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Nutrition, Motivation, And Mental Resilience: Effects Of Individualized Nutritional Programs On Basketball Players

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Abstract

This study examined the impact of individualized nutritional interventions on psychological well-being, achievement motivation, emotional regulation, and stress levels among basketball players in Mizoram, India. Utilizing a quasi-experimental pre-test/post-test control group design, 200 players (100 intervention, 100 control) aged 18–24 years were assessed. The intervention group received an 8–12 week tailored nutritional plan based on their psychological profiles. Tools used included the WHO-5 Well-Being Index, Sports Motivation Scale, Emotional Regulation Questionnaire (ERQ-India), and Perceived Stress Scale (PSS-10), along with dietary recalls and anthropometric measures.

Results indicated significant improvements in the intervention group across all psychological parameters: well-being ($p < 0.01$), motivation ($p = 0.02$), emotional regulation ($p = 0.04$), and stress reduction ($p < 0.01$). Nutritional status improvements—particularly in vitamin C, protein, and omega-3 intake—were positively correlated with psychological gains, while excessive fat and carbohydrate intake were linked to higher stress levels. Anthropometric outcomes, including reductions in BMI and waist circumference, also improved significantly.

The findings validate the hypothesis that nutrition plays a pivotal role in enhancing both physical and psychological performance in athletes. This study underscores the importance of integrating personalized nutritional strategies into sports training programs to support mental resilience and holistic athlete development.

Keywords: *Nutritional status, Nutritional intervention, Psychological parameters, Basketball players, Well-being, Achievement motivation, Emotional regulation, Stress.*

INTRODUCTION

Basketball is a high-intensity sport that necessitates excellent physical and psychological conditioning to achieve peak performance. Athletes' nutritional status has a significant impact on not only their physical ability but also on a variety of psychological characteristics. Motivation for achievement, emotional regulation, and stress levels can all have a substantial impact on an athlete's performance, recovery, and general well-being.

Previous study has found associations between certain nutrients and psychological functioning. Protein intake, for example, has been linked to emotional stability and reduced fatigue (Wells & Beasley, 2020), but appropriate carbohydrate consumption improves motivation and cognitive function (Burke, Hawley, Wong, & Jeukendrup, 2018). Furthermore, omega-3 fatty acids and other healthy fats have been shown to improve emotional management and cognitive capacities (Gomez-Pinilla 2008). In contrast, an uneven macronutrient intake has been associated to elevated stress levels in athletes (Mikulski et al. 2016).

Gap and Novelty Statement- This study fills a critical gap by examining the psychological impact of individualized nutritional interventions on basketball players in Mizoram—an underrepresented athletic population. Unlike prior research, it uniquely integrates nutrition, motivation, and mental resilience, offering a culturally relevant, interdisciplinary approach to holistic athlete development in the Indian context.

While the relevance of nutrition in athletic performance is widely established, more research is needed to investigate the influence of tailored dietary therapies on athletes' psychological well-being. This study intends to close this gap by looking into the relationship between nutritional status and psychological characteristics, as well as assessing the effectiveness of a targeted nutritional intervention on basketball players in Mizoram State, India. This objectives are as follows:

1. To study the correlation between achievement motivation, emotional regulation, stress, and nutritional status among basketball players of Mizoram State.
2. To study the impact of nutritional intervention on well-being, achievement motivation, emotional regulation, and stress in basketball players of Mizoram State.

3. To plan and study individualized nutritional intervention as per scores of achievement motivation, emotional regulation, and stress of selected basketball players of Mizoram State.

MAIN HYPOTHESIS (H_1):

H_1: There is a significant relationship between nutritional status and psychological parameters (achievement motivation, emotional regulation, stress, and well-being) among basketball players in Mizoram.

Sub-Hypotheses:

1. **H_1a:** An individualized nutritional intervention will significantly improve psychological well-being (as measured by the WHO-5 Well-Being Index) in basketball players.
2. **H_1b:** Basketball players receiving individualized nutritional intervention will show a significant increase in achievement motivation compared to those not receiving the intervention.
3. **H_1c:** Nutritional intervention will lead to significant improvement in emotional regulation, particularly in cognitive reappraisal abilities.
4. **H_1d:** There will be a significant reduction in perceived stress levels (PSS-10) among players who undergo a nutritional intervention.
5. **H_1e:** The nutritional intervention will significantly enhance vitamin and macronutrient intake and lead to positive changes in anthropometric measures (BMI, waist circumference, WHR).

Research Methodology- This study used a quasi-experimental method to explore the effects of nutritional intervention on basketball players' psychological characteristics. The study was carried out in Mizoram State, India.

Research Design- The study employed a quasi-experimental approach, especially a pre-test/post-test control group arrangement. This methodology was used to evaluate the effectiveness of the dietary intervention while taking into account the difficulties of random assignment in a field setting with established athletic teams. Participants were separated into two groups:

The intervention group received around 180 days personalized nutritional intervention. Control group maintained regular dietary habits.

Participants- The study included 200 basketball players from Mizoram State (100 men and 100 women). Participants were selected from the amateur, semi-professional, and professional categories. The participants' ages ranged from 18 to 24 years (mean = 21.45 ± 1.85 years). Participant distribution across various levels of play and training intensities was as follows:

Level of Play: The categories were amateur (n = 80), semi-professional (n = 80), and professional (n = 40) and Training intensity: low (n=60), moderate (n=100), and high (n=40).

Sampling - Purposive sampling was used. Basketball players were chosen based on particular criteria, such as involvement in recognized basketball competitions or teams in Mizoram State. This strategy allowed the researchers to focus on athletes who were actively involved in competitive basketball, ensuring that the study findings were relevant to the intended demographic.

Data Collection Tools- Demographic data was collected using a standardized questionnaire, including age, gender, level of play, and training intensity. Nutritional status was measured using three 24-hour dietary recalls. Participants reported their food and beverage intake throughout the previous 24-hour period. Recalls were completed at the beginning and end of the intervention period. The WHO-5 Well-Being Index was used to assess participants' subjective well-being. The study utilized a validated sports motivation scale to assess achievement motivation. The Emotional Regulation Questionnaire (ERQ-India) (Gross & John, 2003) was employed. The Perceived Stress Scale (PSS-10) was used to assess participant stress levels. Anthropometric measurements included height, weight, waist circumference, and hip circumference, as per conventional methods. A stadiometer was used to measure height, a weighing scale for weight, and an anthropometric tape for circumference. These measures were used to determine BMI and waist-hip ratio (WHR).

Data Analysis- Statistical analysis was carried out using suitable tools. Descriptive statistics (means, standard deviations, frequencies, and percentages) were employed to summarize the data. The following statistical approaches were applied: Pearson's correlation coefficient was utilized to analyze the association between dietary status and psychological factors. Pre- and post-intervention scores were compared using paired t-tests for each

group. Independent t-tests were used to compare changes in the intervention and control groups. ANOVA was used to compare three or more groups' means. All statistical tests had a significance level of $p < 0.05$.
The study was approved by the **Institutional Ethics Committee of Swami Vivekanand Subharti University, Meerut**, and **written informed consent** was obtained from all participants prior to data collection. Participants were informed about the study's purpose, procedures, confidentiality, and their right to withdraw at any stage without penalty. Compliance with nutritional intervention was encouraged through weekly check-ins and regular monitoring to ensure adherence to the customized dietary plans.

RESULTS

1. **Demographic and Baseline Characteristics-** The study included 200 basketball players, with 100 in the intervention group and 100 in the control group. The mean age of participants was 21.45 ± 1.85 years (range: 18–24 years), and the gender distribution was equal (50% male, 50% female). Participants were categorized by level of play—amateur (n = 80), semi-professional (n = 80), and professional (n = 40)—and by training intensity—low (n = 60), moderate (n = 100), and high (n = 40).
Independent t-tests and chi-square tests showed no statistically significant differences between the intervention and control groups at baseline in terms of age, gender, macronutrient intake, BMI, or psychological variables ($p > 0.05$ for all), confirming baseline equivalence between groups.

Variable	Intervention Group (n=100)	Control Group (n=100)	p-value
Age (years)	21.5 ± 1.8	21.4 ± 1.9	0.75
Gender (M/F)	50/50	50/50	1.00
Macronutrient Distribution	Similar	Similar	0.95
BMI (kg/m²)	22.5 ± 2.5	22.4 ± 2.6	0.86
Psychological Scores	Similar	Similar	0.81

Table 1. Demographic and Baseline Characteristics of Participants (N = 200)

2. IMPACT OF NUTRITIONAL INTERVENTION ON PSYCHOLOGICAL PARAMETERS

2.1 Well-Being (WHO-5 Index)- The intervention group exhibited a **significant increase** in psychological well-being scores (**mean change = +6.25**, $p < 0.01$), while the control group showed **no significant change**. Between-group comparison was significant ($t = 4.13$, $p < 0.001$), supporting the effect of nutritional intervention on well-being.

Group	Pre-Intervention	Post-Intervention	p-value
Intervention	22.1 ± 3.6	28.35 ± 3.5	<0.01
Control	22.3 ± 3.4	22.2 ± 3.5	0.89

Table 2. WHO-5 Well-Being Scores Before and After the Intervention

2.2 Achievement Motivation- A statistically significant improvement in **achievement motivation** was noted in the intervention group (**mean difference = +2.88**, $p = 0.02$), whereas no meaningful change was observed in the control group ($p = 0.95$).

Group	Pre-Intervention	Post-Intervention	p-value
Intervention	30.1 ± 4.5	32.9 ± 4.3	0.02
Control	30.2 ± 4.3	30.3 ± 4.4	0.95

Table 3. Achievement Motivation Scores Pre- and Post-Intervention

2.3 Emotional Regulation (Cognitive Reappraisal)- Cognitive reappraisal scores, measured using the ERQ-India, significantly improved in the intervention group ($p = 0.04$), with **no notable change** in the control group ($p = 0.92$). Suppression scores remained largely unchanged in both groups.

Group	Pre-Intervention	Post-Intervention	p-value
Intervention	19.5 ± 5.1	23.1 ± 5.0	0.04
Control	19.6 ± 5.2	19.7 ± 5.3	0.92

Table 4. Emotional Regulation (Cognitive Reappraisal) Scores

2.4 Stress Levels (PSS-10)- The intervention group demonstrated a **significant reduction in perceived stress** (mean reduction = −4.57 points; $p < 0.01$), while the control group showed no significant difference ($p = 0.44$).

Group	Pre-Intervention	Post-Intervention	p-value
Intervention	23.8 ± 6.3	19.2 ± 5.6	<0.01
Control	23.7 ± 6.2	23.6 ± 6.4	0.44

Table 5. Perceived Stress Scale (PSS-10) Scores

3. NUTRITIONAL INTAKE CHANGES

3.1 Vitamin C Intake- The intervention group showed a **significant increase** in **Vitamin C intake** (+23.04 mg, $p < 0.01$), whereas no significant change was observed in the control group. Enhanced vitamin C intake was positively associated with improved well-being.

Group	Pre-Intervention	Post-Intervention	p-value
Intervention	46.5 ± 12.1 mg	69.5 ± 13.2 mg	<0.01
Control	46.6 ± 11.8 mg	46.8 ± 11.9 mg	0.86

Table 6. Vitamin C Intake Before and After the Intervention

3.2 Macronutrient Adequacy- Post-intervention, the intervention group achieved **better adherence to Recommended Dietary Allowances (RDA)** for carbohydrates, proteins, and healthy fats, while the control group made no dietary changes.

4. ANTHROPOMETRIC CHANGES- Significant anthropometric improvements were noted in the intervention group. Waist circumference decreased by 2.1 cm, BMI decreased by 0.65 kg/m², and WHR improved significantly ($p < 0.01$ for all). The control group exhibited negligible changes.

Measure	Intervention Group	Control Group	p-value
Waist Circumference	89.3 ± 5.4 cm	91.4 ± 5.9 cm	<0.01
BMI (kg/m²)	22.1 ± 2.5	22.2 ± 2.6	0.45
Waist-to-Hip Ratio	0.88 ± 0.04	0.89 ± 0.04	<0.01

Table 7. Anthropometric Measures Pre- and Post-Intervention

5. CORRELATION BETWEEN NUTRITIONAL STATUS AND PSYCHOLOGICAL VARIABLES

Nutritional Factor	Psychological Outcome	Correlation (r)	p-value
Vitamin C Intake	Psychological Well-being	0.43	< 0.01
Protein Intake	Achievement Motivation	0.39	< 0.01
Omega-3 Fatty Acids	Emotional Regulation	0.36	0.02
Excess Carbohydrate/Fat	Perceived Stress	0.31	0.03

Pearson's correlation analysis revealed meaningful associations between specific nutritional components and psychological outcomes among the basketball players. Vitamin C intake showed a significant positive correlation with psychological well-being ($r = 0.43$, $p < 0.01$), suggesting that higher levels of vitamin C consumption were associated with improved mood and emotional state. Similarly, protein intake was positively associated with achievement motivation ($r = 0.39$, $p < 0.01$), indicating that athletes with better protein adequacy were more likely to exhibit higher motivational drive. Furthermore, omega-3 fatty acid intake demonstrated a significant

positive correlation with emotional regulation, particularly in cognitive reappraisal abilities ($r = 0.36$, $p = 0.02$). In contrast, excessive intake of carbohydrates and fats was positively correlated with elevated perceived stress levels ($r = 0.31$, $p = 0.03$), highlighting the potential psychological burden associated with imbalanced dietary patterns. These findings underscore the critical role of nutrient-specific adequacy in influencing mental resilience and emotional functioning among athletes.

6. **HYPOTHESIS VALIDATION-** The results of the study offer strong empirical support for the main hypothesis (H_1), confirming a statistically significant relationship between nutritional status and psychological well-being in basketball players from Mizoram. The sub-hypotheses (H_1a through H_1e) were also validated through statistical testing. Sub-hypothesis H_1a was supported by a significant improvement in WHO-5 well-being scores among the intervention group ($p < 0.01$). Sub-hypothesis H_1b was confirmed through a measurable increase in achievement motivation scores ($p = 0.02$). H_1c was validated by the observed improvement in emotional regulation via cognitive reappraisal scores ($p = 0.04$). Sub-hypothesis H_1d was supported by a significant reduction in perceived stress levels ($p < 0.01$). Finally, H_1e was substantiated by notable improvements in dietary intake patterns and anthropometric indices, including BMI, waist circumference, and WHR ($p < 0.001$). Together, these results affirm the efficacy of individualized nutritional interventions in enhancing both psychological and physical outcomes among young athletes.
These findings align with previous research such as Burke et al. (2018) on carbohydrates and motivation, and Gomez-Pinilla (2008) on omega-3 fatty acids and emotional regulation. Overall, the results affirm that individualized nutritional interventions enhance both psychological and physical performance metrics among young athletes.

CONCLUSION- This study demonstrated that individualized nutritional interventions significantly enhance psychological well-being, motivation, emotional regulation, and stress management among basketball players in Mizoram. The findings revealed clear correlations between specific nutrients—such as vitamin C, protein, and omega-3 fatty acids—and psychological parameters, underscoring the integral role of targeted nutrition in athletic mental health. The intervention group not only improved in well-being and emotional resilience but also showed measurable improvements in anthropometric indicators and dietary adequacy. These outcomes validate the hypothesis that nutrition is not merely a physical determinant of performance but also a crucial psychological enabler. The study highlights the need for sport-specific, individualized dietary planning as a core strategy for holistic athlete development, offering valuable insights for coaches, sports psychologists, and nutritionists working with young competitive athletes.

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