

# The Influence of Dietary Habits on the Nutritional Status of Athletes

Gurpinderjeet Kaur<sup>1</sup>, Divoy Chhabra<sup>2</sup>, Mahesh Khadwal<sup>3</sup>, Jasdeep Jalph<sup>4</sup> Gurpreet Kaur<sup>5</sup>

## Abstract

*The influence of dietary habits on the nutritional status of athletes, a sample of 100 athletes, consisting of 50 vegetarians (25 males and 25 females) and 50 non-vegetarians (25 males and 25 females), aged 17–26 years, was selected from Punjabi University Patiala and NIS Patiala. Information was gathered about the athletes' overall characteristics, anthropometric measures, food consumption, level of physical activity, and physical performance. The information showed that consumption of five food groups – vegetables, grains, pulses, and sugar – was insufficient. On the other hand, more fruits, milk, and dairy products were consumed. Both vegetarian and non-vegetarian athletes of both sexes were found to consume inadequate amounts of energy, protein, fat, and iron, but acceptable amounts of calcium and folic acid. It was discovered that 3% of nonvegetarians and 7% of vegetarians among males had a Body Mass Index (BMI) below 18 kg/m<sup>2</sup>. 25% of nonvegetarians and 35% of vegetarians were underweight among females.*

**Keywords:** Vegetarian, nonvegetarian, physical performance, athletes, body mass index

## INTRODUCTION

Functional ability, physical performance, and nutrition are all related. A person's ability to perform physically may be hampered by any nutritional deficiencies that have a detrimental effect on their health. As a result, an athlete's overall success in sports depends heavily on their diet and general health. Different sports require varying levels of exercise and a balanced diet to maintain good fitness. Numerous studies support the significant role of good nutrition in sustaining the health and fitness of athletes, enabling them to train and compete effectively.

Due to a wide range of social, economic, and religious views, Indians have quite different eating

### \*Author for Correspondence

Gurpinderjeet kaur  
E-mail: [viceprincipal.ctihm@ctgroup.in](mailto:viceprincipal.ctihm@ctgroup.in)

<sup>1</sup>Assistant Professor, Department of Hotel Management, CT Institute of Hospitality Management, Shahpur, Jalandhar, Punjab, India

<sup>2</sup>Research Scholar, Department of Hotel Management, CT Institute of Hospitality Management, Shahpur, Jalandhar, Punjab, India

<sup>3</sup>Head of Department, CT Institute of Hospitality Management, Shahpur, Jalandhar, Punjab, India

<sup>4,5</sup>Student, Department of Hotel Management, CT Institute of Hospitality Management, Shahpur, Jalandhar, Punjab, India

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patterns. Vegetarianism is becoming popular among athletes and players for religious, financial, and environmental reasons. According to research, a well-planned vegetarian diet that includes a wide range of foods can promote overall health and dramatically reduce the chance of developing chronic illnesses. A vegetarian diet usually consists of fruits, vegetables, whole grains, legumes, and nuts, but it excludes all forms of meat and fish [1]. A healthy, balanced diet can improve an athlete's level of physical activity, performance, and recuperation after training. More muscle mass can be achieved by consuming more protein, especially from meat. Furthermore, eating beef might encourage better muscle growth in reaction to resistance training.

Vegetarian athletes following a meatless diet

often have lower energy intake and reduced levels of vitamins and minerals, particularly B-complex vitamins, calcium, iron, and zinc. However, if vegetarian diets are carefully planned to include a variety of foods, they can meet the nutritional needs of athletes. Vegetarian diets have been associated with numerous health benefits, including a lower risk of death from heart disease, reduced blood pressure, and a lower incidence of cancer. According to Wang and Beydoun (2007) [2], nonvegetarian athletes tend to consume fewer fruits and vegetables compared to their vegetarian counterparts.

Athletes in various sports may require different levels of body fat depending on the duration of their training. Strength and agility, which are crucial for optimal performance, are significantly influenced by body composition [3]. Body weight significantly impacts athletes' speed, endurance, and power. According to Ducher (2011) [4], female athletes are more likely to eat a vegetarian diet to reach their ideal body weight because it is advised that they have at least 12% body fat to satisfy general health needs. But cutting calories to get a certain body or improve performance can backfire, particularly if strength training causes a severely restricted calorie intake.

Excessive exercise or insufficient recovery can lead to detrimental outcomes, such as poor health, chronic fatigue, injuries, and muscle soreness. Recovery involves elements like relaxation, stretching, muscle stimulation, and adequate sleep. Therefore, athletes should prioritize prompt and thorough recovery following intense training to fully reap the benefits of their hard work.

The health benefits of a vegetarian diet have been documented extensively among non-athletes. However, it is pertinent to explore how a vegetarian diet affects athletes and whether it enhances or potentially compromises performance.

Given the current situation, the study was designed with the following objectives:

1. To assess the dietary patterns, nutritional status, and dietary adequacy of athletes.
2. To investigate how dietary patterns influence the nutritional status of athletes.

## REVIEW OF LITERATURE

Much of the research comparing the effectiveness of various dietary habits has focused on adults to observe their impact on nutritional status. Few studies have specifically investigated vegetarian and nonvegetarian athletes to assess their physical fitness in relation to their dietary habits and nutritional status. Accordingly, relevant literature has been reviewed and organized into the following sections:

Laidlaw (1988) [5] analyzed three-day diet records from fourteen participants following a vegetarian diet, finding their intake of protein, carbohydrates, and Vitamin B6 to range from marginal to adequate compared to nonvegetarians.

Kalpna (2012) [6] studied the nutritional status of specific exercise groups among Indian athletes in a sports training camp. It was noted that while the diets planned and provided to athletes supplied sufficient nutrients overall, the intake of foods rich in iron, copper, and zinc was lower among them due to adherence to traditional diets. Additionally, lack of awareness about nutrition and balanced diets for optimal performance may have led to poor food choices and consequently lower nutrient intake.

A study on the situational analysis of female athletes was carried out by Kaur and Singla (2017) [7]. According to the survey, 78% of athletes showed bad confidence, while only 22% showed strong confidence. A diet high in energy, especially in the form of carbs, iron, fruits, vegetables, and fluids, may therefore help athletes become more fit and self-assured.

According to Chandrasekaran & Easwaran (2000) and Anup Adhikari et al. (2014) [8, 9], there was a positive correlation observed between energy intake, lean body mass, hemoglobin levels, and

maximum aerobic capacity (VO<sub>2</sub>) among athletes. This suggests that the nutritional status of athletes directly impacts their physical fitness and, consequently, their performance. It was noted that emphasizing the importance of nutritional adequacy in their diets could help athletes achieve their full potential.

Jose R. & Chandrasekhar U. (2009) [10] investigated the nutritional profiles and performance parameters of selected male and female athletes. They demonstrated a notable correlation between age and variables, such as energy intake ( $p < 0.05$ ) and cardiovascular efficiency scores. They recommended dietary modifications focusing on all nutrients, particularly micronutrients, with special emphasis on foods rich in iron and B-complex vitamins.

Joseph et al. (2012) [11] discovered that professional weightlifters had a mean carbohydrate intake equivalent to only 58% of the Recommended Dietary Allowance (RDA), and protein intake was below recommended levels in 90% of the weightlifters. The analysis of food intake data revealed that the dietary intake of macronutrients and iron did not meet recommended allowances. Fat intake was below recommended levels across all subjects. Iron intake was reported as adequate in only 23% of subjects, while calcium intake exceeded requirements. The findings underscore the need for India to enhance professional and personalized medical and nutritional care for athletes to achieve sporting excellence on the global stage.

Anup Adhikari et al. (2014) [9] found that female athletes had an average height and weight of 157.6 cm and 50.6 kg, respectively, with an average age of 17.8 years. Heights ranged from 149.0 to 166.2 cm, and body weights ranged from 44.0 to 60.3 kg. Male athletes had an average height of  $171.2 \pm 7.5$  cm, ranging from 157.4 to 181.4 cm, and an average body mass of  $62.7 \pm 8.2$  kg, ranging from 47.2 to 73.5 kg. Female athletes exhibited a slightly higher percentage of body fat ( $18.4 \pm 2.3\%$ , ranging from 14.1 to 22.0%) compared to male athletes ( $7.9 \pm 1.5\%$ , ranging from 5.7 to 11.3%). The average VO<sub>2</sub> max was  $45.3 \text{ ml.kg}^{-1}.\text{min}^{-1} \pm 6.6$  for female athletes, ranging from 34.1 to 56.1  $\text{ml.kg}^{-1}.\text{min}^{-1}$ , while male athletes had an average VO<sub>2</sub> max of  $59.1 \text{ ml.kg}^{-1}.\text{min}^{-1} \pm 5.3$ , ranging from 50.3 to 68.4  $\text{ml.kg}^{-1}.\text{min}^{-1}$ . Therefore, the subpar performance of Bangladeshi athletes may be attributed to their suboptimal anthropometric characteristics.

Joseph et al. (2012) [11] proposed that due to the lower digestibility of plant proteins, vegetarians may have significantly higher protein requirements compared to nonvegetarians.

Dietary habits and their effects on changes in waist circumference and BMI in 459 healthy men and women taking part in the ongoing Baltimore Longitudinal Study of Aging were studied by Newby et al. (2003) [12]. Seven-day eating records were used for the dietary assessment, resulting in 41 food groups that were examined in a group study. There were five different types of eating: meat and potatoes, alcohol, sweets, white bread, and health. Subjects in the meat-and-potatoes cluster experienced a mean annual change in BMI of  $0.30 \pm 0.06$ , whereas those in the healthy cluster had a change of  $0.05 \pm 0.06$  ( $P < 0.01$ ). Similarly, the mean annual change in waist circumference was significantly higher for subjects in the white-bread cluster ( $1.32 \pm 0.29$  cm) compared to those in the healthy cluster ( $0.43 \pm 0.27$  cm) ( $P < 0.05$ ) [13]. These findings underscored the association between diets rich in fruits, vegetables, whole grains, and low in red and processed meats and fast food with smaller increases in BMI and waist circumference over time.

Sims et al. (2023) [14] examined the diets of 25 female athletes and 25 nonathletes, revealing that athletes' diets were deficient in essential foods, fluids, and nutrients per day, while nonathletes consumed diets high in fats and sugar.

Newby et al. (2003) [13] investigated the positive impact of meat and fish on iron absorption, attributing it to factors, such as amino acids, peptides, glycosamines, glycans, the gastric-acid

promoting effect of meat, and  $\alpha$ -glycerophosphocholine. Meanwhile, Devadas et al. (2016) [15] found that poor iron status was independently linked with vegetarianism among British adolescents.

## MATERIALS AND METHODS

The purpose of the current study was to investigate how dietary practices affect athletes' nutritional status. The present study was carried out at NIS Patiala and Punjabi University Patiala.

### SELECTION OF SUBJECTS

A total of 120 individuals, comprising fifty vegetarians (25 men and 25 females) and 50 nonvegetarians (25 males and 25 females), were chosen from Punjabi University Patiala and NIS Patiala. The subjects were between the ages of 17 and 26. Personal interviews conducted according to a predetermined timetable were used to gather the data. The time frame covered by the study was December 2022–April 2023. Information was gathered using a semi-structured questionnaire and interview technique. Anthropometric using a weighing scale and an anthropometric rod, measurements, such as height and weight were taken, and BMI was computed. A dietary survey was conducted to gather information on dietary patterns, food consumption habits, and food preferences. Detailed data on food intake was collected using the 24-hour recall method over three consecutive days. The Indian Nutritive Software DietCal-A, created by Kaur G. (2014) for dietary assessment and planning, was used to examine nutrient intake. Means, standard deviations, and percentage distributions were calculated to statistically examine the gathered data. To compare the subjects' classifications, t-tests were used.

## RESULTS AND DISCUSSION

According to Table 1, the highest percentage of vegetarian male athletes (30%) consumed parathas three times a week, while poori was rarely consumed by both vegetarian and nonvegetarian athletes. Many of the subjects, comprising 33% of nonvegetarian athletes and 46% of vegetarian athletes, consumed bread daily or twice a week. Thirty percent of athletes who were not vegetarians ate rice every day. Forty percent of vegetarian athletes rarely ate Dalia.

Three times a week, most vegetarian athletes ate pulses in the form of whole, dehusked, or sprouted pulses. Every day, milk and milk products were ingested by both vegetarian and nonvegetarian participants. Most participants ate green leafy vegetables daily – 56% of nonvegetarians and 56% of vegetarians. Other vegetables, such as roots and tubers, were eaten twice a week by vegetarian males and everyday by nonvegetarian males. In a similar vein, most of both male categories ingested fruits daily.

From Table 2, the highest percentage of vegetarian female athletes (36%) consumed parathas daily, while poori was rarely consumed by both vegetarian and nonvegetarian athletes. Most participants ate bread on a weekly basis for 28% of nonvegetarian athletes and infrequently for 40% of vegetarian athletes. Thirty-five percent of athletes who were not vegetarians ate rice every day. Fifty percent of athletes who were not vegetarians hardly ever ate dahlia. Many vegetarian athletes ate whole or dehusked pulses twice a week in addition to daily. Both vegetarian and nonvegetarian respondents consumed milk and milk products daily. Green leafy vegetables were consumed every day by several participants, including 55% of vegetarians and 66% of athletes who were not vegetarians. 31% of nonvegetarian females and 33% of vegetarian females ingested other vegetables, such as roots and tubers, infrequently. Similarly, most ladies in both groups ate fruit every day. Both vegetarian and nonvegetarian females seldom ever ate sweets.

The frequency of nonvegetarian food consumption among the subjects is presented in Table 3. It was discovered that 40% of the respondents, both male and female, ate eggs every day. Twenty percent of females and 30% of males ate chicken three times a week. All subjects hardly ever ate fish, red meat, or white meat because these nonvegetarian foods are uncommon in Punjab.

**Table 1.** Shows the percentage frequency of different food consumption among males (n = 25 per group).

Food	Daily		Thrice a Week		Twice a Week		Weekly		Fortnightly		Rarely	
	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg
Parantha	23.3	16.7	30	16.6	10	23.3	23.3	23.4	3.4	6.6	6.7	13.4
Poori	0	0	0	0	3	6	26	13	3	10	66	70
Bread	3	33	13.3	6	46	26	13	16	0	6	23	10
Rice	17	30	14	20	26	20	3.4	20	30	4	10	4
Dalia	10	20	14	15	3.4	10	17	20	17	20	40	14
Chapati	100	97	0	4	0	0	0	0	0	0	0	0
Whole pulses	30	17	37	26	27	37	4	4.1	4.3	7.6	0	10
Dehusked pulses	6	21	36	7.6	17	44	14	17	6	3	20	10
Sprouts pulses	13	16	36	26	6.0	24	0	14	10	10	33	10
Milk products	99	98	0	4	0	0	0	0	0	0	0	0
GLV	66	56	27	20	14	6	3	6	0	0	0	0
Roots & tubers	13	26	21	24	24	13	20	20	10	6	13	10
Fruits	75	62	27	14	6	13	3	0	0	0	0	0
Sweets	4	17	10	6	10	16	13	14	20	10	42	37
Fried foods	0	0	11	8	5	10	10	6	20	14	60	62

**Table 2.** The percentage frequency of different food consumption among females (n = 25 per group).

Food	Daily		Thrice a Week		Twice a Week		Weekly		Fortnightly		Rarely	
	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg	Veg	Non-veg
Parantha	36	40	36	20	10	3	13	26	3	0	6	10
Poori	0	0	0	0	0	4	20	24	10	7	70	67
Bread	2.4	0	12.3	15.5	20	24.3	10	28	10	6.5	40	27
Rice	20	35	16	20	20	16	10	16	23	3.0	10	10
Dalia	33	0	33	10	10	23	13	0	3	6	6	50
Chapati	100	100	0	0	0	0	0	0	0	0	0	0
Wholepulses	33.3	36.6	30	16.6	6.7	26.6	26.6	26.6	3.4	3.4	0	10
Dehuskedpulses	10	3.3	16.7	13.4	26.6	20	23.3	30	0	0	23.4	33.3
Sproutspulses	3.4	3.3	20	3.3	33.3	43.3	6.7	16.7	6.6	16.7	30	16.7
Milkproducts	97	100	3	0	0	0	0	0	0	0	0	0
GLV	55	66	26	3	13	21	6	6	1	3.1	0	0
Roots&tubers	10	16	20	20	10	16.6	33	31	20	6.7	6	30
Fruits	70	80	20	20	8	2	3	3	0	0	0	0
Sweets	23	10	6	16	6	10	10	13	10	10	44	40
Friedfoods	0	0	10	3	16	20	10	17	14	20	50	40

**Table 3.** The subjects' (n = 25 each) percentage frequency of nonvegetarian food consumption.

Food	Daily		Thrice a Week		Twice a Week		Weekly		Fortnightly		Rarely	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
EggWhole	40	40	24	10	17	3	0	20	13	13	16	23
Eggyolk	3	0	33	6	6	6	10	13	3	10	43	64
EggWhite	40	23	24	17	14	3	3	20	3	3	16	34
Chicken	14	10	30	20	30	6	27	31	3	14	10	13
Fish	0	8	0	7	6	18	20	0	10	7	65	50
Readmeat	7	0	3	0	4	7	7	5	5	10	75	75
Whitemeat	3	0	0	6	4	12	5	0	7	23.3	85	65

## ANTHROPOMETRIC MEASUREMENTS

Along with other physiological characteristics, anthropometric parameters have a significant impact on athletic performance [14]. There were no appreciable differences in height, weight, or body mass index (BMI) between vegetarian and nonvegetarian subjects of either gender, according to data on the subjects' anthropometric measurements (Table 4). In a similar vein, Kalpana et al. (2012) [6] found no discernible variations in lean body mass, weight, or height between vegetarian and nonvegetarian participants. The waist and hip circumferences of the male and female vegetarian and nonvegetarian subjects, however, differed statistically significantly.

**Table 4.** Anthropometric measurements of the subjects (N = 100).

Parameters	Males			Females		
	Veg (n = 25)	Non-veg (n = 25)	t-value	Veg (n = 25)	Non-veg (n = 25)	t-value
Height(mts)	1.7 ± 0.05	1.7 ± 0.07	1.6 <sup>NS</sup>	1.6 ± 0.04	1.6 ± 0.06	0.9 <sup>NS</sup>
Weight(kg)	69.8 ± 11.3	73.2 ± 9.4	1.2 <sup>NS</sup>	50.2 ± 4.7	52.7 ± 6.6	1.6*
BMI	22.7 ± 3.3	23.1 ± 2.8	0.5 <sup>NS</sup>	19.6 ± 1.7	20.2 ± 2.8	0.9 <sup>NS</sup>
Waist(inch)	32.6 ± 2.4	33.6 ± 2.3	1.7*	28.1 ± 2.1	29.3 ± 2.7	1.9*
Hip(inch)	36.2 ± 2.9	37.9 ± 2.9	2.1*	32.2 ± 2.5	33.9 ± 2.8	2.5*
W/Hratio	0.9 ± 0.02	0.9 ± 0.03	0.6 <sup>NS</sup>	0.9 ± 0.04	0.9 ± 0.02	0.4 <sup>NS</sup>
Tricepsskinfold	7.5 ± 2.7	8.8 ± 3.1	1.6 <sup>NS</sup>	9.8 ± 1.8	9.8 ± 2.0	0.1 <sup>NS</sup>

## CONCLUSIONS

Good nutrition is pivotal in maintaining health, enabling athletes to train and compete optimally. A well-planned and diverse vegetarian diet can effectively support good health and potentially reduce the risk of numerous chronic diseases. Therefore, nutrition plays a crucial role in the realm of sports. The current study looked at how food habits affect athletes' nutritional condition. Regardless of their dietary preferences, athletes of both sexes regularly ingested milk and milk products.

Green leafy vegetables were ingested everyday by the majority, comprising 55% of vegetarians and 66% of nonvegetarians. In a similar vein, most male and female participants ate fruits daily.

Forty percent of the male and female individuals ate eggs every day. Males consumed chicken more frequently than females, with 30% of males and 20% of females eating it three times per week. Subjects of both genders who were vegetarians and those who were not showed no appreciable differences in height, weight, or BMI. Nonetheless, measurements of waist and hip circumference showed a statistically significant difference ( $p \leq 0.05$ ) between male and female vegetarian and nonvegetarian patients.

Most of the patients were in the normal BMI range. Compared to their male counterparts, the prevalence of obesity risk and Grade I obesity was considerably lower among female subjects in both the vegetarian and nonvegetarian categories.

## Recommendations

- Vegetarianism presents a viable and healthy option for sportspersons. By focusing on a balanced diet rich in nutrients, like protein, vegetarians can ensure adequate intake of essential nutrients, promoting optimal health and performance.
- Nutritionists can significantly contribute by educating athletes and importance of proper diet in improving performance.

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