

## Exploring Natural Alternatives to Expensive Supplements for Nutrition-Conscious Athletes on a Tight Budget

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### Abstract

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*Nutrition plays such a significant and, at times, even a deciding role in an athlete's performance, the subject of sports nutrition has gotten a significant amount of study over the past several decades, and it is anticipated that it will garner a great deal and more attention in the future due to the nature of the impact that it has. In point of fact, nutrition has an effect on practically every action that takes place in the human body, including those that are involved in the production of energy and the recovery process after physical activity. In order to appreciate and put the foundations of sport nutrition into practice, it is necessary to have a solid understanding of nutrition, exercise physiology, and sport science. The formulation of nutritional strategies that are applicable to both training and competition is one of the key areas of concentration for researchers working in the field of sport nutrition.*

*A multitude of molecular, biochemical, and physiological responses are triggered by exercise, and the objective of a diet that has been intelligently created is to guarantee that a suitable amount of water, carbohydrates, proteins, and fats, vitamins, and minerals are taken. This is done to support both the fundamental nutritional demands of the body and the pre-exercise, during-exercise, post-exercise specific stages of nutrition. In other words, this is done to support the body's ability to function optimally in all phases of performance. To summarize, specific nutritional strategies need to be established in order to offer sufficient exercise adaptation and to keep the body in excellent general health.*

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**Keywords:** - Natural Alternatives for Nutrition, Expensive Supplements, Athletes

## INTRODUCTION

Athletes competing at all different levels of sport use dietary supplements, which is symptomatic of the extremely high frequency with which people in the general population use them. Athletes give a wide variety of reasons for why they choose the supplements, some of these benefits include the management of micronutrient deficits, the provision of energy and macronutrient demands that may be difficult to meet through food intake alone, and the preservation of good health through the contribution to the required intake of particular nutrients. Athletes have reported a variety of additional specific applications for various dietary supplements. These uses include the direct improvement of performance as well as the indirect benefits that arise from the provision of support for strenuous training. This article's goal is to disseminate information with the objective of supporting high-performance athletes and the members of their support teams (including coaches, trainers, nutritionists, and physicians) in making informed choices about the usage of dietary supplements and natural alternatives to expensive supplements. When it comes to considering the usage of supplements, this study presents a review of natural alternatives to expensive supplements for Nutrition-Conscious athletes and their support teams to guide athletes.

## OBJECTIVES OF THE STUDY

1. To study Natural Alternatives to Expensive Supplements for Nutrition-Conscious Athletes.
2. To study the role and importance of natural alternatives for nutrition.

**METHODOLOGY:** Research design is partly descriptive, partly exploratory. The data for the present study was collected from different sources. To assess the natural alternatives to expensive supplements for nutrition-conscious athletes on a tight budget.

**Clever Ways to Eat Healthy on a Tight Budget:** The good news is that there are a wide variety of delectable options available to meet the requirements of any diet. On the other hand, for some people, the price of healthy nutrient sources may be prohibitive, following are some good sources that won't blow the budget.

**Eggs** are one of the most affordable yet highly nutritious foods available with a price tag of Rs. 6/Piece, containing small amounts of nearly every nutrient essential to the human body. Often referred to as “nature’s multivitamin,” eggs provide all the necessary vitamins except for vitamin C. They are a rich source of high-quality animal protein, healthy fats, and are low in carbohydrates. In addition, eggs are an excellent source of essential nutrients such as iron, selenium, phosphorus, and iodine. Furthermore, regular egg consumption has been linked to an improved weight management.

**Legumes** – A diverse group of foods that includes beans, peas, lentils and soybeans with an average price of Rs. 134/Kg are highly valued for their nutritional benefits. They are rich in dietary fiber, which promotes digestive health and aids in reducing calorie intake. As one of the best sources of plant-based proteins, legumes are particularly suitable for vegan and vegetarian diets. Despite their carbohydrate content, legumes have a low glycemic index. Furthermore, legumes are packed with essential vitamins, antioxidants, and minerals, including iron, calcium, and magnesium, making them a nutrient-dense addition to a balanced diet.

**Spinach** - A leafy green rich in nutrients, spinach usually costs Rs 40 for a bunch of 100g, about 2.9 grams of protein can be found in a 100-gram portion of spinach, which is also high in iron, calcium, magnesium, and the vitamins A, C, and K. As spinach contains iron, which aids in recuperation, and high amounts of vitamin K, which improve bone health, it is beneficial for athletes' muscular function. Additionally, the antioxidants in it boost overall athletic performance and help lower inflammation.

**Kale**, like many leafy greens, is highly nutritious and considered one of the most nutrient-dense foods, Priced at Rs. 290/Kg. It is particularly rich in vitamins C, K, A, and B6. The mineral content of kale includes potassium, calcium, magnesium, copper, and manganese. In addition to being a good source of dietary fiber, kale is packed with various bioactive compounds, such as isothiocyanates and other powerful antioxidants, which contribute to its health-promoting properties.

**Dark chocolate** is a rich source of antioxidants, fiber, magnesium, manganese, and copper, making it one of the healthiest snacks when consumed in moderation. Typically priced around Rs. 200, it offers various health benefits, including a reduced risk of heart disease, improved blood pressure, and enhanced brain function. However, it is crucial to choose dark chocolate with a cocoa content of at least 70% to maximize these benefits. Incorporating moderate amounts of high-quality dark chocolate into your diet can be a delicious and health-promoting choice.

**Nuts & Nut Butter** – A fist full of nuts is a great way to start a day. Nuts are rich in monounsaturated fatty acids which are essential for a range of bodily functions. Additionally, they contain a variety of other nutrients like protein and fiber which gives an abundant amount of energy to perform daily tasks & help ward off fatigue. It includes vitamin K, E, Folate, thiamine and minerals such as magnesium & potassium.

Budget Friendly nut butter can be peanut butter, Natural peanut butter is a protein-rich food, typically priced around Rs. 201 for an 18-ounce (510 grams) jar. Each two-tablespoon serving contains about 10 grams of protein. This versatile nut butter can be added to smoothies, fruit,

or oatmeal for an extra protein boost. To avoid unwanted ingredients like added sugars and oils, it's best to choose natural peanut butter.

**Oats** are highly nutritious food, rich in carbohydrates, fiber, protein, vitamins, and minerals, typically priced at around Rs. 110 per kilogram. A single cup of oatmeal provides 13 grams of protein, 8 grams of fiber, and essential minerals like iron, folate, zinc, and phosphorus, all vital for normal body functioning. Oats contain beta-glucan, a type of fiber that helps lower LDL (low-density lipoprotein) cholesterol. Additionally, oatmeal promotes a feeling of fullness, helping to prevent overeating and support healthy calorie management.

**Bananas** are a powerhouse of potassium, and their benefits extend beyond just that. Priced at around Rs. 50 per dozen, they are packed with filling fiber and other valuable nutrients, providing an energizing start to the day. What makes bananas particularly beneficial is their resistant starch, which supports digestive health without causing bloating or lethargy. In addition to being rich in potassium, bananas help lower blood pressure and reduce the risk of heart attacks, making them a nutritious and heart-healthy choice.

**Greek yogurt** is a nutritious, light, and super healthy food, making it an ideal choice for athletes. Priced at around Rs. 150 for a 400-gram container, it is rich in protein & calcium and contain probiotics that support a healthy gut and strengthen the immune system. Regular consumption of Greek yogurt is linked to higher nutrient intake, improved diet quality, and a favorable metabolic profile, making it a valuable addition to a balanced diet.

**Sweet potatoes** have a protein content of around 10 grams per 500 grams and usually cost Rs 50 for half a kg. They supply vital minerals like manganese and potassium, and are high in beta-carotene, vitamins A, C, and B6. Sweet potatoes are a great source of complex carbs, which support muscle growth and recovery in athletes. Their high potassium level promotes electrolyte balance and muscular function, while their antioxidant content reduces inflammation and enhances performance in general.

**Pearl millet (Bajra)** is a reasonably priced grain; a kilogram cost 50/Kg. Bajra is high in fiber, iron, magnesium, phosphorus, and B vitamins including niacin and folate. A 100-gram portion will supply you about 10–12 grams of protein, because it is abundant in protein and magnesium, bajra is beneficial to the athletes as it increases energy and promotes muscle repair.

**Amaranth** may not be a pantry staple, but this protein-packed, gluten-free grain deserves a place in your diet. One cup (246 grams) of cooked amaranth provides over 9 grams of protein, making it a valuable source of plant-based nutrition. In addition to its protein content, amaranth is rich in essential nutrients such as folate, manganese, magnesium, phosphorus, and iron.

**Flax seeds** - Despite their small size and an affordable price of Rs. 188 per kilogram, flaxseeds are a powerhouse of essential nutrients, including omega-3 fatty acids, these healthy fats help lower LDL (bad) cholesterol, reduce inflammation, and protect against chronic conditions like diabetes, heart disease, and arthritis. In addition to their omega-3 content, flaxseeds are also rich in fiber, protein, antioxidants, and important minerals such as magnesium and selenium. These combined benefits make flaxseeds a highly nutritious addition to a balanced diet.

**Pumpkin seeds** are a nutrient-dense food that packs a significant amount of nutrition into a small package. Priced at around Rs.300 per kilogram, these budget-friendly seeds are an excellent source of protein, making them a smart addition to your diet. Rich in essential minerals and healthy fats, pumpkin seeds contribute to overall health and well-being.

**Sunflower seeds** are packed with an impressive amount of plant-based protein, with just one ounce providing about 6 grams. These buttery-tasting seeds are rich in protein as well as essential nutrients like vitamin E and magnesium. sunflower seeds are versatile, vegan-friendly, and cost-effective with just Rs.300 per Kg, making them a nutritious addition to a variety of meals and snacks.

The most effective strategy for preventing nutritional deficiencies in athletes is to encourage to eat a diet that is both balanced and varied. A typical diet can only be considered a Balanced Diet if it provides an individual with all of the nutrients in the optimal amount that are necessary for them to build and keep a healthy body.

**NUTRIENTS:** Complex organic or inorganic substances found in food are called nutrients. About 50 different nutrients are typically provided by the food we consume. Every nutrient performs a specific job in the body. The majority of natural foods are multi-nutrient foods. These might be separated into:

**MACRONUTRIENTS:** Proteins, carbohydrates and fats are typically referred to as the "proximate principles" of nutrition since they make up the majority of the mass in the foods we eat.

**CARBOHYDRATES:** Carbohydrates are the primary source of energy, and each gram of carbohydrate contains 4 kcal of energy. There are the three primary places from where the carbohydrate can be obtained, that are Starches, Sugar and Cellulose.

The diet of humans must always include starch, it is present in high quantities in grains, roots, and tubers. The monosaccharides that make up sugar are glucose, fructose, and galactose, while the disaccharides that make up sugar are sucrose, lactose, and maltose. These unrefined sugars have a high degree of solubility in water and are simple to digest. Free sugar and carbohydrates together make up a significant portion of the body's energy supply. Cellulose, a component of

carbohydrates that cannot be digested and contributes very little in the way of nutritional value, is a contributor to dietary fiber.

**Role of Carbohydrates:** Carbohydrates' primary role in the body is to serve as a source of fuel for the cells. Carbohydrates in the diet have a number of vital functions, one of which is to help preserve protein. A diet including at least some carbohydrates is required for the regular oxidation of dietary lipids to take place. Lactose is beneficial because it encourages the growth of beneficial microorganisms, some of which are necessary for the production of B-complex vitamins. Additionally, it improves the body's ability to absorb calcium. Ribose, a sugar with five carbons, is present in both DNA and RNA, which are two very significant molecules.

### **Dietary Sources of Carbohydrates**

Natural sources of carbohydrates suitable for athletes encompass a diverse range of foods, including whole grains, fruits, and vegetables. These options offer athletes an array of nutrient-rich and energy-providing choices:

**Whole Grains:** Whole grains like brown rice, quinoa, oats, and whole wheat pasta are excellent sources of complex carbohydrates. They are rich in starches, which are broken down into glucose, the body's primary energy source. These carbohydrates provide athletes with sustained energy, making them ideal for endurance sports. Whole grains are also packed with dietary fiber, vitamins (B vitamins and vitamin E), minerals (such as magnesium and iron), and antioxidants. This combination of nutrients supports sustained energy release, aids in muscle function, and helps in recovery after intense exercise.

- **Nutritional Content:** Whole grains are rich in complex carbohydrates, primarily in the form of starches. They are rich in dietary fiber, helps in digestion and gives a fullness feeling. Whole grains also provide essential vitamins, such as B vitamins (e.g., B1, B2, B3, and B6) that are involved in energy metabolism and iron, which is crucial for oxygen transport in the body. They contain minerals like magnesium, which supports muscle and nerve function, and selenium, an antioxidant mineral. Additionally, whole grains contain phytonutrients, antioxidants, and polyphenols that contribute to overall health.
- **Importance:** The complex carbohydrates in whole grains release energy gradually, making them ideal for endurance athletes. The high fiber content supports digestion and helps maintain steady blood sugar levels. The B vitamins and iron aid in energy production and oxygen transport, benefiting athletic performance. The presence of antioxidants and other phytonutrients contributes to the reduction of oxidative stress, lowering the risk of inflammation and improving overall health.

**Fruits:** Fruits are natural sources of simple carbohydrates, such as fructose and glucose, which can quickly replenish glycogen stores and provide a rapid energy boost. Athletes can benefit from fruits like bananas, which are high in potassium and vitamin B6, making them excellent for preventing muscle cramps. Berries, such as blueberries and strawberries, are rich in antioxidants that help combat oxidative stress generated during physical activity. Oranges, a source of vitamin C, contribute to immune system support, important for athletes engaged in intense training.

- **Nutritional Content:** Fruits are abundant in simple carbohydrates, particularly fructose and glucose. They are also packed with vitamins, including vitamin C, vitamin A (in the form of beta-carotene), and various B vitamins. Minerals like potassium and magnesium are present in fruits as well. They contain dietary fiber and a wide range of antioxidants, such as flavonoids and polyphenols.
- **Importance:** Fruits provide a quick source of energy due to their simple carbohydrates, making them suitable for immediate energy needs, like pre or mid-workout snacks. Vitamin C supports the immune system, which is vital for athletes under physical stress. Beta-carotene in fruits like apricots and cantaloupe promotes eye health. Potassium helps maintain proper fluid balance, reducing the risk of muscle cramps. The antioxidants in fruits combat oxidative stress, which is common in physically active individuals and can lead to inflammation and tissue damage.

**Vegetables:** Vegetables like sweet potatoes, beets, and spinach are nutritious carbohydrate sources. Sweet potatoes are rich in complex carbohydrates and provide essential vitamins like A and C. They also offer potassium, which helps regulate fluid balance and muscle function. Beets are known to enhance endurance by increasing nitric oxide production, which improves blood flow. Spinach, along with other leafy greens, contains various vitamins and minerals, including iron and calcium, which are essential for maintaining energy levels and overall health.

- **Nutritional Content:** Vegetables like sweet potatoes, beets, and spinach are rich in complex carbohydrates. They provide vitamins, such as vitamin A, vitamin C, and various B vitamins (e.g., B6). These vegetables also contain minerals like potassium, iron, and calcium. Leafy greens like spinach are especially high in dietary fiber and antioxidants.
- **Importance:** The complex carbohydrates in these vegetables provide sustained energy for athletes, making them suitable for longer training sessions. The vitamins and minerals, such as vitamin A and iron, are essential for maintaining energy levels and oxygen transport to muscles. Potassium helps regulate fluid balance and muscle function, reducing the risk of

cramps. The antioxidants in vegetables like spinach contribute to reducing oxidative stress and inflammation, benefiting overall health and recovery

**DIETARY FIBERS:** Dietary fibers are a type of plant element that cannot be broken down by the enzymes that are found in the human digestive tract. Cellulose, hemicelluloses, pectin, mucilage's, gums, and lignin are the components that make up these. Dietary fiber is essential for maintaining athletes' health and performance. It is a vital component of a balanced diet due to its roles in digestion, energy regulation, weight management, and intestinal health. Through the consumption of a diverse range of fiber-rich meals, athletes can improve their general health, recuperation, and performance.

**Role of Dietary fibers:** Dietary fibers are capable of retaining water, which results in stools that are moist, thick, and easy to pass. Constipation can be avoided by eating more fiber, as a result. In general, fiber enhances the motility of the small intestine and colon, which minimizes the amount of time it takes for food to move through the digestive tract.

**Sources of dietary fibers:** A healthy diet must include a range of foods that are high in dietary fiber. Vegetables like broccoli, carrots, and leafy greens offer both soluble and insoluble fiber, while fruits like oranges, berries, and apples are high in soluble fiber. Legumes are great sources with a high protein content, such as beans, lentils, and peas. Nuts and seeds like flaxseeds, chia seeds, and almonds offer a good balance of lipids and fiber, while whole grains like quinoa, brown rice, and oats make up a large portion of the daily fiber consumption. Including a variety of these items in your diet can help guarantee that you are getting enough fiber for good health and performance.

**PROTEINS:** Proteins make up around twenty percent of the total body weight of an adult. It is said that a protein is "biologically incomplete" if it is lacking one or more essential amino acids. This is because essential amino acids are required for protein synthesis because they include all of the necessary biological components, animal proteins are favored over vegetable proteins as animal proteins are complete in themselves.

**Role of Proteins:** Protein is needed to support the repair of damaged body tissues and the building of new tissues in response to the training stimulus. Strength trained athletes look for additional protein to increase muscle size and strength in response to resistance training. Protein is essential to the building, repairing, and maintaining of bodily tissues, and the body cannot function without it. When proteins serve in the capacity of buffers, they are also involved in the management of the acid-base balance that occurs in the tissues.

**Dietary Sources of Protein:** Proteins may be found everywhere in the natural world. Every type of food, with the exception of refined sugar, oil, and fats, has some amount of protein.

High-quality protein may be found in meals derived from animals, such as beef, chicken, pork, meat, poultry, fish, milk, cheese, and eggs. However, plants are also an important source soybeans are a complete protein, making them on par with the majority of animal proteins in terms of quality. Protein needs are easily taken care of when a varied diet that focuses on nutrient-rich foods is consumed.

#### **Protein contents of some foods**

<b>Food</b>	<b>Proteins (g/100g of food)</b>
Milk	3.1 - 3.3
Foods from animals	18.1- 25.0
Eggs	12.0
Meat Fish	14.0- 22.0
Plant-based foods	5.0 – 12.0
Pulses	1.0 – 26.0
Vegetables and Fruits	1.0 – 3.0
Cereals	1.0 – 6.0
Nuts	4.0 – 19.0
Soybeans	41.2

**FATS:** There is a significant quantity of energy that may be found in fats and oils. They are considered to be part of the category of Simple lipids such as triglycerides, Compound lipids such as phospholipids, cholesterol and other derived lipids. Triglycerides and cholesterol can be produced by the body on its own. This process is known as endogenous synthesis. Essential fatty acids are those that our bodies are unable to produce on their own. They can only be obtained by the consumption of food.

**Role of Fats:** One of the most important roles of fat is to serve as a source of energy. When oxidized, one gram of fat produces around nine kilocalories, which is almost twice as much energy as one gram of carbohydrate or protein. It provides a source of energy reserve that may be used during times of hunger and adipose tissue also works as an insulating substance against the cold. Fat in the diet acts as a transport medium for the fat-soluble vitamins A, D, E, and K. Dietary fat is the transport medium for these vitamins. Fat enhances the palatability of the food and provides a satiety value. Linoleic acid and linolenic acid are necessary fatty acids, which play highly essential roles in a variety of bodily processes, including the regulation of blood

pressure and blood viscosity, the contraction and relaxation of muscles, the alleviation of pain, male fertility and female conception, and proper delivery.

**Dietary Sources of Fat:** The following types of animal fats can be found in foods that are consumed as part of a diet that are Ghee, butter, milk, cheese, eggs, and the fat from meat and fish are the primary sources of this nutrient. Seeds from plants, such as crushed nuts, mustard, sesame, coconut, and others, can be used to produce vegetable oils. Additional sources that are as such Rice has 3% fat, wheat contains 3% fat, jowar contains 4% fat, and bajra contains between 6% and 5% fat. Fat may also be found in pulses, nuts, and vegetables.

Omega-3 fatty acids, which are abundant in fatty fishlike salmon and mackerel, as well as foods like avocados, nuts, and seeds are good sources of fat. Coconut oil includes medium-chain triglycerides for rapid energy, while olive oil, especially extra virgin, offers heart-healthy monounsaturated fats. Nuts and seeds rich in fatty acids and vital nutrients include almonds, walnuts, chia seeds, and flaxseed. Dark chocolate offers healthful fats and antioxidants, while fatty fish is good for heart and brain.

**MICRONUTIENTS:** These are the vitamins and minerals that are referred to as micronutrients due to the fact that just trace quantities, which can range from a fraction of a milligram to several grams, are necessary for proper functioning.

#### **MINERALS:**

**Iron-** Due to its vital role in energy production, muscular function, and oxygen delivery, iron is a necessary mineral for athletes. Iron helps the body supply oxygen to muscles during activity. It can be found in both plant and animal sources, such as leafy greens, legumes, and seeds, as well as red meat, chicken, and fish. This is especially important for women athletes and athletes following a plant-based diet. Eating meals high in iron and vitamin C together will help absorb it better.

**Calcium-** Athletes need calcium because it helps maintain healthy bones, which lowers the chance of fractures and other injuries during physical exercise. For healthy muscular contraction and nerve function, calcium is also required. It may be found in dairy products like milk, cheese, and yogurt as well as non-dairy sources such leafy greens, tofu, and fortified plant-based milks.

**Iodine-** Iodine plays a vital role for athletes because it helps the thyroid, which controls metabolism and energy generation. Iodized salt, shellfish, dairy products, seaweed, and eggs are important sources of iodine. Athletes can perform at their best during training and recuperation when their iodine levels are balanced.

**Sodium-** Sodium is essential for athletes because it supports neuron function, muscular contraction, and fluid equilibrium. Sodium requirements are fulfilled by table salt. During intense exercise, athletes lose sodium through sweat, resupplying it ensures peak performance by preventing weariness, cramping, and dehydration.

**Magnesium** benefits Athletes in muscular function, energy generation, and recuperation. Leafy greens, legumes, nuts, seeds, and whole grains are important sources of magnesium. During physical exertion, this mineral helps control muscular spasms, avoid cramps, and lessen weariness. Additionally, it promotes muscle repair and protein synthesis, which improves recovery after exercise.

**Zinc-** Whole grains, dairy products, seafood, legumes, seeds, and nuts are good sources of zinc. It helps athletes recover and perform better by promoting wound healing, protein synthesis, and immunological function. Moreover, zinc supports testosterone levels and energy metabolism, which in turn supports the development and strength of muscles.

**Phosphorous-** Foods high in phosphorus include dairy products, eggs, meat, chicken, fish, nuts, seeds, and whole grains. Phosphorus is essential to athletes for the synthesis of energy, healthy bones, and strong muscles.

**Potassium-** Bananas, oranges, spinach, potatoes, avocados, and yogurt are among the foods high in potassium. Potassium is necessary for athletes to sustain fluid equilibrium, neuron function, and muscular contraction.

**Manganese-** Nuts, seeds, whole grains, leafy green vegetables, and tea are foods high in manganese. Manganese benefits athletes by promoting healthy bones, a healthy metabolism, and antioxidant processes that guard against oxidative damage during strenuous exercise.

**Selenium-** Seafood, eggs, chicken, Brazil nuts, and whole grains are among the foods high in selenium content. Due to its antioxidant properties, selenium is essential for athletes as it helps shield cells from oxidative stress brought on by prolonged physical activity. Consuming enough selenium promotes aiding in quicker recovery for athletes.

## **VITAMINS**

**Vitamin D-** This essential vitamin, often referred to as the "sunshine vitamin," plays a crucial role in calcium absorption and bone health. While it is often obtained through sun exposure, some dietary sources can provide vitamin D. Fatty fish like salmon, mackerel, and sardines are excellent natural sources of vitamin D. Additionally, fortified dairy products such as milk and yogurt, as well as fortified plant-based alternatives like soy milk and orange juice, can be valuable sources for individuals looking to maintain their vitamin D levels. For athletes,

maintaining adequate vitamin D levels is essential for bone health, immune function, and overall well-being.

**Vitamin C-** Vitamin C is well-known for its role in supporting the immune system and its powerful antioxidant properties. Fruits like grapefruits and oranges including lemon are known for higher amount of vitamin C. Berries, particularly strawberries and blueberries, also offer a significant dose of this vitamin. Other sources include bell peppers, kiwi, and broccoli. Athletes benefit from vitamin C as it helps reduce exercise-induced oxidative stress, supports collagen production for joint health, and aids in the absorption of non-heme iron from plant-based foods, important for preventing anaemia.

**B-Vitamins-** B-vitamins, including B1 (thiamine), B2 (riboflavin), B3 (niacin), B6 (pyridoxine), B9 (folate), and B12 (cobalamin), play a variety of roles in energy metabolism and overall health. Whole grains, such as brown rice and whole wheat, are excellent sources of B-vitamins, particularly thiamine and niacin. Lean meats like chicken and turkey contain riboflavin and B6, while fortified cereals provide a range of B-vitamins. Leafy greens, such as spinach and kale, offer folate. For those following a vegetarian or vegan diet, nutritional yeast is a valuable source of B12. Athletes depend on B-vitamins to convert food into energy, support nerve function, and maintain healthy red blood cells.

**Vitamin A-** Foods high in vitamin A include liver, sweet potatoes, spinach, carrots, and dairy products. By encouraging tissue regeneration and enhancing immunity vitamin A is necessary for enduring strenuous physical activity. It aids in the recuperation process for athletes.

**Vitamin E-** Vegetable oils, avocados, spinach, sunflower seeds, and almonds are among the foods high in vitamin E. It has potent antioxidant properties that shield cells from oxidative damage brought on by strenuous activity. Vitamin E helps athletes avoid injury and exhaustion by promoting muscle repair and lowering inflammation.

**Vitamin K-** In addition to fish, meat, and eggs, leafy greens including spinach, kale, broccoli, and Brussels sprouts are good sources of vitamin K. Supporting blood coagulation and preserving bone health are its principal roles. vitamin K helps athletes recover more quickly and is associated with a lower risk of injury.

Incorporating these vitamin-rich foods into an athlete's diet can be both cost-effective and nutritionally advantageous. These natural sources not only provide the vitamins athletes need but also offer a range of other essential nutrients and health benefits. The bioavailability of vitamins from natural food sources compared to supplements is a critical consideration in understanding how the body absorbs and utilizes these nutrients. Bioavailability refers to the

proportion of a nutrient that enters the bloodstream when introduced into the body and is available for physiological functions.

Natural food sources often provide vitamins in a complex matrix that includes various nutrients, fiber, and phytochemicals. This natural synergy can enhance the absorption and utilization of vitamins. For instance, vitamin C in whole fruits like oranges is accompanied by fiber and various antioxidants, which can slow the absorption of vitamin C, allowing for a gradual and sustained release in the body. This gradual release is advantageous for maintaining steady blood levels and optimizing utilization. In contrast, supplements typically offer vitamins in isolated, concentrated forms. While this can be beneficial in cases of deficiency or specific medical needs, it may result in different bioavailability profiles. In some cases, synthetic forms of vitamins in supplements may be absorbed differently than those from natural food sources. For instance, the bioavailability of synthetic vitamin E may be lower than that of natural vitamin E found in foods like nuts and seeds.

Additionally, the body's ability to absorb vitamins can be influenced by individual factors, such as a person's overall diet, age, and the presence of specific health conditions. Some vitamins require fat for absorption, making it more efficient to consume them with a meal containing dietary fats. The bioavailability of vitamins from natural food sources tends to be well-regulated by the body's natural processes and is often optimized by the presence of other beneficial compounds. Supplements can provide concentrated forms of vitamins, but their bioavailability may vary, and they may not always replicate the benefits of natural food sources.

Therefore, a balanced and varied diet rich in whole foods is generally recommended for meeting nutritional needs and ensuring optimal bioavailability of nutrients.

## **CONCLUSION**

This study makes a strong argument against the overuse of pricey supplements by highlighting the critical role that natural alternatives play in satisfying the nutritional demands of athletes on a tight budget. The study demonstrates the ability of a variety of natural food sources to supply important vitamins, minerals, and macronutrients that are frequently sold as supplements by thoroughly examining them. The results show that because natural alternatives have intrinsic biochemical complexity that supplements may not have, they not only meet nutritional requirements but also improve general health and well-being. Additionally, the study highlights the value of accessibility and education, promoting greater athlete knowledge of affordable, nutrient-dense food options. In the end, this research adds to the increasing amount of data implying that whole foods should be incorporated into sports nutrition plans. It

also suggests that a balanced diet based on natural sources can effectively improve performance and recuperation without incurring the expense of supplements.

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