmers. Psychological skill training [10, 11] on basket balls, soccer players. Alanag *et al.*, 2017 was reported physical exercise with cognitive imagery, physical exercises with motivational imagery on Rifle Shooters [9].

Discussion

The current available studies in this systemic review mostly were conducted as non-randomized study design. Out 25 studies, 9 studies only reported with objective outcome

measures and post intervention follow up also. Previous studies were mainly focused with combination of multiple psychological skill techniques for a group. The successive performance in sports depends upon complete training which included technical, physical and psychological training.

Only one study was focused on physical and psychological components of training. So, there was urgent requirements for future research to focus on complete and controlled intervention to reduce anxiety and enhance performance in elite athletes.

Conclusion

There is lots psychological training conducted among elite athletes even though world of athletes still suffering anxiety. This review was recommended need of multi-disciplinary approach of training with follow-up to solve major issue of unsuccessful performance due to precompetitive anxiety and lack of muscle strength even after vigorous technical training in elite athletes.

The limitation of this review was limited extracted articles used because of less articles which freely available full text in the data base. There was a need of specific behavioral therapy to alter this major issue of precompetitive anxiety. The PRISMA (Preferred Reporting items for Systematic reviews and Meta – Analyses) statement of guidelines was followed to include the quality of the methodology (fig.1).

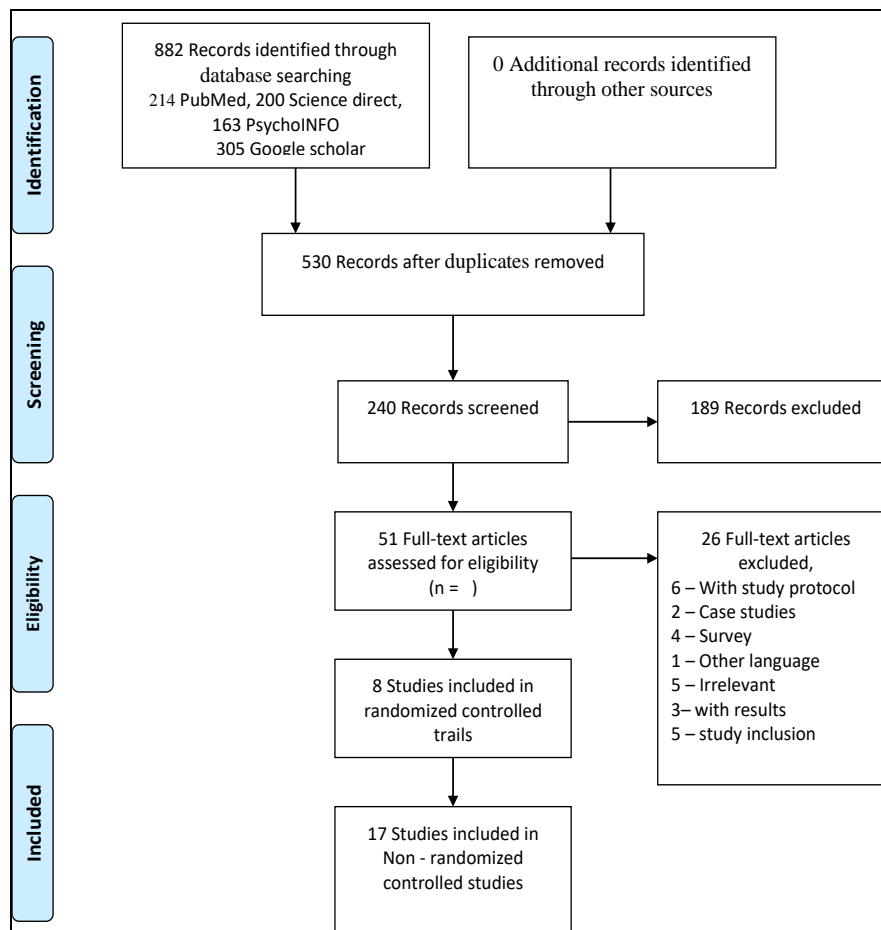


Fig 1: PRISMA flow diagram

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