

Effect of Multi-Nutrient Supplementation on Body Mass Index (BMI) And Body Composition of Physical Education Students, University of Mysore

Lawrence T. Mugambi¹, Asna Urooj²

¹Department of Human Nutrition & Dietetics, Kenya Methodist University, Kenya

²Department of Food Science and Nutrition, University of Mysore, INDIA.

Corresponding Author: Lawrence T. Mugambi

DOI: <https://doi.org/10.52403/gijash.20260309>

ABSTRACT

The present study was designed to comprise of three phases i.e. development of the nutritional supplement and its' sensory and acceptability analysis, pre-supplementation intervention body composition analysis, deworming of all the participants, supplementation intervention for a period of two months and then post-intervention body composition analysis. According to the Body Composition Analysis results, there was an increase in both the mean percent body fat and Fat Mass from 11.3 to 12.9% and from 7.3Kg to 8.6Kg respectively. Mean Fat Free Mass showed an increase from 54.1Kg during the pre-intervention period to 54.4Kg at the end of the intervention period. Total body water also had a slight increase from 39.6Kg to 39.8Kg.

Key words: Sports nutrition, sports persons, physical fitness, sports' supplement, BMI.

INTRODUCTION

A supplement was prepared by use of the following ingredients; wheat, ragi, rice, green gram dhal, flax-seed, coconut milk powder, palm oil, whey protein and sugar. The main target was to increase total calorie and protein consumed by the participants,

whose Recommended Dietary Allowance is very important in sports' performance.

The nutrition supplement was analyzed for proximate composition with regard to Protein, Moisture, Crude fat, Dietary fibre (insoluble, soluble & total dietary fibre) and starch (total starch, available starch & resistant starch). Ash content, Iron, Calcium and Phosphorus content was determined by proximate composition analysis done using Standard AOAC methods.

The study was conducted on 12 male master's students from the department of studies in physical education and sports sciences, university of Mysore, belonging to the age group 21-25 yrs. The students were assessed for body composition, supplementation done for a period of 8 weeks and then a post-supplementation assessment done for comparison.

MATERIALS AND METHODS

Supplement Development.

The supplement was prepared by use of wheat, ragi, rice, green gram dhal, flax-seed, coconut milk powder, palm oil, whey protein and 30% sugar. All the ingredients apart from palm oil and whey protein were first roasted and milled into flour before all the ingredients were then thoroughly mixed together to obtain a homogenous product. The target was for the supplement to deliver

at least 25% of the Recommended Dietary Allowance (RDA) for the Calorie intake.

Sensory and acceptability analysis

Before supplementation, sensory analysis was done to assess the acceptability of the supplement. This was done by developing a hedonic scale score card which consisted of the following; colour, appearance, texture, consistency, taste, aroma and overall acceptability. The supplement was subjected to sensory analysis by a trained 6 member panel in two forms i.e. in one preparation the flour was reconstituted by stirring it in boiling water for a short period of 10 seconds and the other one with the flour (supplement) reconstituted by stirring it in Luke warm water.

The panel members were then asked to define and characterize each parameter separately. The panel rated the variation made by stirring the flour in boiling water for a short time as the most acceptable.

Proximate Composition analysis

The nutrition supplement was analyzed for; Protein, Moisture, Crude fat, Dietary fiber (insoluble, soluble & total dietary fiber) and starch (total starch, available starch & resistant starch). Ash, Iron, Calcium and Phosphorus content was also determined by use of Standard AOAC methods.

Selection of Participants

Then based on the extent of malnutrition, a sample of 12 male students was randomly selected from the post graduate class of the department of studies in physical education and sports sciences. The selected participants for the clinical trial intervention were in the age group of 21-25 yrs.

All the subjects participated in two different games each day, with one game taking a period of 2 hours in the morning and the other game 2 hours in the evening.

Pre-Supplementation Intervention Assessment

Deworming the participants and pre-intervention assessment:

Before starting the intervention programme, all the study participants were given deworming tablet each, to reduce chances of poor results due to worm infestation. This was followed by pre-intervention body composition assessment. The participants were assessed for total body fat, % body fat, Fat free mass and total body water. This was done by 'feeding' the Body Composition Analyzer (BCA) machine with the information of a participant i.e. age, height and age, and then the individual standing on the machine for a short time bare footed, for the machine to automatically conduct the analysis and produce analyzed data on a results slip which is then shed out.

Administration of the Supplement.

After all the pre-intervention nutritional status assessments, body composition analysis and physical endurance tests were done, supplementation intervention was started. The intervention period was 2 months (60 days) and each of the 12 respondents was given 50g of the supplement powder per day and was advised to reconstitute it by stirring in 200ml of boiling water (i.e. in the ratio 1:4 respectively) for short period of 10 seconds and then drink it. The participants were advised to stir the supplement in the boiling water thoroughly until they get a porridge consistency, and then take it 30 minutes before each of the morning exercises. The participants consumed the supplement along with their daily diet, throughout the intervention period.

Post-Supplementation intervention Assessment

Body composition assessment was repeated at the end of the supplementation period (8 weeks) for the purpose of efficacy test analysis. The data obtained was used to determine the efficacy of the nutrition supplement on improvement of body composition and Body Mass Index of the sports persons.

Data analysis

Descriptive method of analysis was used where means were calculated and used to determine the difference between before and after supplementation intervention with respect to Body Mass Index, Percentage Fat mass, Free Fat Mass and Total Body Water. Then the results were discussed and presented in bar graphs.

RESULTS AND DISCUSSION

Phase I: Rationale of the Food Supplement Development and Proximate Composition Results

Product development was informed by the Key target nutritional components, vital for optimal sports' performance. One of the key components is energy which according to research findings is a challenge for many endurance sports persons more so due to glycogen depletion and underweight as a result of inadequate dietary intake. The recommended Dietary Allowance (RDA) for energy in athletes is 45-50Kcal/Kg bwt/day which is by far higher than non-exercising individuals which is usually around 30-35Kcal/Kg bwt/day. The other major nutritional component of interest is protein, whose RDA is elevated to 1.2 to 1.4g/Kg bwt/day to help in repair of worn out tissues and recovery in between competitions. Apart from these two, iron is also another key nutritional component because sports' anemia is very common in athletes. This is because there is usually increased iron loss from the body through sweat. The RDA for Iron in athletes is elevated to 15-18mg/day which is far above the normal average for non-exercising individuals' of 8mg/day. The other nutrient very critical for athletes and targeted by the present study is calcium, which is essential for maintenance of healthy bones and muscular activity. The RDA for calcium in athletics is 1200 to 1500 mg/day which by

far exceeds the RDA for non-exercising persons which is 800 to 1,000 mg/ day.

Proximate analysis results found out that the Supplement contained 14.5% protein, 8% fat, 11.2% fibre, 5.83mg of iron and 128mg of calcium per 100g sample, which was found to be comparatively high in nutrient content when compared to other commercially available sports drinks. In addition to the supplementation the participants were encouraged to maintain their normal dietary intake to ensure adequate calorie and nutrient intake.

The Food supplement was formulated with a target of providing at least 25% RDA of the four key nutritional components which formed the basis of this study. To ensure acceptability of the food supplement, four variations were formulated and subjected to sensory evaluation. The variation which scored the highest was then chosen for the supplementation intervention.

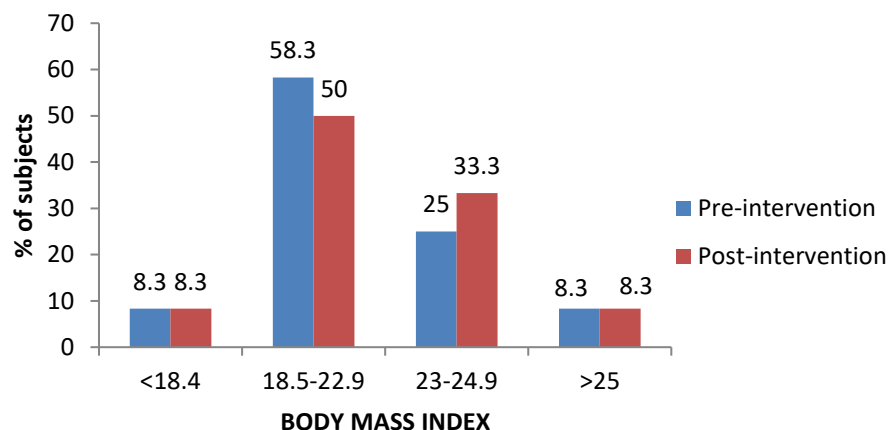
Also had high acceptability ratings in terms of colour, appearance, Texture, flavor and overall acceptability as shown by the sensory evaluation results.

Dietary intervention and the study

Results.

Before the first two (2) months supplementation intervention, baseline assessments were done on all the participants, sports' nutrition education offered and deworming done. The same participants were then given dietary supplement using the food product that was developed and followed up farther for the next two months period. So the entire study period on the participants was two (2) months. At the end of the supplementation period, the same assessments were repeated in order to determine efficacy of the Food Supplement in improving nutritional status and body composition of the target sports persons.

Distribution of Body Mass Index of subjects at pre- and post-intervention



Body Mass Index status

Percentage of the participants with BMI less than 18.4 remained unchanged at 8.3%, whereas those with BMI of 18.5 to 22.9 reduced from 58.3% to 50%. Those with BMI of 23 to 24.9 increased from 25% to 33.3% whereas those with BMI greater than 25 remained unchanged at 8.3%.

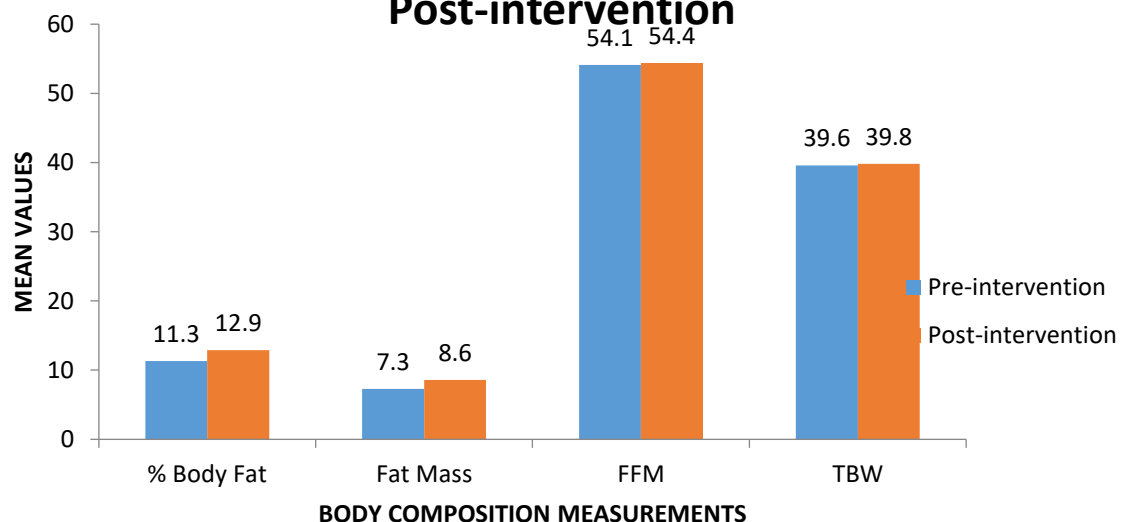
mass from 11.3 to 12.9% and from 7.3Kg to 8.6Kg respectively. This was in correlation with the increase in mean abdominal fat as indicated by both the sub-scapular and Suprailiac skin fold measurements.

Fat free mass had a slight increase from 54.1Kg during the pre-intervention period to 54.4Kg at the end of the intervention period. This was 0.55% increment which was quite low. Total body water also had a slight increase from 39.6Kg to 39.8Kg representing 0.5% increment.

Body Composition Analysis Results

According to the Body Composition Analysis results, there was an increase in both the mean percent body fat and fat free

Comparison of Body Composition at Pre- and Post-intervention



According to the research findings, the supplementation with the developed product resulted in significant improvement of nutritional status of the participants as reflected in both the Body Mass Index and body composition parameters. The findings reveal the importance of adequate nutrition in maintenance of good nutritional status of sports' persons.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Andari, N. N. I., Dieny, F. F., Tsani, A. F. A., Fitranti, D. Y., & Widyastuti, N. (2021). Diet Quality, Nutritional Status, and Haemoglobin Level of Female Adolescent Athletes in Endurance and Non Endurance Sports. *Amerta Nutrition*, 5(2), 140. <https://doi.org/10.20473/amnt.v5i2.2021.140-148>
2. Elon University, Department of Exercise Science, Elon, USA, Nepocaty, S., Balilionis, G., Elon University, Department of Exercise Science, Elon, USA, O'Neal, E. K., & The University of North Alabama, Department of Health, Physical Education and Recreation, Florence, USA. (2017). Analysis of Dietary Intake and Body Composition of Female Athletes over a Competitive Season. *Montenegrin Journal of Sports Science and Medicine*, 6(2), 57–65. <https://doi.org/10.26773/mjssm.2017.09.008>
3. Gibson-Smith, E., Storey, R., & Ranchordas, M. (2020). Dietary Intake, Body Composition and Iron Status in Experienced and Elite Climbers. *Frontiers in Nutrition*, 7, 122. <https://doi.org/10.3389/fnut.2020.00122>
4. Jeukendrup, A. E. (2011). Nutrition for endurance sports: Marathon, triathlon, and road cycling. *Journal of Sports Sciences*, 29(sup1), S91–S99. <https://doi.org/10.1080/02640414.2011.610348>
5. Kannan, S., Naha, A., Singh, R. R., Bansal, P., Nayak, V. C., Goud, S., & Rani, U. (2020). Role of dietary supplements in sports performance. *RESEARCH JOURNAL OF PHARMACY AND TECHNOLOGY*, 13(12), 6259–6265. <https://doi.org/10.5958/0974-360X.2020.01090.2>
6. Lestari, L. A., Susetyowati, Setyopranoto, I., Probosuseno, & Astuti, H. (2021). Physicochemical and Organoleptic Properties of Local Food-based Enteral Nutrition Product to Mitigate Patient Malnutrition. *Current Nutrition & Food Science*, 17(5), 509–515. <https://doi.org/10.2174/1573401316999200922090202>
7. Pramukova, B. (2011). Current knowledge about sports nutrition. *Australasian Medical Journal*, 4(3), 107–110. <https://doi.org/10.4066/AMJ.2011.520>
8. Sedeaud, A., Marc, A., Marck, A., Dor, F., Schipman, J., Dorsey, M., Haida, A., Berthelot, G., & Toussaint, J.-F. (2014). BMI, a Performance Parameter for Speed Improvement. *PLoS ONE*, 9(2), e90183. <https://doi.org/10.1371/journal.pone.0090183>
9. Smith, J. W., Holmes, M. E., & McAllister, M. J. (2015). Nutritional Considerations for Performance in Young Athletes. *Journal of Sports Medicine*, 2015, 1–13. <https://doi.org/10.1155/2015/734649>
10. Vitale, K., & Getzin, A. (2019). Nutrition and Supplement Update for the Endurance Athlete: Review and Recommendations. *Nutrients*, 11(6), 1289. <https://doi.org/10.3390/nu11061289>

How to cite this article: Lawrence T. Mugambi, Asna Urooj. Effect of multi-nutrient supplementation on body mass index (BMI) and body composition of physical education students, University of Mysore. *Galore International Journal of Applied Sciences & Humanities*. 2026; 10(3): 66-70. DOI: <https://doi.org/10.52403/gijash.20260309>
