Chapter I

Introduction

“Exercise is King, Nutrition is Queen. Put them together and you've got a Kingdom”

Jack Lalanne - 'The Godfather of Fitness' (2006)

Sports and athletics are currently receiving a lot of attention around the world. The sports industry is expanding at a rapid pace. In the sphere of sports, India is experiencing remarkable progress in both national and international competitions, Indian athletes strive for the top spot. Nutritional deficiencies and illnesses create a lack of stamina and bad health which frequently hamper their performance. Furthermore, poor performance is caused by a lack of information and comprehension of sports nutrition. An international athlete, (Natarajan, 2013) has stated that fitness through proper eating habits and lifestyle is the need of the hour for India.

Each sport is unique in terms of physical needs, such as open or closed skills, as well as psychological demands, such as coach ability, emotionality, maturity, and the desire to attain a certain degree of motivation, among others. Athletes' psychological training is an essential component of any sports training programme. Biological and sociocultural elements aside, an athlete's psychological conditioning affects his or her success or failure in competition. All indoor and outdoor games, as well as athletics, are considered games and sports. The different types of track events that are typically held on the track are sprints, middle-distance, and long-distance events. Sprinting is defined as a small distance run in a short amount of time that requires greater energy. Interval training (sprints or speed work) is also used by most endurance athletes to enhance their anaerobic threshold.

Sprinting is defined as races over short distances, or sprints, which are among the oldest running competitions. Athletes compete in sprinting events to

achieve and maintain their fastest potential running pace. The 100 metres, 200 metres, and 400 metres are the three sprinting events now competed at the Olympics and outdoor World Championships. The 100 metres comes from the 100-yard sprint, the 200 metres from the 1/8 mile, and the 400 metres from the 440-yard dash or quarter-mile race.

Sprint performance is ability to achieve a high score in the sprinting competitive event. The goal of increased running speed had resulted in a diversity of training methods and combinations. Athletes are continuously looking for methods to improve their speed. Running speed is an important component of most major sports, and it can determine the outcome of a competition. Athletes participate in training regimens to increase their speed for this reason. To achieve a competitive advantage, various innovative aerobic and anaerobic training methods impart a major role in improving the athlete’s performance.

Dharambir from Haryana set a new personal best of 10.46 seconds in the semi-finals of the national games in Kerala in February 2015, and he won first with 10.46 seconds. Vijaya Kumar came in sixth place for Tamil Nadu with a time of 10.96 seconds, and Suresh and Manikanda Arumugam recorded times of 10.92 seconds and 10.97 seconds respectively in 100 meters sprint (New Records, 2015).

Between 1964 and 2009, the world record for the 100-meter sprint had decreased from 10.06 seconds to 9.58 seconds. Usain Bolt established a new world mark of 9.58 seconds in the 2009 World Athletic Championships in Berlin, Germany. (www.olympic.org). In sprinting, even slight performance increase can make a big impact (Bezodis, 2007).

Physical fitness refers to the capacity to do everyday chores with vitality and alertness, without being excessively exhausted, and with the stamina to engage in leisure activities and respond to unexpected occurrences. The World Health Organization (WHO) defines it as "the ability to do satisfactory muscular

work." Body composition, cardiorespiratory endurance (aerobic power), skeletal muscular endurance, skeletal muscle strength, skeletal muscle power, flexibility, balance, speed of movement, and response time are the physical fitness components. Physical fitness is an essential component of sports performance and achievement since it aids in the resistance to stress and strain induced by sports, as well as the prevention of injuries.

Sports are essential for human growth, physical and mental health, championship, and a friendly competitive spirit. Sports nutrition is primarily concerned with the athletic performance of athletes. Nutrition is crucial in keeping athletes healthy, reducing fatigue and illness associated with poor recovery and increased performance. Hence sports nutrition is defined as, a special application of the science of nutrition to performance enhancement in sports. It implies the application of nutrition principles to sports with the intent of maximizing performance. In sports, success is determined by three factors: genetics, training, and nutrition. It is impossible to alter one's genetic makeup. Specialized training is the most effective way to improve athletic performance, and nutrition is a vital part of the whole training program since it allows athletes to reach their full potential. An individual must eat nutritious, balanced meals derived from macro and micronutrients to become an all-rounder in sports and games. Individuals who seek to boost physical performance rely on a power diet and training.

According to the Joint Position of American Dietetic Association (ADA), Dietitians of Canada (2009), and American College of Sports Medicine (ACSM), to sustain blood glucose throughout exercise, enhance exercise performance, and increase recovery time, athletes should take appropriate food and hydration before, during, and after exercise. Sprinters may experience a depletion of glycogen storage, dehydration, and muscular injury during exercise periods. As a result, nutrient-dense meals (meat/milk, fruits, vegetables, and complex carbs) and water must be consumed in order to promote thermoregulation, increase energy storage, boost muscle protein synthesis, and supply vitamins and minerals. (Thomas *et al.,* 2016). When calorie intake is limited to minimize body and/or fat

mass, a thorough choosing of nutrient-rich meals is especially important to avoid the danger of nutritional deficiencies, which can have a negative impact on both health and performance (Lausanne, 2011).

The nutritional status assessment offers the information needed in observe the impact of nutrition on health and Illness, identify key nutrients in a particular population or group, and establish effective public health policies to prevent and treat nutrition-related diseases. Bodyweight and composition reveal the amount of energy consumed. BMI is a powerful tool for assessing body weight, however, the data should be measured under consistent settings (Gorber *et al.,* 2000). Anthropometry, biochemistry, clinical, dietary, body composition measurement, and physical examination are used to determine nutritional status, either combined or separately.

Plant meals have a variety of physiological impacts as a result of their phytochemical and nutritional elements, which are linked to a variety of health advantages (Hunter and Fletcher, 2002). The term "nutraceutical" was coined in 1989 by DeFelice and is derived from the words "nutrition" and "pharmaceuticals." The word refers to any product generated from food sources that provide further health advantages along with the food's nutritional value. Nutraceutical are used to keep the body healthy and prevent and treat disorders. As scientists and nutritionists continue to investigate the link between numerous diseases and diet, the importance of nutrition is becoming evident to many individuals. During pandemic, all the more people became conscious about the consumption of functional and nutraceuticals to enhance immunity. The manufacturing companies also started releasing variety of natural food products incorporating herbal constituents too. A number of studies shows that appropriate plant food consumption is linked to a lower risk of chronic degenerative illnesses such coronary heart disease, diabetes, stroke, and some forms of cancer. Bioactive components such as phytochemicals, phytonutrients, vitamins, minerals, and fibre are thought to be risk factors.

Sports endurance supplements have traditionally been targeted at bodybuilders and other professional athletes. Sales of sports nutrition products, on the other hand, are now being pushed and grouped into numerous fitness categories. Although sports performance nutritional supplements have traditionally been aimed at male users, they are now popular among both genders. There has also been an increase in the younger demographic for athlete's performance nutritional supplements. Nutritional supplements are also becoming more popular among teenagers. According to the National Health Interview Survey (NHIS), 1.6 per cent of children are now using sports performance supplements. The expansion of the base market for sports supplements has been attributed to the changing demographics of the average sports endurance supplement and nutraceuticals to the consumer. (Kreider *et al.,* 2010)

Dietary supplements were classified in a distinct group of "foods" by the Dietary Supplement Health and Education Act (DSHEA) of 1994. President Clinton signed DSHEA into law in October 1994, which defines the "dietary complement" as as a food product that is used up by mouth and includes "dietary component" that is proposed to enhance diet (Young *et al.,* 1995). Vitamins, minerals, herbs or other botanicals, amino acids, and other compounds are examples of "dietary ingredients" (e.g., glandular, organ tissues, metabolites, and enzymes,). Extracts or concentrates from plants or foods can also be used as dietary supplements such as capsules, tablets, soft gels, drinks, health mix, and bars are common forms of dietary supplements. Dietary supplement products must be prominently labelled. Suitability supplements (e.g., energy bars, meal replacement powders, ready-to-drink supplements) are meant to make satisfying caloric demands and/or calorie management, weight growth, weight loss, and/or performance enhancement more convenient.

Nutrient-dense bars are a common dietary supplement consumed by athletes and others to meet their daily energy requirements. It provides the necessary energy for long-term physical and mental activity. Athletes can benefit

from Nutribar as a source of nourishment. It's a type of nutritional food supplement that is made up of energy-rich ingredients with high nutritional value, total antioxidant, and nutraceutical potentials that act as an energy boost.

Functional food is defined by Functional Food Centre (FFC,USA) as "natural or processed foods that contain known or unknown biologically-active compounds; these foods, in defined, effective, and non-toxic amounts, provide a clinically proven and documented health benefit for the prevention, management, or treatment of chronic disease". Functional foods like sweet potato which is called as *Ipomoea batatas L. Lamarck syn. Convolvulus batatas L*., *Ulva lactuca* green and Basil (*Ocimum basilicum L*.) were functional foods were consumed in ancient days in tropical areas. They are a strong source of micronutrients and have antioxidant potential, making them extremely helpful to human health. Traditional foods such as Sweet potatoes are foods that have been consumed for a long time. These meals have been ingrained in many civilizations and customs. Traditional foods are said to provide health benefits because of their authenticity, local production, propagation, and minimum or no industrial processing. Traditional food items, according to FAO (2008), are an expression of culture and lifestyle deriving from local climatic, agricultural, and economic factors that influence production and processing methods.

The United States Department of Agriculture (USDA) defines a standardized recipe as one that "has been tried, adapted, and retried several times for use by a given foodservice operation and has been found to produce the same good results and yield whenever the exact procedures are used with the same type of equipment and the same quantity and quality of ingredients". The cost of nutrients per serving and consumer satisfaction are the most significant aspects of standardisation. The use of uniform recipes ensures that the quality of menu items is maintained throughout the cooking and serving process. Nutritional data per serving will be valid and consistent if recipes are standardised. (http://www.nfsmi.org/Resource Overview).

Inadequate nutrition throughout adolescence can impair growth and puberty, as well as increase the risk of fractures and anemia, as well as a lack of stamina to compete in sports (Cotunga, 2005; Litt, 2004; Zawila et al 2003). Therefore, young athletes must obtain appropriate nutrition education. According to study, Sprinters who receive nutrition education have significantly improved their knowledge and attitudes, and as their knowledge improves, they are more inclined to eat or avoid particular foods (Werblow, Fox & Henneman, 1978). Dietary habits can have a negative impact on health and sports performance. Nutrition education is frequently used to spread knowledge about healthy eating and nutrition to a wide range of demographic groups. The present study aims to develop a Nutraceutical energy-rich Nutribar that could benefit the women sprinters nutritionally and ergogenically which may increase their performance.

Research rationale:

Many well-known athletes in India were from rural areas and had traditional heritages. So, it is important to determine and evaluate their nutritional and performance status. Athletes require a special diet depending upon particular training or event. One of the most critical aspects of reaching great performance is proper nutrition. Women Sprinters were chosen for this study because based on the literature cited above, it was found that inadequate nutrition intake is more common in female athletes than in male athletes. In comparison, women's athletics in advanced countries is extremely competitive, whereas our athletes lag far behind. Though women's performance in national and international sports competitions is improving, more progress is required. Athletes need proper diet, coaching, and specific training to achieve any significant improvements in their athletic performance. Therefore, it is important to develop a nutrient energy-rich food supplement, which improves the energy performance of women sprinters. As a result, the current research was conducted.

Scope of the study -

- Developing a novel nutraceutical energy rich food supplement for sprinters
- A step towards understanding contributions of nutraceuticals in treating and preventing nutrition induced public health diseases
- Body composition data for setting standards in sports policy

Hypothesis of the Study:

1. Supplementation of developed Nutribar will not significantly improve anthropometric measurements of selected sprinters.
2. Supplementation of nutraceutical energy rich Nutribar will not significantly improve biochemical parameters of sprinters
3. Supplementation of nutraceutical energy rich Nutribar will not significantly improve the Physical performance of sprinters
4. The effect of nutrition education will not improve Knowledge, Attitude, and Practice

The objectives of the study are;

(a) Primary Objectives are: To

- Develop instant energy food products incorporating Nutraceutical rich foods.
- Evaluate the acceptability, shelf life, nutrient, and Nutraceutical potentials of the developed product.

(b) Secondary Objectives are: To

- Determine the background details of the Athletes.
- Assess the Nutritional Status, Body Composition, and Physical Performance of athletes.
- Assess the impact of supplementation of the developed Nutraceutical energy-rich food among under 20 years of age district-level women sprinters on sports performance.