

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills		
	20	
2. Knowledge and Understanding Skills		
	20	
3. Cognitive and Intellectual Skills		
	30	
4. Practical Application Skills		
	20	
5. Transferable Skills for Life and Professional Practice		
	10	

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate)	
	Up to 1 week late (40% Max)	
	Over 1 week late (0%)	

Essay

UNIVERSITY OF WALES TRINITY SAINT DAVID

**Perspectives on Health & Physical Activity
(BMPE6003)**

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Vegan and Plant-Based Diets in Sports and Exercise

Abstract

Health is one of the most important aspects of life, and nutrition plays a very significant role in health. When it comes to athletes their overall health is strongly associated with their performance in sports and physical activity. With each passing year, various diets and nutritional strategies are emerging and becoming more popular in public. Vegan and plant-based diets are becoming more popular among the general population every year. Many athletes are also influenced by these trends, and they are trying these nutritional strategies and diets to get better in their sports. Animal products like meat and dairy have been used for ages as a symbol of stronger bones and muscles. This results in a massive debate, especially between vegan, vegetarian, plant-based and non-vegan athletes. The debates are can an individual who follows a meat-free diet be strong and fit as a meat eater and whether can meat-free diet plan result in more benefits on sports performance. This paper will evaluate these debates by looking at several studies which have been done in the past, identify the issues caused by meat-free diets in sports and demonstrate the use of meat-free diets by athletes in sports.

Introduction

Meat-free diets are becoming increasingly popular and impact populations for a variety of reasons, including health, a more sustained lifestyle, and ethical reasons. Following a meat-free diet has been linked with multiple health benefits. The diet is associated with reducing the chances of developing diseases such as coronary heart disease (Fraser, 2005, pp. 53-58), dementia (Giem et al, 1993, pp. 28-36), breast cancer (Catsburg et al, 2015, pp. 817-823), cataracts (Appleby et al, 2011, pp. 1128-1135), colorectal cancers (Orlich et al, 2015, pp.767-776), hypertension (Yokoyama et al, 2014, pp. 577-587), prostate cancer (Tantamango-Bartley et al, 2016, pp.153-160), type 2 diabetes (Kahleova and Pelikanova, 2015, pp. 448-458) and insulin resistance (Kim and Bae, 2015, pp. 175-181). The studies also revealed that people who follow a meat-free diet are also relatively low in body mass index (BMI) and they got better lipid panel (Spencer et al, 2003, pp. 728-734, and, Quiles et al, 2015, pp. 156-164). All these health benefits result in a big influence on the general population. Especially athletes who always try to get healthier, and fitter to perform and reach better physical capacity are influenced by these health benefits. For this reason, vegan and meat-free diets are becoming very

popular among athletes. Furthermore to the health benefits of these diets, less meat and dairy consumption have a major positive impact on the environment. The production process of meat and meat products requires more water, land and energy supplies to be used in higher demand compared to growing plants for food sources (Pimentel and Pimentel, 2003, pp. 660S-663S). Also, meat production requires more greenhouse gases to produce than a vegan diet (Monsivais et al, 2015, pp.138-145). Regardless of these many positive impacts on the health of meat-free diets most people are still worried if these diets can supply adequate nutrition to support athletic performance optimally. The major issue with meat-free diets is usually they are low in protein, carnitine, creatine and vitamin B-12 which all these nutrients are essential for optimal athletic performance (Delanghe et al, 1989, pp. 1802-1803 and, Janelle and Barr, 1995, pp. 180-189). The bioavailability of zinc and iron minerals is lower in plant sources compared to meat sources (Hunt, 2003, pp. 633S-639S). In spite meat-free diets often provide higher carbohydrates and antioxidants (Rauma and Mykkanen, 2000, pp. 111-119, and, Calkins et al, 1984, pp. 896-905), which are crucial for achieving optimum physical performance, especially for endurance sports (Nieman, 1988, pp. 754-761). The common issue that plant-based athletes usually come across is that even nowadays meat is still respected and used as a symbol of masculinity and muscularity, especially for male athletes (Wirnitzer et al, 2018, pp. 387-453). The reason that this issue is more common in male athletes is that male model images are directly linked with physical capacity, potency, domination, power and strength (Schösler et al, 2015, pp. 152-159). The fact that male athletes withdraw their consumption of meat and animal products may create a stereotype and conception in society that they are not as real men as meat eaters. This social understanding can have a major negative impact on the self-esteem levels of plant-based male athletes, resulting in decreased performance and motivation in their sport (Baines et al, 2007, pp. 436-442). There are so many debates in the general public issued by the representation of protein in physical activity and sports (Jager et al, 2017, p. 20). Despite the many health benefits of meat-free diets, there is still a widespread belief among the general public that vegetable protein is of poor quality compared to animal protein. That is why the most common question vegan athletes usually get is 'Where do you get your protein from?' (Wirnitzer, 2020, p. 165). Protein has a very crucial role in the construction and maintenance of the body's tissues and it is essential for assisting in the repairment and recovery of strained and damaged body tissues like muscles. Vegan and plant-based diets may not involve the consumption of meat and meat products but surprisingly many plant-based food sources excluding fruits such as soybeans, legumes, peas, lupins, peanuts, rice and potatoes are also high in protein. In the comparison of animal and plant proteins on a caloric basis, plant-based sources are relatively higher in protein content compared to animal sources because of the high-fat content of animal sources. The low-fat content of plant-based foods also supports body-weight management

(Wirnitzer, 2020, p. 165). Nuts and legumes are the main plant sources of protein, but they also provide a variety of nutrients that help with numerous positive effects on health. Nuts and legumes provide quality carbohydrates with a low glycemic index structure, high dietary fibre, phytochemicals, minerals and vitamins (Hoffman and Falvo, 2004, pp. 118). One of the main debates in plant-based diets in sports is 'Can plant-based diet provide adequate protein supply and quality for athletes?'. Academy of Nutrition and Dietetics (AND) reported that plant-based and vegan diets supply the same protein quality as omnivore diets. The limitation of plant-based proteins is the leucine, threonine, tryptophan, methionine, and lysine content are relatively low compared to animal proteins (Mangels et al 2003, pp. 748-766). Legumes and grains are good sources of protein, but soy provides better protein quality and is more similar to animal protein in terms of protein quality. (Melina et al, 2016, pp. 1970-1980). A well-balanced meat-free diet means high consumption of plant-based foods such as various vegetables, grains, beans, legumes, nuts and fruits. When the essential total calorie intake is achieved with these food sources, they will also supply essential amino acids and many vitamins and minerals which are crucial for health especially when it comes to physical performance and capacity. Some studies have revealed that plant-based diets not only result in the consumption of essential micro and macronutrients but may even exceed the limits of essential macronutrients without any additional supplementations (Melina et al, 2016, pp. 1970-1980 and, Thomas et al, 2016, pp. 543-568). It is scientifically proven that non-active vegans and even vegan athletes who have higher needs of nutrients their amino-acid and protein requirements are effortlessly achieved with a plant-based diet plan (Mcdougall, 20022, pp. e197-e197). AND and ADA also agreed that when a plant-based diet is followed with the consumption of various plant foods there is no requirement for nutritional habits like 'protein combining' or 'complementing'. Consumption of essential amino acids is easily achievable by just following a plant-based diet (Melina et al, 2016, pp. 1970-1980 and, American Dietetic Association, 2003, p. 748).

How popular are plant-based diets?

However, vegan and plant-based diets started to get more interest after 2017. The scientific interest in the connection between plant-based diets and sports is rising and the publication of studies and review articles about plant-based diets and sports have been more common. Nine review articles have been written between 2004 and 2020 about plant-based diets and their effects on sports (Barr and Rideout, 2004, pp. 696-703). Eliminating meat and animal products are becoming a big trend, especially in industrialized nations. This trend is also being followed by a few world-class elite-level athletes. The elite-level world-class athletes have a huge effect on influencing the population, especially people who exercise and take part in physical activity are more

likely to be influenced. For this reason, the number of vegan athletes is growing across all levels of sports such as school, amateur, professional and recreational (Stahler, 2011, pp. 10-11). In the United States, 6% of the population is classified as vegetarian and vegan. In Europe, about 10% of the population are following some kind of vegetarian diet. The vegan and plant-based diets are followed by 10% of the Austria, Germany and Italy populations. In the British 13% of the population and 14% of the Swiss population are identifying themselves as vegan or vegetarian. In the younger generation who are between 22-38 years old vegan and plant-based diets are becoming more popular and common each day. 25% of the 18-year-olds in the UK are following a vegan or plant-based diet while 30% of the 18 to 24 year-old British population are identifying themselves as vegan or plant-based eaters. (Wirnitzer, 2020, p. 165).

Plant-based diets in Sports

Health is the most crucial element when it comes to living life to the fullest. It is also accepted as an essential social standard (Wirnitzer, 2020, p. 165)., Furthermore, it is the main key aspect for a decent physical capacity and success in sports (Wirnitzer et al, 2018, pp. 387-453). The strong link between health and lifestyle aspects of sport, exercise and nutrition is believed to be undisputed. Another consideration is that nutrition and sports are both accepted as medicine. Nutrition and sports are two key elements that have a big positive impact on better overall health for athletes. Poor nutrition can be harmful to health and make people ill and good nutrition can improve health and help with recovery. Nutrition has a huge potential for overall health so it can either heal or harm. Personal nutrition habits are very important when it comes to getting the most benefits out of nutrition. The athletes are responsible for their own nutrition strategies so either they can get benefits or cause harm to their performance and physical capacity (Schroeder, 2007, pp. 1221-1228). Even in ancient history vegan and plant-based diets had been connected to sports and physical activity (Wirnitzer et al, 2018, pp. 387-453). There are many vegan and plant-based professional world-class elite-level athletes who participate in endurance sports. Fiona Oakes is one of those athletes who set a world record in 2018 which was her fourth world record in the sport. Another ultra-marathon runner is Scott Jurek who completed the Appalachian Trail which is roughly 2,200 miles in 46 days, 8 hours and 7 minutes in 2015. A five-time Ironman ultra triathlete Rich Roll and Gerlinde Kaltenbrunner is the most successful female mountain climber in the world who has climbed 14 eight-thousanders without any oxygen supplementation or any other sort of help from porters. 14-times winner of the Grand Slam Wimbledon Australian Open is Novak Djokovic which is also ranked number 1 in the 2018 ATP list. Serena Williams also ranked number 16 on the same list and she is a 23-times Grand Slam winner. These two athletes are great role models for vegan tennis athletes or many other vegans who are interested in sports and exercise.

The vegan and plant-based diets are not only used by endurance athletes but these nutrition strategies are also used by power and strength athletes such as Patrik Baboumian who is a three-time world champion and record holder at Beer Barrel Lift. Patrick Reiser is another vegan bodybuilding athlete who became a world champion in Natural Bodybuilding. Kendrick Farris is an Olympic Weightlifter who set the American record in his own weight category. Even Formula-1 driver Lewis Hamilton has his name on the world-class elite-level vegan and plant-based athletes list. The Green Rovers is the first vegan football club in the UK which only consists of athletes who follow vegan and plant-based diets (Wirnitzer et al, 2018, pp. 387-453). All of these elite athletes are proof that reaching world-class fitness and physical capacity is achievable by following a vegan or plant-based diet. There are loads of records that have been set by vegan and plant-based athletes which means they reached the world's highest athletic potential and capacity by following a plant-based diet plan.

Cross-sectional Study

This cross-sectional study was done by Lynch et al in 2016. The aim of this cross-sectional study was to look at the performance and body composition rates of vegetarian and omnivore adult endurance athletes and make a comparison of their performance results and see how two diets affected their athletic capacity and performance. Dual-energy X-ray absorptiometry (DXA) is used to measure participants' body composition and visceral adiposity. To measure their leg strength dynamometer has been used and aerobic capacity was measured with the use of the Bruce protocol treadmill test. It was considered that there wouldn't be any differences in parameters between groups. The study consists of healthy women and men who follow plant-based and omnivore diet plans. The participants are recruited from a website called Stevebay.org which is a very popular website for endurance athletes. Participants' fitness levels were at a competitive level. They all were participating in national competitions or training for high-level endurance competitions such as marathons, triathlons, cycling races or other ultra-endurance events. For this study the number of omnivore and vegetarian athletes were equal and their age ranged between 21 to 58 years old. The questionnaire was given to them before the study and eight of the plant-based participants stated that they consumed meat occasionally so these participants are re-classified as omnivores. This questionnaire also stated if they had any sort of chronic illnesses or health problems (Lynch et al, 2016, pp. 726).

Methods

In this study, all the measurements have been completed by a single visit of participants. Before the visit, participants filled out a seven-day food diary. Of seventy

participants fifty-seven completed and returned the food diaries. All these food diaries are analysed using Food Processor SQL Nutrition and Fitness Software by ESHA Research, Inc. (version 10.11.0, Salem, OR, USA). SECA direct-print measuring station has been used to calculate participants' body mass and to measure their height and, a full-body DXA scan is also completed. Bruce protocol on a treadmill has been used to measure participants' VO2 max levels. After the VO2 max test participants went on to the dynamometer testing and they had 30 seconds of rest periods between sets on the dynamometer. The data is analysed by using Statistical Package for Social Sciences (SPSS) software programme. The data were analysed by an independent t-test on the SPSS programme and the analysis revealed the mean, standard deviation and p-values of the test (Lynch et al, 2016, pp. 726).

Results

Out of 27 vegetarian participants, 24 of them was following a vegetarian diet for more than 2 years. The remaining three participants was following the diet for three, six or eleven months. There were fifteen vegans in that group. There were no gender or age differences between the two groups. One of the significant differences between groups was body mass and lean body mass. Female plant-based eaters resulted in lower total body and lean body mass compared to the females who followed an omnivore diet plan. The fat mass did not differ between the two groups. Vegetarians resulted in 20% higher physical activity levels compared to the omnivore group. The aerobic capacity was also a significant difference between the two groups. The aerobic capacity of female vegetarians was 13% higher compared to female omnivores. The peak-power output was measured while doing leg extensions and it did not result in any difference between groups. The total daily calorie intake was slightly the same between the two groups but vegetarians had higher carbohydrate, fibre and iron consumption compared to the meat-eaters. But plant-based participants' daily protein, vitamin B12, cholesterol, saturated fat and selenium intake was lower than the meat-eaters (Lynch et al, 2016, pp. 726).

Conclusion

The vegan diet is becoming more popular each day. In general, the diet has many health benefits which is a result of consuming many plant-based foods such as fruits, vegetables, lentils, beans and legumes. The diet can result in some deficiencies such as vitamin B12 deficiency. When looking at the studies above it is clear that elite-level world-class athlete physical capacity and performance is achievable by following a vegan or plant-based diet. This means that people do not need to eat meat in order to achieve a decent level of athletic performance and capacity. This paper looked at this

diet on a sports and physical activity basis so the environmental impacts of a vegan and plant-based diet have not been studied very deeply. The cross-sectional study revealed that individuals who follow a vegan or plant-based diet can be as fit and strong as a meat eater or even fitter and stronger. Total daily energy intake and meeting the micro and macro-nutrient requirements is the key factor to achieving better physical performance and capacity. Vegan and plant-based diets are great nutritional strategies which supply athletes with many essential nutrients and health benefits.

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