

# Development of an Anti-Oxidant Rich Nutrient Bar for Track and Field Athletes

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**Abstract:** **Background:** *The beneficial effects of exercise and a healthy diet are well documented in the general population but poorly understood in athletes previous research in athletes suggests that regular training and an antioxidant-rich diet enhance antioxidant defenses and performance, endurance of athletes.* **Objective:** *To formulate an anti-oxidant rich nutri- bar supplement for athletes.* **Materials and Methods:** *A ready to eat, nutri bar which is anti- oxidant rich was formulated and acceptability tests were done to be supplemented for athletes. Locally available ingredients which are anti-oxidant rich are selected and utilized for the preparation of the bar. Dehydrated carrots, pumpkin seeds, rolled oats, wheat germ, almonds which are have high anti-oxidant content were selected and nutri bar was prepared and organoleptically evaluated. Selected nutrients were analyzed by standardized methods. Results: The scores obtained for organoleptic evaluation show that nutri bar supplement taste, appearance had obtained a mean score of 4.5 out of 5 for overall acceptability and therefore highly acceptable. Nutrient analysis per 100 gms of bar revealed- 525 kcals, 24 gms proteins and 116 mg of total anti-oxidants (using DPPH method) thus confirming that the developed bar is highly nutritious. To meet the requirements of the antioxidants/day two bars (50 gm wt) would be required to be supplemented to the athletes.* **Conclusion:** *Sports nutri bar has been widely used in many countries. In India, not many studies have focused on this aspect. Development of a sports nutri bar which is anti-oxidant rich, ready to consume, easy to carry snack would be an ideal supplement for athletes- pre event and post event snack as well.*

**Keywords:** Nutri bar, antioxidants, formulation, athletes, ready- to eat snack.

## 1. Introduction

Sports nutrition is a subset of nutrition. Exercise nutrition should develop its own core courses, blending knowledge from traditional fields like bio-chemistry, chemistry, exercise physiology, medicine, nutrition and physiology. A cross disciplinary field like exercise nutrition enlarges the scope of current offerings. Today, sports nutrition concentrates on athletic performance (Wolinsky, 2000). Sports nutrition has an important part to play in keeping athletes healthy, preventing fatigue and illness associated with poor recovery (Reid, 2000).

Sports nutrition has emerged as a strong decisive factor in maximizing performance of sports persons as sports, health and nutritional status are interrelated. Good nutrition plays a significant role in maintenance of health and activating the athlete to train and compete (Usha, 2000).

A sports person is a fitter individual in society and the person needs more enhanced nutrition. Many Indian athletes are not aware of the need for right food for sports. A bakery food was mostly accepted by all the age groups, because of its taste, flavor and good keeping quality. The ingredients used in the bakery products will dominate the addition of any other incorporated food stuffs. In India breads, biscuits, cakes, pastries, fruit pies, bun sand pizza bases are popular items of bakery industry. Most of these items except bars, biscuits are subject to microbial deterioration limiting their shelf life to 2-5 days at room temperature, they have a shelf life of 3-4 months. The rate of deterioration is also influenced by intrinsic food related factors. Such as moisture content and level of preservatives and extrinsic factors such as temperature, relative humidity and gaseous environment surrounding the product (Arya, 2003).

The primary concern of many athletes is to supplement the diet with protein, vitamins and minerals and a range of more exotic compounds, key dietary issues are often neglected. The existing situation calls for creating awareness among sports personnel on the importance of good nutrition for their successful sports life (Jacob, C.S.1992).

Antioxidants significantly decrease the adverse effects of reactive oxygen and nitrogen species (free radicals) on normal physiological functioning and modify cell-signaling pathways. Free radicals are produced during normal cellular metabolism and are both beneficial and harmful to human health. Overproduction of free radicals, in conjunction with a deficiency in antioxidants, can lead to oxidative stress and, consequently, damage to cellular lipids, proteins and DNA (Julie Upton, 2009).

During the last decade, research into antioxidant nutrition and athletic performance has been one of the most rapidly evolving areas of sports nutrition. But while many athletes take antioxidant supplements, the most recent research suggests that there may be more effective approaches to protecting the athletic body (Andrew Hamilton, 2011). The new era life style leads to the increased protein and antioxidant for sports person helping to maintain muscle mass and reduce antioxidant stress. These above mentioned reports motivated the investigator to formulate anti- oxidant rich product. Hence the study was carried out with the following objectives: TO

- (i) Select antioxidant rich foods which are underutilized.
- (ii) Formulate and standardize antioxidant rich nutri- bars.
- (iii) Assess the acceptability of the prepared antioxidant rich nutri- bars and
- (iv) Estimate the nutrient composition and shelf life of the

developed product.

## 2. Methodology

The methodology involved in the conduct of the present study such as study area, design is explained below.

## 3. Place of Study

This study was carried out at various sports academies in Chennai.

## 4. Study Design

The present study follows an experimental study design

### Formulation of Anti-oxidant Rich Nutri- bars



#### Step 1: Selection and Procurement of antioxidant rich ingredients

The ingredients which are underutilized are selected based on their anti-oxidant properties. The ingredients such as rolled oats, pumpkin seeds, dehydrated carrots, flaxseeds, peanuts, almonds, honey, dates syrup are procured from a departmental store at Chennai. Rolled oats (50 kg bag) was sponsored by Bagrry's Oats Company from Mumbai.

These ingredients were selected since they are underutilized, easily available, ready-made foods and easily consumable. Main Objective of the present study is to formulate a recipe which provides considerable amount of antioxidants and in turn be helpful for athletes.

#### Step 2: Standardization of the Nutri – bars

The Selected ingredients which are underutilized are standardized based on the anti-oxidant properties. The dry ingredients are mixed and baked into granola (nutri- bars). The nutri- bars are made up into 50 gm (each bar weight) and two bars are provided for the athletes.

#### Step 3: Procedure for the preparation of Nutri- bars

##### Method

- Mix all dry ingredients in a bowl.
- Add honey and dates puree to the dry ingredients, mix well
- Spread a baking sheet over the baking tray, and add the mixture and hold it tightly
- Preheat the oven and bake at 180<sup>o</sup>C and cool it and cut into bars

- Pour the choco mixture over it.

#### Step 4: Estimation of nutrient analysis in the developed biscuits

The prepared bars using antioxidant rich ingredients were subjected to nutrient analysis. Micro nutrients such as Total carotene, vitamin A, C, E and Macro- nutrients such as energy, proteins, carbohydrates and fats are also analysed.

Nutrients	Composition/100gm
Energy	524.5 kcals
Protein	24.48gms
Carbohydrates	39.14gms
Fats	30.87gms
Vitamin A	15.6 mcg
Vitamin E	20.2 mg
Vitamin C	50.6 mg
TOTAL	115.8 mg

The anti-oxidants were analyzed using DPPH method.

#### Step 4- Assessment of shelf life of the developed bars

The anti-oxidant rich bar was also analyzed for shelf life of about fifteen days at room temperature.

#### Organoleptic evaluation by the panel members

Acceptability test was conducted for the prepared bars in three variations by evaluating the different sensory attributes like appearance colour, flavour, texture, taste and overall acceptability by five panel members. Five point hedonic scales were used to evaluate the nutri- bars.

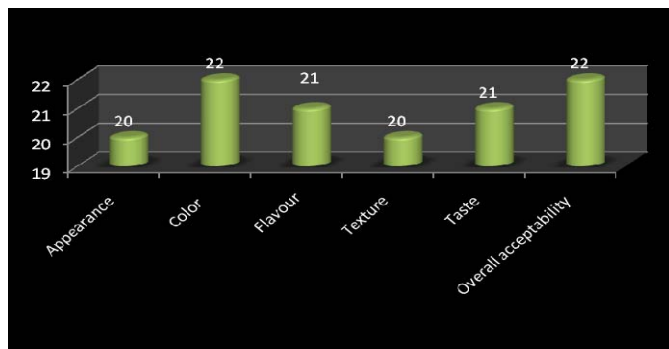
#### Organoleptic evaluation by consumers

The Nutri- bar was also subjected to organoleptic evaluation by the athletic population. The focus group considered were young adults with an age ranging from 18-25 yrs. (Staci Nix, 2005). Acceptability test was rated by 20 athletes of St. Joseph's academy. They were asked to score products using the score card. The attributes score for appearance, colour, flavour, texture, taste and overall acceptability. The score was given as very good (5), good (4), fair (3), average (2) and poor (1) for the sensory evaluation.

## 5. Observations and Discussion

Table1: Organoleptic scores of Nutri- bars

Attributes	Max Score	Nutri- bars
Appearance	30	20
Color	30	22
Flavour	30	21
Texture	30	20
Taste	30	21
Overall acceptability	30	22
Total score	180	126

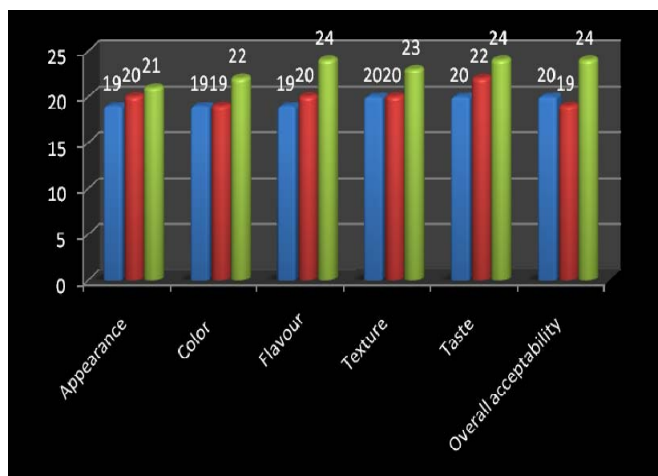


Organoleptic evaluation of Nutri bars

Table 2: Three variations of Nutri- bars

Attributes	Max Score	A1	A2	A3
Appearance	30	19	20	21
Colour	30	19	19	22
Flavour	30	19	20	24
Texture	30	20	20	23
Taste	30	20	22	24
Overall acceptability	30	20	19	24
Total score	180	117	120	138

It was thus observed that sample A3 scored highest in attributes of appearance, colour, flavor, texture, taste and overall acceptability. The product was accepted well with a total score of 24.



Comments received for sample a through organoleptic evaluation included A3 is accepted as best than A1 and A2. On a positive note, comments included that the sample was acceptable and tasted good.

High intensity exercise causes a substantial breakdown of muscle protein, quantity of protein needed to maximise this adaptation to exercise. Almonds provide a source of protein, as well as the antioxidant vitamin E. Almonds contains healthy monounsaturated fats and fibre. Almonds also contains other important vitamins and minerals such as potassium, magnesium, iron, phosphorous and riboflavin (vitamin B2). (Lemon PW, et al. 1995).

Table 3: Comparison of nutrient analysis of Anti- oxidant rich bar with recommended levels

Nutrient	Recommendation	Nutri- bars	% Met
Energy (k.cal)	3000	524.5 kcal	17.4
Protein (g)	84	24.48gms	29
Carbohydrate (g)	450	39.14gms	8.6
Fat (g)	96	30.87gms	32
Vitamin –A (µg)	900	15.6 mcg	2.1
Vitamin – C (mg)	90	20.2 mg	22
Vitamin – E (mg)	15	50.6 mg	>100

The energy requirement for athletes is 3000k.cal, 84g of protein, 450g of carbohydrate, and 96g of fat. The vitamin A requirement is 900 µg, 90mg of vitamin C and 15mg of vitamin E.

Compared to the requirements, the nutri bars have got better nutrient properties. 14 percentage of energy, 29 percentage of protein, 10 percentage of carbohydrate, 32 percentage of fat, 2.1 percentage of vitamin –A, 22 percentage of vitamin – C, >100 percentage of vitamin – E was met. Total antioxidant levels are fixed at 115.6 mg/100 gm. Two bars (50 gm weight) can be supplemented to meet up the recommended intake. Vitamin E recommendations are above 100% to reduce the oxidative stress involved in athletes.

### 6. Conclusion

The present study looked into the avenues of nutrition in athletes with positive outcomes, proving the role of nutrition in athletes and the formulation of a biscuit, takes nutrition a step further in an athlete’s performance. Out of the three variations, third one was found to be having better quality and antioxidant properties. The recommendation of athlete should be kept in mind, in prescribing these nutri- bars so that they meet up the requirement of the athletes. Biscuits have a better keeping quality and it is prepared out of underutilized which could be nutritionally effective for endurance athletes. Nutri bars also provide easy consumability during training and post competition for athletes. Therefore, nutri- bars could be a better option for supplementing antioxidant for the athletes.