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Vegan Diets for Sports Performance in India: A Comparative Review of Homemade Plant-Based Foods versus Animal-Based Diets

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Abstract

Vegan diets are increasingly discussed in sport because athletes seek dietary patterns that align with performance, health, ethics, religion, cost, sustainability, and cultural identity. In India, the question is especially distinctive because many athletes already consume largely plant-based home foods such as dal, chana, rajma, soybean, groundnut, millets, rice, wheat, vegetables, chutneys, and spices, while other athletes rely on milk, curd, paneer, eggs, fish, chicken, and meat for protein and micronutrients. This paper compares homemade vegan plant-based diets with animal-based diets for sports performance in the Indian context. The review evaluates energy availability, carbohydrate provision, protein quality, leucine density, iron, zinc, calcium, vitamin B12, vitamin D, iodine, omega-3 fatty acids, creatine, gastrointestinal tolerance, affordability, and practicality across training phases. Current evidence does not show that vegan diets automatically improve performance, but it also does not show that well-planned vegan diets necessarily impair performance. The decisive issue is planning quality. Homemade vegan diets can provide abundant carbohydrate, fiber, phytochemicals, and culturally acceptable meals, but they require intentional protein distribution, vitamin B12 supplementation, attention to iron and zinc bioavailability, vitamin D monitoring, and consideration of creatine or beta-alanine for power events. Animal-based diets offer convenient high-quality protein and vitamin B12 but can still be nutritionally poor if dominated by fried foods, low vegetables, or excess saturated fat. The paper concludes that Indian athletes can perform well on either dietary pattern when total energy, macronutrients, micronutrients, hydration, and recovery are managed. Sport-specific assessment is more valid than ideological comparison.

Keywords: *Vegan Athletes; India; Sports Nutrition; Plant-Based Diet; Animal-Based Diet; Protein Quality; Vitamin B12; Performance*

1. INTRODUCTION

The debate on vegan diets for sports performance has moved from the margins of nutrition discussion to mainstream sport science. Athletes now consider plant-based diets for reasons that include health, ethics, environmental concern, religion, digestive comfort, body composition, and social influence. In India, the debate has a unique character because plant-based eating is not new. Many households routinely consume dal, rice, roti, vegetables, chutneys, pickles, fermented foods, peanuts, sesame, sprouts, and seasonal fruit. At the same time, Indian sport nutrition increasingly includes milk, curd, paneer, eggs, fish, chicken, meat, whey protein, and commercial supplements. The central question is therefore not whether plant foods are foreign to Indian athletes, but whether a fully vegan pattern based on homemade foods can meet the demands of training and competition.

Sports performance depends on training, recovery, genetics, sleep, coaching, psychology, injury prevention, hydration, and nutrition. Diet cannot compensate for poor training, but inadequate diet can limit adaptation. Athletes require sufficient energy availability, carbohydrate for glycogen, protein for muscle repair and remodeling, essential fatty acids, micronutrients, fluids, electrolytes, and timing strategies that support training quality. The joint sports nutrition position statement from major dietetic and sports-medicine bodies emphasizes that energy and nutrient needs vary by sport, training phase, body composition goals, and competition schedule (Thomas et al., 2016). Any comparison of vegan and animal-based diets must therefore be sport-specific rather than based on a single universal menu.

The evidence base remains cautious. Reviews of vegan and vegetarian athletes generally report that well-planned plant-based diets can support performance, but current evidence does not prove that vegan diets inherently enhance performance compared with omnivorous diets. A systematic review of vegetarian diets and performance found that vegetarian diets did not clearly improve or impair performance outcomes compared with omnivorous diets (Craddock et al., 2016). More recent work similarly emphasizes planning challenges such as protein quality, vitamin B12, iron, zinc, calcium, iodine, vitamin D, and long-chain omega-3 fatty acids (West et al., 2023).

This paper compares homemade vegan plant-based foods with animal-based diets in India. The focus on homemade foods is important because many Indian athletes cannot afford imported vegan products, plant-protein powders, fortified meat substitutes, or specialized performance foods. The review assesses whether traditional and locally available foods can meet athletic needs when intelligently combined. It also examines where animal-source foods offer practical advantages and where plant-based diets may offer benefits. The goal is not to declare a single best diet, but to provide an academic, evidence-informed framework for coaches, dietitians, students, and athletes.

2. CONCEPTUAL BASIS FOR COMPARING DIETS

A fair comparison must distinguish dietary ideology from dietary execution. A poorly planned vegan diet may be low in energy, protein, vitamin B12, calcium, vitamin D, iron, zinc, iodine, and omega-3 fats. A poorly planned animal-based diet may be low in fiber, fruits, vegetables, antioxidants, and whole grains while being high in saturated fat, fried foods, and excess energy. In practice, athletes do not eat categories; they eat meals. Therefore, homemade vegan khichdi with dal, soybean, vegetables, curd alternatives, fruit, nuts, and fortified foods may be superior to an animal-based diet dominated by fried chicken, refined flour, and sugary drinks. The reverse may also be true if the vegan diet is monotonous and under-fueled.

Performance nutrition can be organized into four questions. First, does the diet provide enough total energy to avoid low energy availability? Second, does it provide sufficient carbohydrate for training intensity and glycogen restoration? Third, does it provide protein in the right amount, quality, and timing to support muscle protein synthesis? Fourth, does it provide micronutrients and ergogenic compounds that affect oxygen transport, neuromuscular function, immunity, and recovery? Vegan and animal-based diets can both succeed or fail on these criteria. The framework in Figure 1 places Indian homemade foods within this broader performance system.

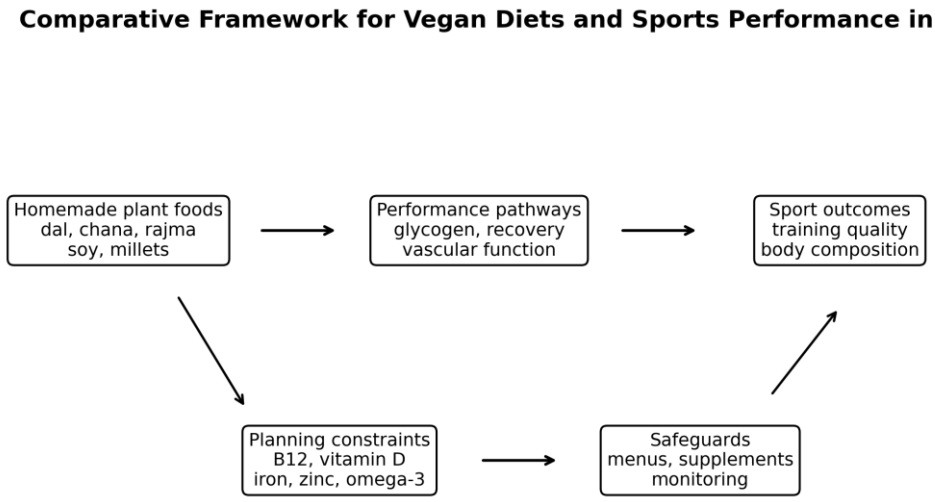

Figure 1. Comparative framework for evaluating vegan diets and sport outcomes in India.

3. EVIDENCE ON VEGAN AND VEGETARIAN DIETS IN ATHLETES

The sports literature on vegan athletes is still smaller than the literature on general omnivorous sports nutrition. Rogerson argued that vegan diets can meet many athletic needs when strategically planned, but also identified challenges related to energy density, protein, vitamin B12, iron, zinc, calcium, iodine, vitamin D, and long-chain omega-3 fatty acids (Rogerson, 2017). This balanced conclusion is important because it rejects two extremes: the claim that vegan diets are automatically superior and the claim that vegan diets are inherently inadequate. The nutritional adequacy of a vegan diet depends on food selection, fortification, supplementation, and monitoring.

A recent review concluded that current evidence does not support a performance-enhancing effect of vegan diets, but it also did not establish inevitable performance harm when diets are well planned (West et al., 2023). This distinction matters for athletes who want certainty. The present evidence suggests nutritional equivalence is possible, not automatic. Athletes choosing a vegan diet must manage known risk nutrients, while athletes using animal foods must still meet total diet-quality standards. Performance is affected by execution, not by dietary label alone.

Studies comparing vegetarian and omnivorous performance are heterogeneous in sport type, training status, diet definition, and outcome measures. Some participants labeled vegetarian may consume milk, curd, eggs, or whey, making the results less applicable to strict vegan diets. Training programs and energy intake are often not tightly controlled. The best interpretation is that a vegetarian or vegan diet can be compatible with athletic performance when nutrient targets are met. Stronger conclusions require randomized trials with matched protein, energy, training load, and micronutrient status.

Evidence from resistance training is instructive. A trial comparing high-protein plant-based diets with protein-matched omnivorous diets during resistance training found similar support for adaptations when protein intake was matched (Hevia-Larrain et al., 2021). This suggests that protein adequacy may matter more than protein source when amino-acid needs are met. However, achieving adequate leucine and total protein from homemade vegan foods may require larger portions, soy products, careful meal distribution, or supplementation. The evidence therefore supports planning rather than complacency.

4. INDIAN HOMEMADE VEGAN FOODS: STRENGTHS

Indian homemade vegan diets can be rich in carbohydrates, which are essential for many sports. Rice, wheat, millets, poha, upma, idli, dosa, potatoes, sweet potatoes, bananas, jaggery in moderation, and fruit can support glycogen replenishment. Endurance athletes, team-sport athletes, and high-volume trainees often require substantial carbohydrate intake, and

plant-based Indian staples can meet this need affordably. The challenge is not carbohydrate availability but matching intake to training load while avoiding excessive refined carbohydrates without micronutrient density.

Pulses and legumes provide protein, carbohydrate, fiber, iron, zinc, magnesium, potassium, and phytochemicals. Dal, chana, rajma, lobia, peas, moong, masoor, urad, sprouts, sattu, besan, and fermented batters can be used across meals. Soybean, tofu, tempeh, soy chunks, and soy milk are especially valuable because soy protein has a more favorable amino-acid profile than many other plant proteins. Indian Food Composition Tables provide nutrient values for a wide range of common foods and can support menu planning using locally available ingredients (Longvah et al., 2017).

Plant-based diets often provide high fiber and phytochemical intake. Fruits, vegetables, spices, legumes, nuts, seeds, and whole grains provide polyphenols, carotenoids, vitamin C, magnesium, and other compounds that may support vascular function and recovery. High antioxidant intake from whole foods may help athletes manage training-induced oxidative stress, although excessive isolated antioxidant supplementation may blunt some training adaptations. A whole-food plant-based diet is therefore best viewed as a diet-quality strategy rather than as a pharmacological antioxidant intervention.

Homemade vegan diets may also be affordable and culturally acceptable. Dal-rice, roti-dal, chana, rajma, sattu drinks, peanut chutney, sesame chutney, sprouts, soybean curry, millet khichdi, and vegetable pulao can be prepared in large quantities at low cost. For athletes from vegetarian or religiously observant households, a vegan diet may align with identity and reduce family conflict, although avoiding dairy may require additional negotiation in India. Cultural compatibility improves adherence, and adherence is a major determinant of long-term nutrition success.

5. ANIMAL-BASED DIETS: STRENGTHS AND LIMITATIONS

Animal-based diets offer practical advantages for protein quality. Eggs, milk, curd, paneer, fish, chicken, and meat provide complete proteins with high digestibility and relatively high leucine content. These foods can help athletes meet protein targets with smaller volumes of food, which is useful for strength athletes, power athletes, or athletes with low appetite. Dairy foods also provide calcium and vitamin B12, while eggs and fish can contribute vitamin D depending on preparation and food composition. For athletes with access and cultural acceptance, animal foods can simplify nutrient planning.

Vitamin B12 is the clearest advantage of animal-source foods. Strict vegan diets do not reliably provide vitamin B12 unless fortified foods or supplements are used. Vitamin B12 deficiency can cause megaloblastic anemia, neurological symptoms, and fatigue, all of which are incompatible with optimal performance. Vegetarian athletes who consume dairy may still have low B12 if intake is limited or absorption is poor. Vegan athletes should treat B12 supplementation as a requirement rather than an optional enhancement. This is one of the most important practical conclusions in vegan sports nutrition (Rogerson, 2017).

Animal-source iron and zinc are generally more bioavailable than plant-source iron and zinc. Heme iron in meat and fish is absorbed more efficiently than non-heme iron from pulses and greens. Plant diets can meet iron needs, but they require vitamin C-rich foods, food processing methods that reduce phytate, and monitoring in athletes with high sweat losses, menstruation, or endurance training. Zinc bioavailability is also lower in high-phytate diets. These issues do not make vegan diets impossible, but they make biochemical monitoring more important for serious athletes.

Animal-based diets are not automatically optimal. Some athletes consume animal foods in fried, salty, or highly processed forms while neglecting vegetables, fruits, whole grains, and hydration. Excess saturated fat or low fiber may impair long-term health. High animal-protein intake without enough carbohydrate can reduce glycogen restoration in sports that depend on repeated high-intensity efforts. Animal-based diets can also be expensive, inaccessible, or culturally unacceptable for some Indian athletes. A high-quality animal-based diet still requires planning, variety, and timing.

Table 1
Comparison of Homemade Vegan and Animal-based Diets for Indian Athletes

Dimension	Homemade vegan plant-based diet	Animal-based diet
Energy and carbohydrate	Strong potential through rice, roti, millets, potatoes, fruit, poha, idli, dosa, and sattu; bulk may limit intake for some athletes	Can meet needs, but low-carbohydrate patterns may impair glycogen restoration
Protein	Possible with soy, dal, chana, rajma, peanuts, tofu, besan, and cereal-pulse combinations; requires portion planning	Easier through eggs, milk, curd, paneer, fish, chicken, and meat; smaller food volume
Vitamin B12	Requires fortified foods or supplementation	Generally available from dairy, eggs, fish, meat, and poultry
Iron and zinc	Present in legumes, millets, greens, nuts, and seeds but lower bioavailability; vitamin C and processing help	More bioavailable in meat and fish; still requires overall diet quality
Calcium and vitamin D	Needs fortified plant milk, calcium-set tofu, sesame, ragi, greens, sunlight, monitoring, or supplements	Dairy supports calcium; vitamin D may still be low
Digestive tolerance	High fiber may require timing strategies around training	Lower fiber may ease pre-event meals but can reduce gut-health benefits
Cost and access	Can be low-cost if based on local pulses, soy chunks, grains, and seasonal foods	Can be more expensive depending on eggs, dairy, chicken, fish, and meat prices
Performance conclusion	Compatible with performance when planned and supplemented responsibly	Compatible with performance when balanced and not dominated by fried or processed foods

Note. This comparative synthesis draws on the principles of sports nutrition described by Thomas et al. (2016).

6. PROTEIN QUANTITY, QUALITY, AND TIMING

Protein is the most contested nutrient in vegan sports nutrition. Athlete protein needs often exceed sedentary requirements because training increases muscle protein turnover and adaptation demands. The sports nutrition position statement commonly cited in practice recommends approximately 1.2-2.0 grams of protein per kilogram of body weight per day for many athletes, depending on training type and goals (Thomas et al., 2016). Vegan athletes can meet this range, but they must account for lower digestibility and lower leucine density in many plant proteins. Soy, legumes, peanuts, and combinations of cereals and pulses are central to an Indian vegan plan.

The traditional cereal-pulse combination is nutritionally meaningful. Rice with dal, roti with chana, idli or dosa with sambar, khichdi, besan chilla, and sattu with roti combine amino-acid profiles better than cereal-only meals. However, the amount matters. A small bowl of thin dal served with large portions of rice may not provide enough protein for an athlete. Recipes may need to be modified by increasing dal thickness, adding soy chunks, using besan, including peanut or sesame chutney, adding tofu, and distributing protein across three to five meals. The Dietary Guidelines for Indians emphasize appropriate combinations of foods for good-quality protein (Indian Council of Medical Research-National Institute of Nutrition, 2024).

Leucine is important because it helps trigger muscle protein synthesis. Animal proteins usually provide more leucine per gram and are easier to consume in smaller volumes. Vegan athletes can compensate by eating larger portions, prioritizing soy foods, using legumes at multiple meals, and considering plant-protein powders when food volume becomes impractical. Homemade diets can work well for recreational and many competitive athletes, but elite athletes with high energy expenditure or limited eating windows may require specialized planning. The bar chart in Figure 2 shows approximate protein contributions from common Indian foods and illustrates why serving size matters.

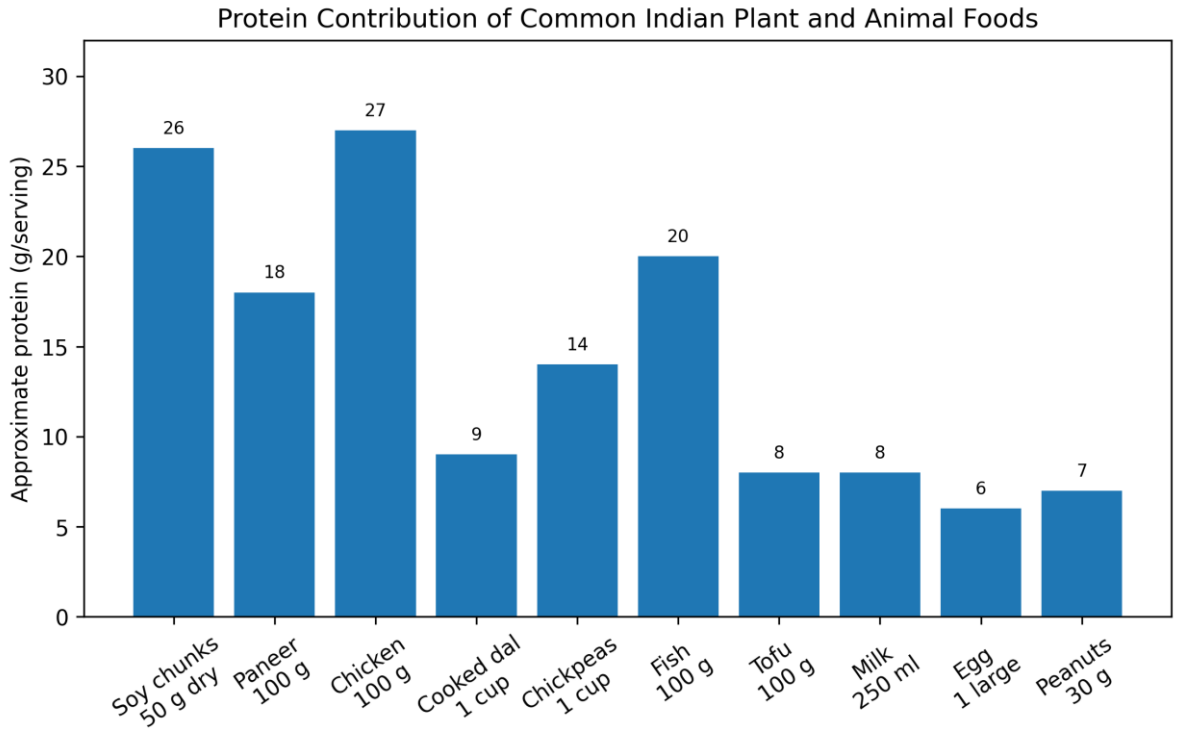

Figure 2. Approximate protein from common Indian plant and animal foods per serving.

Values vary by food variety and preparation.

7. MICRONUTRIENTS AND ERGOGENIC COMPOUNDS

Vitamin B12 is the non-negotiable nutrient in vegan diets. Fermented foods, spirulina, unfortified nutritional yeast, or soil contamination should not be considered reliable sources. Vegan athletes should use a tested B12 supplement or consistently consume fortified foods with adequate dose. B12 status should be monitored using appropriate biomarkers when symptoms or long-term veganism are present. Because deficiency can cause neurological harm, waiting for symptoms is not acceptable. This requirement does not make vegan diets inferior; it makes supplementation part of responsible vegan practice.

Iron requires special attention for Indian athletes, especially menstruating female athletes and endurance athletes. Vegan diets may contain substantial total iron from legumes, millets, greens, seeds, and jaggery, but non-heme iron absorption varies. Vitamin C-rich foods such as lemon, amla, guava, orange, tomato, and capsicum can improve absorption. Tea and coffee should not be consumed immediately with iron-rich meals. Soaking, sprouting, fermenting, and pressure cooking can reduce antinutrients and improve digestibility. Ferritin testing may be useful when fatigue, heavy menstrual bleeding, or declining performance occurs.

Calcium and vitamin D must be planned together. Dairy-based animal diets often provide calcium through milk, curd, and paneer, whereas vegan diets require fortified plant milks, calcium-set tofu, sesame, ragi, leafy greens with favorable oxalate profiles, or supplements when intake is low. Vitamin D deficiency is common even in sunny countries because of indoor lifestyles, clothing, pollution, skin pigmentation, and limited midday sun exposure. Athletes with low vitamin D may experience impaired bone health and muscle function. Monitoring and evidence-based supplementation are often necessary for both vegan and non-vegan athletes.

Omega-3 fatty acids present another difference. Vegan diets can provide alpha-linolenic acid from flaxseed, chia, walnuts, mustard oil, and soybean, but conversion to EPA and DHA is limited. Fish provides preformed EPA and DHA. Vegan athletes concerned about inflammation, cardiovascular health, or long-term adequacy may consider algae-based DHA or EPA

supplements. This is especially relevant when diets are high in omega-6 oils and low in alpha-linolenic acid. The performance effect is not always direct, but recovery and general health considerations matter across seasons.

Creatine and beta-alanine are performance-related compounds that are lower in vegan diets. Creatine is found mainly in animal tissues and supports repeated high-intensity efforts through phosphocreatine stores. Beta-alanine contributes to carnosine synthesis, which buffers acidity during high-intensity exercise. Vegan athletes may have lower baseline creatine stores and may respond well to creatine supplementation, especially in strength, sprint, and team sports. Rogerson identified creatine and beta-alanine as supplements that may be useful for vegan athletes, depending on sport demands (Rogerson, 2017). Supplements should be third-party tested to reduce contamination risk.

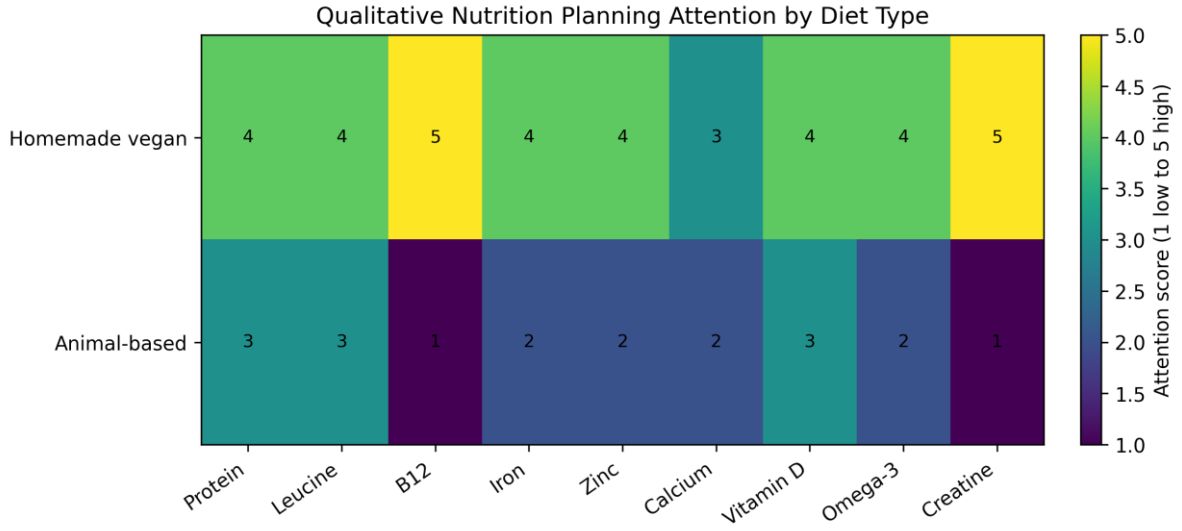

Figure 3. Qualitative planning-attention scores for key nutrients and compounds in vegan and animal-based diets.

8. DIGESTIVE TOLERANCE, FOOD VOLUME, AND TIMING

A common challenge in homemade vegan sports diets is food volume. Pulses, whole grains, vegetables, and fruits provide fiber and micronutrients, but high fiber immediately before training can cause bloating, gas, urgency, or discomfort. Athletes may need to periodize fiber intake by consuming lower-fiber carbohydrate foods before competition and higher-fiber meals away from training. For example, rice, poha, idli, bananas, and low-fat preparations may be better before high-intensity sessions than large portions of rajma or chana. This is not a rejection of legumes; it is timing strategy.

Gastrointestinal adaptation varies. Some athletes tolerate dal and legumes well because they have eaten them since childhood. Others experience discomfort when suddenly increasing beans, soy, or raw vegetables. Gradual increases, soaking, sprouting, pressure cooking, using hing, ginger, cumin, and dividing legumes across meals can improve tolerance. Fermented foods such as idli and dosa batters may be easier for some athletes than whole legumes. Coaches should avoid imposing high-fiber vegan meals immediately before competition without testing them during training.

Energy availability can be difficult when a vegan diet is very bulky and low in fat. Athletes with high training volume may need energy-dense foods such as peanuts, sesame, coconut, oils in moderation, dates, raisins, bananas, soy products, and smoothies made with fortified plant milk. Low energy availability can impair menstrual function, immunity, bone health, mood, and performance. This risk exists in both vegan and animal-based diets, but high-fiber low-energy-density vegan meals can make under-fueling less obvious. Regular monitoring of body weight trends, menstrual health, training mood, and recovery can help identify problems early.

Meal timing should match sport demands. A morning runner may need a banana, poha, or toast before training and a recovery meal with dal, soy, or tofu afterward. A wrestler or weightlifter may need protein distributed across meals and snacks. A

footballer may prioritize carbohydrate before and after training while maintaining protein through dal, chana, soy, and nuts. A marathoner may need carbohydrate loading using rice, potatoes, fruit, and low-fiber options. Diet type should be adapted to training, not the other way around.

9. INDIAN PRACTICAL MENU STRATEGIES

A homemade vegan high-protein day for an Indian athlete might include besan chilla with peanut chutney, a banana before training, soy-chunk pulao or dal-rice with vegetables after training, roasted chana or sattu drink as a snack, tofu or soybean curry with roti at dinner, fruit with vitamin C, and a B12 supplement. This pattern can provide carbohydrate, protein, minerals, and culturally familiar flavors. The main planning tasks are to ensure adequate portion size, distribute protein across the day, include vitamin C with iron-rich meals, and avoid tea immediately with major iron sources.

A lacto-vegetarian animal-source pattern might include milk, curd, paneer, dal, roti, rice, vegetables, fruit, nuts, and perhaps whey protein. This pattern can make calcium, protein, and B12 easier, but it may still lack iron if green vegetables and pulses are low. It may also become too high in saturated fat if paneer, ghee, and fried foods dominate. For athletes, dairy should be used strategically rather than assumed to solve all nutrient needs. Lacto-vegetarian athletes with low B12 are not rare, so monitoring remains useful.

An omnivorous pattern might include eggs at breakfast, dal-rice, chicken or fish at dinner, curd, vegetables, fruit, and snacks around training. This can provide high-quality protein and B12 efficiently, but affordability and cultural acceptance differ widely. Athletes who use chicken or eggs should still consume pulses, vegetables, fruits, and whole grains. Animal foods should add nutrient density rather than replace all plant foods. The healthiest animal-based sports diet in India is often mixed, not meat-dominant.

For budget-constrained athletes, soy chunks, sattu, roasted chana, groundnuts, seasonal fruit, dal, rice, millets, and vegetables may be more affordable than daily paneer, chicken, or supplements. Cost analysis should consider protein per rupee, cooking fuel, digestibility, storage, taste, and family sharing. Homemade vegan diets can be cost-effective when planned around local staples. However, relying on imported vegan products can make a vegan diet expensive and unnecessary. The Indian context favors practical food literacy rather than imitation of Western packaged vegan diets.

10. COMPARATIVE INTERPRETATION BY SPORT TYPE

Endurance sports such as running, cycling, rowing, and long-distance swimming depend heavily on carbohydrate availability, iron status, hydration, and gastrointestinal tolerance. Vegan diets can be advantageous in providing carbohydrate-rich meals, but menstruating female endurance athletes require careful iron monitoring. Animal-based diets can supply heme iron and compact protein but may underperform if carbohydrate is restricted. The key for endurance athletes is not vegan versus non-vegan; it is adequate carbohydrate, iron status, energy availability, and race-day gut comfort.

Strength and power sports such as weightlifting, sprinting, wrestling, kabaddi, and throwing events require protein adequacy, leucine distribution, creatine availability, total energy, and body-composition management. Vegan athletes can meet protein needs using soy, legumes, nuts, seeds, and possibly protein powders, but they may need more deliberate planning than athletes consuming eggs, dairy, fish, or meat. Creatine supplementation may be especially relevant for vegan power athletes. Animal-based diets offer convenience, but overreliance on high-fat foods may interfere with weight-category goals.

Team sports such as football, hockey, cricket, basketball, and volleyball combine endurance, sprinting, agility, skill, and recovery demands. These athletes need carbohydrate before and after sessions, protein distributed through the day, hydration, electrolytes, and micronutrient sufficiency. Vegan menus can support these demands if meals are timed and portable snacks are planned. Animal foods can simplify recovery meals but are not essential if vegan alternatives are well designed. Travel, tournament schedules, and hostel food availability may be more important barriers than diet category.

Aesthetic and weight-category sports require special caution. Gymnastics, combat sports, bodybuilding, and weight-sensitive events can increase risk of restrictive eating and low energy availability. Vegan diets may be misused as a socially acceptable way to restrict food groups, while animal-based high-protein diets may be misused to justify extreme carbohydrate restriction. Coaches and dietitians should screen for disordered eating,

menstrual dysfunction, fatigue, and rapid weight changes. The priority is health-protective performance, not short-term weight manipulation.

11. ETHICAL, CULTURAL, AND SUSTAINABILITY CONSIDERATIONS

Diet choice is not only physiological. In India, religious practice, caste norms, family identity, affordability, animal welfare, environmental concern, and local food availability shape what athletes can eat. Some athletes may face family resistance to eggs or meat; others may face resistance to removing dairy. A respectful sports nutrition approach should not shame athletes for their food culture. Instead, it should translate performance targets into culturally feasible meals. This is especially important for young athletes living in hostels, sports academies, or rural households.

Sustainability is often cited in favor of plant-based diets. Legumes, pulses, and millets can have lower environmental burdens than many animal-source foods, though impacts vary by production system. India also has rich traditions of pulse and millet consumption that align with food-system resilience. However, sustainability claims should not ignore athlete health or local livelihoods. A balanced conclusion is that plant-forward sports diets can support both health and sustainability when nutrient adequacy is protected. Vegan diets require B12 supplementation and careful attention to other nutrients; sustainability does not eliminate physiology.

Ethical communication matters. Athletes should not be promised that veganism will automatically increase stamina, reduce injury, or accelerate recovery. Nor should they be told that performance is impossible without meat, eggs, or whey. Exaggerated claims create distrust and may harm athletes who follow them without monitoring. The most ethical message is conditional: either vegan or animal-based diets can support performance when they meet evidence-based targets and are adapted to the athlete's sport, body, values, and context.

12. RECOMMENDATIONS FOR INDIAN ATHLETES AND PRACTITIONERS

The first recommendation is to assess before prescribing. A nutrition plan should collect the athlete's sport, training volume, body weight, body-composition goals, menstrual status where relevant, injury history, gastrointestinal tolerance, budget, cooking facilities, supplement access, and food preferences. A vegan athlete who can cook soy and dal at home has different needs from a hostel athlete dependent on a canteen. An omnivorous athlete with low vegetable intake requires different counseling from one already eating a diverse diet. Assessment prevents generic advice.

The second recommendation is to set measurable targets. Athletes should know daily energy goals, carbohydrate timing, protein target per kilogram, protein per meal, hydration plan, and key micronutrient safeguards. Vegan athletes should include B12 supplementation, vitamin D monitoring, iron strategy, zinc-rich foods, calcium sources, and omega-3 planning. Animal-based athletes should include vegetables, fruits, pulses, whole grains, and limits on fried processed foods. Both groups should monitor performance, recovery, sleep, injury, and illness patterns.

The third recommendation is to use food-first planning but not food-only ideology. Most needs should be met through meals, but supplements are sometimes evidence-based and practical. Vegan athletes may require B12 and may benefit from creatine depending on sport. Vitamin D may be needed by athletes of any diet pattern. Iron should be supplemented only when indicated because unnecessary iron can be harmful. Protein powders may be useful when food volume, travel, or timing prevents adequate intake, but they should not replace dietary quality.

The fourth recommendation is to periodize nutrition. Training days, rest days, competition days, weight-management phases, injury rehabilitation, and travel periods require different strategies. A high-fiber rajma meal may be excellent for general health but unsuitable two hours before a race. A low-fiber carbohydrate meal may be useful before competition but insufficient as a daily diet. Vegan and animal-based athletes both benefit from matching food timing to physiology.

13. CONCLUSION

Vegan diets can support sports performance in India when they are well planned, adequately fueled, protein-conscious, and supported by vitamin B12 supplementation and monitoring of key nutrients. Homemade plant-based foods such as dal, chana, rajma, soy, peanuts, sesame, millets, rice, wheat, vegetables, and fruit provide a culturally grounded foundation for athletic diets. Animal-based diets offer

practical advantages in protein density, vitamin B12, and bioavailable iron and zinc, but they are not automatically superior and can be poor in overall quality if badly structured. The evidence does not justify ideological certainty on either side.

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