

## The Effect of Nutrient-Dense Foods in Older, Elite Pickleball Athletes

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### Abstract

Pickleball is a rapidly growing sport, especially among older individuals. Competitive players are elite athletes like those of any other sport, and nutritional information is lacking. The purpose of this two-week, single-arm, prospective study was to determine if elite pickleball athletes can improve quality of life with nutrient-dense foods. Subjects, with an average age of  $55 \pm 8$  years, were recruited at a competition and were all avid players. Three nutrient-dense foods were provided daily – a brain-enhancing shake to improve focus, a bar to increase energy, and a hot meal to help with endurance and recovery. Ten, general quality of life questions used a rating system of 1 to 5, with 5 being the best. Four pickleball-targeted questions were asked using Yes (noticed a change) or No (no change). Three of these four were also asked using the numeric rating system. During week 1, about half of the participants (47%; 7/15) consumed one brain-enhancing product daily, but more consumed one energy bar daily (80%; 12/15) and the meals (60%; 9/15). At week 2, fewer participants consumed the one brain-enhancing shake daily (13%) and one meal daily (20%); but all consumed one energy bar each day. Participants engaged in exercise more than 500 minutes each week. For the ten general quality of life indicators, the range of the percentage change that showed improvement was 8% to 27%. Only Gastrointestinal issues worsened by 23%. The greatest improvements were seen in: Sleeping better (27%), Feeling full (24%), and Passion (21%). The four pickleball-targeted quality of life questions improved: 40% had better Endurance and Recovery; 33% had more Energy; and 27% had better Focus. The three questions that were asked using both systems showed similar improvements. The ability to improve quality of life in elite athletes exceeds what others have found. In summary, nutrient-dense foods can be readily incorporated into the lives of older, elite pickleball athletes and improve quality of life indicators.

**Keywords:** Nutrient-dense foods, Pickleball, Elite athletes, Effects of nutrient-dense foods

### Introduction

Although few have heard of the sport pickleball, there are more than 3 million regular players in the United States and that number has grown by more than 10 percent each year over the past decade [1]. Pickleball combines the elements of tennis, racquetball and ping pong [2]. The sport was invented in 1965 by a trio of fathers in Washington State who were trying to occupy their kids on a summer day when they couldn't visit the beach.

Pickleball, like tennis, can be played as singles (two players) or doubles (four players) [3]. However, compared to tennis, pickleball is a slower sport, because the court that it's played on is smaller (44 X 20 feet; compared to 78 X 36 feet for a tennis court). Despite its perceived slowness, the enjoyment factor is high, because it is easier to keep the ball in play. The smaller court also means less running and less wear-and-tear on knees, hips, and ankles [3]. Also, the paddle doesn't have strings, which coupled with the soft ball used in the game, results in minimal stress on the tendons and muscles of the arms.

Pickleball, like other racquet sports, provides an aerobic workout without as much stress and strain on joints and muscles as tennis or squash [3]. Most individuals burn about 250-350 kcal for each 30-minute game [4]. The higher end of the estimated calorie range involves a more intense game with lots of stop-and-start action and very short rest time between serves. It is possible to log 7,000 to 10,000 steps over 90 minutes of playing pickleball.

Two studies have shown that seniors, from 50 to over 70 years of age, derived significant benefit in life satisfaction, suggesting that playing pickleball can be an enriching leisure activity and may help them cope with retirement [5,6]. Differences in age, gender, and employment status were observed in pickleball players [6]. The oldest group (70+) reported significantly higher life satisfaction than those who were 50–59 years old. In addition, female participants scored significantly higher on social integration scores than men. The retired participants scored significantly higher on life satisfaction than the employed participants. This study suggested that playing pickleball can be a key leisure pursuit that contributes to well-being of older adults.

Information about diet and pickleball players is lacking and sorely

needed. Pickleball is a high-intensity sport and may require unique nutrients or products to optimize performance, especially for those who compete professionally. The purpose of this study was to determine the effect of consuming nutrient-dense foods on body weight, compliance with foods, and quality of life indicators in an elite group of pickleball players.

### Materials and Methods

This study is a single-arm, prospective, two-week study. Pickleball players were recruited at the Margaritaville USA Pickleball National Championships held in Palm Springs, California, in November 2018. Participants were required to complete online baseline and weekly questionnaires related to changes in body weight, exercise regimen, compliance with eating nutrient-dense foods, and quality of life indicators. In exchange, each was provided three nutrient-rich meals daily and health coaching at no charge.

### Diet

Participants selected 14 items (total 42) from each of three nutrient-dense food categories: brain-enhancing shake (chocolate or coffee flavor); energy bar (chocolate chip, chocolate, honey granola, peanut butter); and a hot meal, which was a sauce mixed with rice or noodles (cheese, vegetarian-flavor beef and chicken, Pad Thai). At the end of week 1 and week 2, participants estimated how many of each food they consumed. Ideally, someone should have consumed seven brain-enhancing shakes, seven energy bars, and seven meals.

Each food, except the energy bars, contained 35% of the Daily Value (DV) for every vitamin and mineral, except sodium and chloride. The bars had 25% DV for these nutrients. The brain-targeted shake includes the same one-third DV of all nutrients as the other foods do. In addition, it includes BrainCare™, a proprietary blend of ingredients, including phosphatidylserine, alpha lipoic acid, and quercetin, which support memory, focus, and concentration.

The nutrient-dense foods were portion-controlled and easy to prepare. The bars were ready to eat, and the brain-enhancing shake could be made with water or any type of milk; fruit and other things like peanut butter can be added. The meals are prepared by adding hot water to the starch portion (noodles or rice) and to the sauce.

### Quality of Life Questions

Fourteen quality of life questions were presented to the participants. Ten were general quality of life questions that were asked at baseline, and at the end of each of the two subsequent weeks: General feeling of wellbeing, Mood, Fullness, Energy level, Gastrointestinal changes, Appearance, Sleep, Focus, Passion, and Recovery. Each response was given using a scale of 1 to 5 with 1 being the worst, and 5 being the best. The percentage change was calculated by: week 2 score – Baseline score/ week 2 score x 100.

Four questions probed in depth the aspects of athletic performance that we believed would improve from consuming the three nutrient-dense foods: Endurance and Recovery (the nutrient-dense meal, bar, and brain-enhancing shake), Energy (the nutrient-dense energy bar), and Focus (brain-enhancing shake). For each of these four questions, participants were asked at the end of week 1 and week 2 if there was a change. Participants responded with Yes or No and provided written comments regardless of the response. Improvement was considered

for Yes/Yes and No/Yes. No change was No/No and worsening status was Yes/No. Three of these four questions were asked in both ways (Yes/No and using a rating of 1-5): Focus, Energy, and Recovery.

Data are expressed as means ± standard deviation.

### Results and Discussion

Twenty participants enrolled and 15 completed the two-week study (25% drop out rate). The group was 73% female had a mean age of 55 ± 8 years. This makes sense, as pickleball is mostly played by an older demographic [5]. The group had an average, healthy body mass index (BMI) of 23 ± 4 kg/m<sup>2</sup>.

Weight remained stable (Table 1), which was an objective of the study. In addition to the nutrient-dense foods, participants were encouraged to consume one meal of their own choosing to maintain weight. Most consumed healthy, fresh foods that were minimally-processed foods, such as proteins (meats, beans), grains (e.g., rice), fruits, and vegetables. Compliance with the nutrient-dense foods was good. At week 1, about half of the participants (47%; 7/15) consumed one of the brain-enhancing products daily but more consumed one energy bar daily (80%; 12/15) and the meals (60%; 9/15). At week 2, fewer participants consumed the one brain-enhancing shake daily (13%) and one meal daily (20%). In contrast, more consumed one energy bar daily (100%). These findings show that nutrient-dense foods can readily be incorporated into the diet of pickleball players and that the bar was used by everyone by week 2.

**Table 1: Changes in weight and compliance with nutrient-dense foods**

	Baseline	Week 1	Week 2
Weight (kg)	69 ± 17	70 ± 18	69 ± 17
<i>Nutrient-dense foods</i> (number of servings per day each week/number of participants)			
Brain-enhancing shake	N/A*	< 5/4 (27%)	< 5/4 (27%)
		5-6/4 (27%)	5-6/9 (60%)
		7/7 (47%)	7/2 (13%)
Energy bar	N/A	< 7/3 (20%)	< 7/0 (0%)
		7/12 (80%)	7/15 (100%)
Meal	N/A	<5/2 (13%)	<5/2 (13%)
		5-6/4 (27%)	5-6/10 (67%)
		7/9 (60%)	7/3 (20%)

\*Not applicable

Most participants (at least 60%) exercised five to seven days each week (Table 2). Everyone played pickleball, but many also engaged in tennis, yoga, mountain biking, Cross fit, Stairmaster workouts, running and walking. The group exercised three times more minutes than the recommended 150 minutes per week [7]. At week 1, the average duration of exercise was 508 ± 411 minutes, and during week 2, the average was 571 ± 341 minutes.

**Table 2: Exercise frequency and duration**

	Week 1	Week 2
Frequency of exercise: days in one week/number of participants (percentage)	0-2/2 (13%)	0-2/2 (13%)
	3-4/3 (20%)	3-4/4 (27%)
	5-7/10 (67%)	5-7/9 (60%)
Duration of exercise (minutes)	508 ± 411	571 ± 341

For the ten general quality of life indicators, the range of the percentage change that showed improvement was 8% to 27% (Table 3). Only Gastrointestinal issues worsened by 23%. The greatest improvements were seen in: Sleeping better (27%), Feeling full (24%), Passion (21%), and Appearance (16%).

**Table 3: Changes in ten quality of life questions\***

	Baseline	Week 1	Week 2
Overall feeling	3.6 ± 1.0	3.0 ± 0.8	3.9 ± 0.7 (8%)+
Feeling full	3.2 ± 0.6	3.5 ± 1.1	4.0 ± 0.7 (24%)
Mood	3.9 ± 0.7	4.6 ± 0.9	4.4 ± 0.8 (12%)
Energy level	3.7 ± 0.8	4.0 ± 1.0	4.2 ± 0.7 (14%)
Gastrointestinal issues	3.9 ± 1.0	3.0 ± 1.1	3.0 ± 1.3 (-23%)
Sleep	2.9 ± 1.0	3.6 ± 1.0	3.7 ± 0.6 (27%)
Appearance	3.1 ± 0.8	3.3 ± 0.5	3.6 ± 0.6 (16%)
Focus	3.5 ± 0.5	3.9 ± 0.7	4.0 ± 0.5 (16%)
Passion	2.8 ± 0.8	3.5 ± 1.0	3.4 ± 0.9 (21%)
Recovery	3.3 ± 1.2	3.7 ± 0.9	3.6 ± 1.0 (10%)

\*Rated on a scale of 1 to 5, with 5 being the best

+Represents the percentage increase between baseline and week 2

The ability to improve quality of life in elite athletes, who already eat well and exercise, with nutrient-dense diets is impressive. It is difficult to improve most aspects of life in elite athletes. For example, a group of elite cyclists, who claimed that they were at their highest level of performance, consumed an antioxidant supplement containing quercetin [8]. The mean time to complete 30 km of cycling increased by 3%. These findings in cyclists were surprising yet welcomed. These new results in elite pickleball players exceeded what was achieved by an antioxidant supplement in elite cyclists and were welcomed by the participants.

Four quality of life questions related to athletic performance that were asked as Yes/No are presented in (Table 4). For each condition, subjects improved: 40% (6/15) reported better Endurance and Recovery; 33% (5/15) had more Energy; and 27% (4/15) had better Focus. The comments that the participants provided at week 2 matched these reported improvements. Individuals stated that they had better endurance, faster recovery, more energy, and remained focused longer.

**Table 4: Changes in four pickleball-targeted quality of life questions**

	Change from week 1 to the end of week 2	Number of participants
Endurance	No to Yes (improved)	3
	Yes to No (got worse)	2
	Yes for both weeks (improved)	3
	No for both weeks (no change)	7
Comments (direct quotes)	-Maybe a little-playing pickleball for longer period of time without fatigue	
	-Felt more energized in the morning	
	-Slight increase in endurance more energy	
	-My endurance has improved. Before these two weeks, I could not go longer than 10 minutes on the Stairmaster. Yesterday, I was able to stay on it for 45 minutes. Definitely a record for me.	
Recovery	No to Yes (improved)	2
	Yes to No (got worse)	1
	Yes for both weeks (improved)	4
	No for both weeks (no change)	8
	-I am able to play pickleball for a longer period of time without muscle tiredness	
	-Fast recovery, less soreness	
	-Yes slightly	
-My recovery time between exercises in CrossFit has dropped from nearly 4 minutes to 2 minutes.		
Energy level	No to Yes (improved)	1
	Yes to No (got worse)	4
	Yes for both weeks (improved)	4
	No for both weeks (no change)	6
Comments (direct quotes)	-I noticed I feel more alert in the afternoon. Did not feel drained after 3hrs of playing pickleball.	
	-Yes, felt better and need less sleep.	
	-I felt more energetic and stronger. I did not run out of gas like I did before on the Stairmaster.	
Focus	No to Yes (improved)	2
	Yes to No (got worse)	3
	Yes for both weeks (improved)	2
	No for both weeks (no change)	8
Comments (direct quotes)	-Felt more alert in the afternoon. I would say I was able to lock in on an exercise and stay with it much better than I was before.	

Three questions were asked using the 1 to 5 rating system and Yes/No. Similar improvements were observed between the two methods

of asking questions. Using the numeric rating system: 16% had better Focus; 14% had more Energy; and 10% had improved Recovery. When the same questions were asked as Yes/No, 27% had better focus; 33% had more Energy; and 40% reported improved Recovery.

In summary, nutrient-dense foods can be readily incorporated into the lives of older, elite pickleball athletes and improve quality of life indicators. If improvements can be appreciated in only two weeks in an elite group of athletes, then it is likely that the general population will benefit as well.

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