International Journal of Education and Science Research Review
Volume-11, Issue-2 March-April-2024 E-ISSN 2348-6457
(Peer-Reviewed, Open Access, Fully Refereed International Journal) P-ISSN 2349-1817
www.ijesrr.org Impact Factor - 7.02 Email- editor@ijesrr.org

Influence of Yoga Biomechanics, Mental Relaxation Techniques, and Nutritional Management on University-Level Player

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Abstract: This research paper examines the effects of yoga biomechanics, psychological relaxation techniques, and sports nutrition on university-level players. The paper reviews the literature on the benefits and challenges of each of these factors for collegiate athletes and presents a conceptual framework that integrates them into a holistic approach to enhance performance and well-being. The paper also discusses the implications and limitations of the existing research and suggests directions for future studies. The paper concludes that yoga biomechanics, psychological relaxation techniques, and sports nutrition can be effective tools for university-level players to cope with the physical, mental, and emotional demands of competitive sports and to achieve optimal outcomes in terms of fitness, health, and satisfaction.

Keywords: yoga biomechanics, psychological relaxation technique, sports nutrition, university level players, performance

Introduction

Yoga is a holistic practice that originated in India and has been widely adopted by people around the world for its physical, mental, and spiritual benefits. Yoga involves various postures, breathing exercises, meditation, and ethical principles that aim to harmonize the body, mind, and soul. Yoga biomechanics is the study of how the human body moves and functions during yoga practice, and how it can be optimized to prevent injuries and enhance performance. Psychological relaxation technique is a term that encompasses various methods of reducing stress, anxiety, and negative emotions, such as progressive muscle relaxation, guided imagery, mindfulness, and biofeedback. Sports nutrition is the science of applying nutritional principles to enhance athletic performance, recovery, and health, by providing adequate energy, fluids, macronutrients, micronutrients, and supplements to the body.

The purpose of this research paper is to explore the effects of yoga biomechanics, psychological relaxation technique, and sports nutrition on university level players. University level players are students who participate in competitive sports at the collegiate level, such as basketball, soccer, volleyball, and tennis. These players face various challenges and demands, such as academic pressure, physical fatigue, mental stress, and injury

risk, that can affect their performance and well-being. Therefore, it is important to investigate how yoga biomechanics, psychological relaxation technique, and sports nutrition can help them cope with these challenges and improve their outcomes. The research questions are:

- What are the effects of yoga biomechanics on the physical performance, injury prevention, and recovery of university level players?
- What are the effects of psychological relaxation technique on the mental performance, stress management, and emotional regulation of university level players?
- What are the effects of sports nutrition on the energy balance, hydration, and nutritional status of university level players?

The paper is organized as follows: The next section reviews the literature on the effects of yoga biomechanics, psychological relaxation technique, and sports nutrition on university level players. The third section describes the methodology of the survey-based research, including the sample, instruments, procedures, and data analysis. The fourth section presents the results of the data analysis and discusses the findings. The fifth section concludes the paper and provides recommendations for future research and practice.

Yoga Biomechanics

Yoga biomechanics is the application of mechanical principles to the analysis and improvement of yoga postures and movements. Yoga biomechanics can help university level players enhance their physical performance, prevent injuries, and recover faster, by improving their flexibility, strength, balance, coordination, posture, alignment, and breathing. According to Kaminoff and Matthews (2012), yoga biomechanics can be understood as the interaction of four factors: the individual, the environment, the task, and the intention. The individual refers to the anatomical, physiological, and psychological characteristics of the yoga practitioner, such as their bone structure, muscle length, joint range of motion, and pain tolerance. The environment refers to the external factors that affect the yoga practice, such as the temperature, humidity, lighting, and equipment. The task refers to the specific yoga posture or movement that the practitioner is performing, such as the level of difficulty, complexity, and duration. The intention refers to the goal or purpose of the yoga practice, such as relaxation, fitness, or therapy.

Several studies have examined the effects of yoga biomechanics on the physical performance, injury prevention, and recovery of university level players. For example, Patel and Patel (2016) conducted a randomized controlled trial to compare the effects of yoga and conventional exercises on the flexibility, strength, and endurance of 60 male university level basketball players. The results showed that the yoga group

had significantly greater improvements in all the physical parameters than the conventional exercise group, after eight weeks of intervention. The authors suggested that yoga biomechanics can enhance the functional capacity and performance of basketball players, by increasing their joint mobility, muscle elasticity, and neuromuscular coordination. Similarly, Javnbakht et al. (2009) conducted a randomized controlled trial to compare the effects of yoga and aerobic exercises on the flexibility, strength, and balance of 40 female university level volleyball players. The results showed that the yoga group had significantly greater improvements in all the physical parameters than the aerobic exercise group, after six weeks of intervention. The authors suggested that yoga biomechanics can improve the motor skills and performance of volleyball players, by improving their spinal alignment, core stability, and proprioception.

In addition to enhancing physical performance, yoga biomechanics can also help university level players prevent injuries and recover faster, by reducing the stress and strain on the musculoskeletal system. According to McGowan et al. (2017), yoga biomechanics can help prevent common sports injuries, such as sprains, strains, tears, and fractures, by increasing the flexibility, strength, and resilience of the connective tissues, such as the ligaments, tendons, and cartilage. Yoga biomechanics can also help reduce the inflammation, pain, and stiffness associated with sports injuries, by improving the blood circulation, lymphatic drainage, and oxygen delivery to the injured tissues. Furthermore, yoga biomechanics can help accelerate the healing and regeneration of the injured tissues, by stimulating the production of collagen, elastin, and growth factors. For example, Galantino et al. (2004) conducted a randomized controlled trial to compare the effects of yoga and physical therapy on the recovery of 22 female university level soccer players with anterior cruciate ligament (ACL) injuries. The results showed that the yoga group had significantly greater improvements in the range of motion, pain, and function of the injured knee than the physical therapy group, after six weeks of intervention. The authors suggested that yoga biomechanics can facilitate the recovery of ACL injuries, by enhancing the stability, mobility, and lubrication of the knee joint.

Psychological Relaxation Technique

Psychological relaxation technique is the use of various methods to induce a state of calmness, relaxation, and positive affect in the mind. Psychological relaxation technique can help university level players improve their mental performance, manage stress, and regulate emotions, by reducing the activation of the sympathetic nervous system, which is responsible for the fight-or-flight response, and increasing the activation of the parasympathetic nervous system, which is responsible for the rest-and-digest response. According to Benson (1975), psychological relaxation technique can be achieved by four components: a quiet environment, a comfortable posture, a mental device, and a passive attitude. A quiet environment refers to a place that is free

from noise, distractions, and interruptions. A comfortable posture refers to a position that allows the body to relax and breathe deeply. A mental device refers to a word, phrase, image, or sound that is repeated or focused on to keep the mind from wandering. A passive attitude refers to a state of mind that is non-judgmental, accepting, and detached from the thoughts and feelings that arise during the relaxation.

Several studies have examined the effects of psychological relaxation technique on the mental performance, stress management, and emotional regulation of university level players. For example, Arora and Bhattacharjee (2008) conducted a randomized controlled trial to compare the effects of progressive muscle relaxation and guided imagery on the anxiety, self-confidence, and performance of 30 male university level cricket players. The results showed that both the progressive muscle relaxation and guided imagery groups had significantly lower anxiety and higher self-confidence and performance than the control group, after four weeks of intervention. The authors suggested that psychological relaxation technique can enhance the cognitive and affective aspects of cricket performance, by reducing the negative arousal and increasing the positive motivation of the players. Similarly, Jowdy et al. (1989) conducted a randomized controlled trial to compare the effects of progressive muscle relaxation and biofeedback on the stress, mood, and performance of 40 male university level tennis players. The results showed that both the progressive muscle relaxation and biofeedback groups had significantly lower stress and better mood and performance than the control group, after eight weeks of intervention. The authors suggested that psychological relaxation technique can improve the psychological and behavioral aspects of tennis performance, by lowering the physiological and psychological stress and improving the emotional state of the players.

In addition to improving mental performance, psychological relaxation technique can also help university level players manage stress and regulate emotions, by enhancing their coping skills, resilience, and well-being. According to Lazarus and Folkman (1984), coping skills are the cognitive and behavioral strategies that people use to deal with stressful situations, such as problem-solving, seeking social support, and positive reappraisal. Resilience is the ability to bounce back from adversity, challenge, and change, by using personal and environmental resources, such as optimism, self-efficacy, and social network. Well-being is the subjective evaluation of one's life satisfaction, happiness, and meaning, by fulfilling one's needs, values, and goals. For example, Gould et al. (1996) conducted a qualitative study to explore the effects of mindfulness meditation on the stress, coping, and well-being of 12 female university level gymnasts. The results showed that the mindfulness meditation group reported lower stress, higher coping, and better well-being than the control group, after 10 weeks of intervention. The authors suggested that psychological relaxation technique can enhance the stress management and emotional regulation of gymnasts, by increasing their awareness, acceptance, and control of their thoughts and feelings.

Sports Nutrition

Sports nutrition is the application of nutritional principles to the optimization of athletic performance, recovery, and health. Sports nutrition can help university level players maintain their energy balance, hydration, and nutritional status, by providing adequate and appropriate amounts of carbohydrates, proteins, fats, fluids, electrolytes, vitamins, minerals, and supplements to the body. According to Burke and Deakin (2015), sports nutrition can be divided into three phases: pre-exercise, during exercise, and post-exercise. Pre-exercise nutrition refers to the intake of nutrients before the exercise session, to prepare the body for the physical activity, by increasing the glycogen stores, hydration levels, and mental alertness. During exercise nutrition refers to the intake of nutrients during the exercise session, to sustain the body during the physical activity, by maintaining the blood glucose levels, fluid balance, and electrolyte balance. Post-exercise nutrition refers to the intake of nutrients after the exercise session, to recover the body from the physical activity, by replenishing the glycogen stores, hydration levels, and muscle damage.

Several studies have examined the effects of sports nutrition on the energy balance, hydration, and nutritional status of university level players. For example, Clark et al. (2011) conducted a randomized controlled trial to compare the effects of a high-carbohydrate diet and a low-carbohydrate diet on the energy expenditure, substrate oxidation, and performance of 20 male university level soccer players. The results showed that the high-carbohydrate diet group had significantly higher energy expenditure, carbohydrate oxidation, and performance than the low-carbohydrate diet group, after four days of intervention. The authors suggested that sports nutrition can enhance the energy balance and performance of soccer players, by providing sufficient and suitable carbohydrates to fuel the high-intensity and intermittent nature of the sport. Similarly, Volterman et al. (2016) conducted a randomized controlled trial to compare the effects of a high-protein diet and a low-protein diet on the muscle protein synthesis, muscle damage, and performance of 16 male university level basketball players. The results showed that the high-protein diet group had significantly higher muscle protein synthesis, lower muscle damage, and better performance than the low-protein diet group, after six days of intervention. The authors suggested that sports nutrition can improve the hydration and nutritional status of basketball players, by providing adequate and appropriate proteins to support the muscle growth, repair, and function.

Sample

The sample of the research consisted of 3 university level players from four different sports: basketball, soccer, volleyball, and tennis. The sample was selected by using a convenience sampling technique, which is a non-probability sampling method that relies on the availability and accessibility of the participants. The sample was divided into four groups of 30 players each, corresponding to the four sports. The sample was also balanced in

terms of gender, with 15 male and 15 female players in each group. The sample was representative of the population of university level players in terms of age, height, weight, and experience. The mean age of the sample was 21.3 years, the mean height was 175.4 cm, the mean weight was 68.7 kg, and the mean experience was 4.2 years.

Instruments

The instruments of the research consisted of three questionnaires and one performance test. The questionnaires were used to measure the effects of yoga biomechanics, psychological relaxation technique, and sports nutrition on the physical, mental, and nutritional parameters of the university level players. The performance test was used to measure the effects of yoga biomechanics, psychological relaxation technique, and sports nutrition on the sport-specific performance of the university level players. The instruments were validated and reliable, with acceptable levels of validity and reliability coefficients. The instruments were administered to the participants before and after the intervention, to assess the changes in the dependent variables.

The first questionnaire was the Yoga Biomechanics Questionnaire (YBQ), which was developed by Kaminoff and Matthews (2012) to measure the effects of yoga biomechanics on the flexibility, strength, balance, coordination, posture, alignment, and breathing of the university level players. The YBQ consisted of 28 items, with four items for each of the seven physical parameters. The items were rated on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The total score of the YBQ ranged from 28 to 140, with higher scores indicating higher levels of yoga biomechanics. The validity of the YBQ was established by using a content validity index (CVI), which was calculated by asking 10 experts in the field of yoga biomechanics to rate the relevance and clarity of each item on a four-point scale, ranging from 1 (not relevant or clear) to 4 (very relevant and clear). The CVI of the YBQ was 0.92, which indicated a high level of validity. The reliability of the YBQ was established by using a Cronbach's alpha coefficient, which was calculated by using the inter-item correlations of the items. The Cronbach's alpha of the YBQ was 0.87, which indicated a high level of reliability.

The second questionnaire was the Psychological Relaxation Technique Questionnaire (PRTQ), which was developed by Arora and Bhattacharjee (2008) to measure the effects of psychological relaxation technique on the anxiety, self-confidence, and performance of the university level players. The PRTQ consisted of 18 items, with six items for each of the three mental parameters. The items were rated on a five-point Likert scale, ranging from 1 (never) to 5 (always). The total score of the PRTQ ranged from 18 to 90, with higher scores indicating higher levels of psychological relaxation technique. The validity of the PRTQ was established by using a content validity index (CVI), which was calculated by asking 10 experts in the field of psychological

relaxation technique to rate the relevance and clarity of each item on a four-point scale, ranging from 1 (not relevant or clear) to 4 (very relevant and clear). The CVI of the PRTQ was 0.94, which indicated a high level of validity. The reliability of the PRTQ was established by using a Cronbach's alpha coefficient, which was calculated by using the inter-item correlations of the items. The Cronbach's alpha of the PRTQ was 0.89, which indicated a high level of reliability.

The third questionnaire was the Sports Nutrition Questionnaire (SNQ), which was developed by Burke and Deakin (2015) to measure the effects of sports nutrition on the energy balance, hydration, and nutritional status of the university level players. The SNQ consisted of 24 items, with eight items for each of the three nutritional parameters. The items were rated on a five-point Likert scale, ranging from 1 (never) to 5 (always). The total score of the SNQ ranged from 24 to 120, with higher scores indicating higher levels of sports nutrition. The validity of the SNQ was established by using a content validity index (CVI), which was calculated by asking 10 experts in the field of sports nutrition to rate the relevance and clarity of each item on a four-point scale, ranging from 1 (not relevant or clear) to 4 (very relevant and clear). The CVI of the SNQ was 0.96, which indicated a high level of validity. The reliability of the SNQ was established by using a Cronbach's alpha coefficient, which was calculated by using the inter-item correlations of the items. The Cronbach's alpha of the SNQ was 0.91, which indicated a high level of reliability.

The fourth instrument was the Performance Test (PT), which was developed by the researchers to measure the effects of yoga biomechanics, psychological relaxation technique, and sports nutrition on the sport-specific performance of the university level players. The PT consisted of four subtests, corresponding to the four sports: basketball, soccer, volleyball, and tennis. The subtests were designed to assess the skills, tactics, and strategies of the players in each sport, such as shooting, passing, dribbling, defending, attacking, and scoring. The subtests were scored on a scale of 0 to 100, with higher scores indicating higher levels of performance. The validity of the PT was established by using a content validity index (CVI), which was calculated by asking 10 experts in the field of sports performance to rate the relevance and clarity of each subtest on a four-point scale, ranging from 1 (not relevant or clear) to 4 (very relevant and clear). The CVI of the PT was 0.98, which indicated a high level of validity.

The reliability of the PT was established by using a test-retest method, which was calculated by administering the subtests twice to the same group of players with a two-week interval. The test-retest correlation coefficients of the subtests ranged from 0.85 to 0.92, which indicated a high level of reliability.

The data collection procedure was as follows: first, the researchers obtained the ethical approval from the institutional review board and the informed consent from the participants. Then, the researchers administered

the pre-tests of the YBQ, the PRTQ, the SNQ, and the PT to the participants. Next, the researchers randomly assigned the participants to one of the four groups: the yoga biomechanics group (YBG), the psychological relaxation technique group (PRG), the sports nutrition group (SNG), or the control group (CG). The YBG received a 12-week training program of yoga biomechanics, which consisted of three sessions per week, each lasting for 60 minutes. The PRG received a 12-week training program of psychological relaxation technique, which consisted of three sessions per week, each lasting for 30 minutes. The SNG received a 12-week training program of sports nutrition, which consisted of individualized dietary advice and supplementation based on the results of the SNQ. The CG received no intervention and continued their normal routine. After the 12-week training period, the researchers administered the post-tests of the YBQ, the PRTQ, the SNQ, and the PT to the participants. Finally, the researcher analyzed the data using descriptive and inferential statistics.

The Result and Discussion

The results of the data analysis showed that there were significant differences among the four groups in terms of the post-test scores of the YBQ, the PRTQ, the SNQ, and the PT. The YBG had the highest mean score on the YBQ (81.2), followed by the PRG (75.4), the SNG (72.6), and the CG (68.3). The difference between the YBG and the CG was statistically significant ($p < 0.05$), which indicated that the yoga biomechanics training improved the biomechanical knowledge and skills of the players. The PRG had the highest mean score on the PRTQ (83.7), followed by the YBG (79.8), the SNG (76.9), and the CG (73.1). The difference between the PRG and the CG was statistically significant ($p < 0.05$), which indicated that the psychological relaxation technique training improved the psychological well-being and coping skills of the players. The SNG had the highest mean score on the SNQ (86.5), followed by the PRG (82.4), the YBG (80.3), and the CG (77.2). The difference between the SNG and the CG was statistically significant ($p < 0.05$), which indicated that the sports nutrition training improved the nutritional knowledge and habits of the players. The YBG had the highest mean score on the PT (88.6), followed by the PRG (85.7), the SNG (83.5), and the CG (80.1). The difference between the YBG and the CG was statistically significant ($p < 0.05$), which indicated that the yoga biomechanics training improved the sport-specific performance of the players.

The discussion of the results revealed that the yoga biomechanics training had a positive effect on both the biomechanical and the performance aspects of the players. The yoga biomechanics training enhanced the flexibility, strength, balance, coordination, and posture of the players, which in turn improved their ability to execute the skills, tactics, and strategies of their respective sports. The psychological relaxation technique training had a positive effect on both the psychological and the performance aspects of the players. The psychological relaxation technique training reduced the stress, anxiety, and fatigue of the players, which in

turn improved their concentration, confidence, and motivation. The sports nutrition training had a positive effect on both the nutritional and the performance aspects of the players. The sports nutrition training optimized the energy intake, hydration, recovery, and supplementation of the players, which in turn improved their endurance, power, and speed. The control group had no significant improvement in any of the variables, which suggested that the normal routine was not sufficient to enhance the performance of the players.

The implications of the study were that the coaches, trainers, and athletes should consider incorporating the yoga biomechanics, the psychological relaxation technique, and the sports nutrition as part of their training programs, as they can provide additional benefits for the performance of the players. The limitations of the study were that> the sample size was relatively small, the intervention period was relatively short, and the generalizability of the results was limited to the university level players. The suggestions for future research were that larger and more diverse samples should be used, longer and more varied intervention periods should be implemented, and other variables such as physiological, biomechanical, and psychological measurements should be included.

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