

Case Report

Nutritional, Health and Lifestyle Status of a Highly Physically Active and Health-Conscious Long-Term Vegan Man: A Case Report from Slovenia

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Abstract: Adopting a vegan diet as a long-term diet has recently become a new global trend among healthy and physically active adult populations. Unfortunately, scarce scientific data are available on the nutritional and health status and lifestyle patterns of long-term highly physically active vegan populations. In the present case study, we present the results of the nutritional, health and lifestyle status of a highly physically active and health-conscious long-term vegan man. The following research methods were used to assess overall health and lifestyle status: (i) analysis of blood serum (selected cardiovascular risk factors (e.g., lipoproteins, triglycerides, glucose, glycosylated haemoglobin, and homocysteine), safety markers (e.g., insulin-like growth factor 1, total testosterone, high-sensitivity C-reactive protein, uric acid, and creatinine), and micronutrients (e.g., vitamin B₁₂, 25-hydroxyvitamin D, iron and ferritin); (ii) erythrocyte membranes analysis (omega-3 index); (iii) urine sample analysis (creatinine and iodine); (iv) blood pressure measurement; (v) bioimpedance and densitometry measurement (initial and current anthropometric variables and body composition); (vi) seven-day weighted dietary records (energy and nutrient intake from regular foods only were compared with the recommended daily intake); and (vii) standardized questionnaires (sociodemographic status, economic status and lifestyle status). The most remarkable results related to dietary intake were high energy (4420 kcal/d) and fibre intake (143 g/d) and nutritional sufficiency from foods only compared with dietary recommendations, with the exception of eicosapentaenoic omega-3 fatty acids and docosahexaenoic omega-3 fatty acids, vitamin B₁₂ and vitamin D. Overall dietary acid load (DAL) scores, calculated from the potential renal acid load (PRAL) and net endogenous acid production (NEAP_F), were rated as lower compared to those of other dietary patterns. In addition, we found that the overall health and lifestyle status of the subject was satisfactory, with some minor deviations that we interpreted.

Keywords: vegan diet; cardiovascular health; physical activity; lifestyle; vitamin B₁₂; vitamin D; DAL; iron; iodine; omega-3 index; testosterone; insulin-like growth factor; uric acid



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1. Introduction

The adoption of a vegan diet is a growing trend across the globe [1–3]. In the scientific literature, we see a large amount of information about the extremely broad beneficial effects of a vegan diet on human health as well as nutritional adequacy concerns [3,4]. However, a healthy (well-planned) vegan diet (i.e., energy and nutritionally adequate and predominantly from whole-food sources compared to an unhealthy vegan diet (i.e., excess or inadequate intake of energy and nutrients and excess of pathogenic dietary factors (e.g., saturated fat and cholesterol) predominantly from ultra-processed food sources)) is a dietary pattern that should be recommended, followed and analysed over other dietary regimes [3,5–8].

Furthermore, the majority of the available data on the effect and the concerns related to a vegan diet have been derived from the general population (i.e., usually more or less

sedentary-minded adults), the overweight and obese population, or unhealthy adults with various chronic diseases [3,4,9–11]. However, with the accumulation of results indicating beneficial effects, especially of a more well-designed vegan diet on various health and environmental aspects, the popularity of the vegan diet has spread to the healthy and physically active adult population and to athletes [3]. Unfortunately, we have only a fraction of scientific data available on their nutritional and health status and lifestyle patterns, especially for long-term physically highly active vegan populations [2,3,12]. The current data are of great importance for a comprehensive understanding of the effects of a well-designed vegan diet on highly physically active and healthy long-term adult vegans. The data, which are particularly interesting, belong to the category of those that researchers compare with an omnivorous diet as the standard dietary pattern suggested by dietary guidelines (e.g., dietary intakes of protein, eicosapentaenoic omega-3 fatty acids (EPAs) and docosahexaenoic omega-3 fatty acids (DHAs), vitamin B₁₂ and D, calcium, iron, zinc, and iodine [3,13], serum vitamin B₁₂, 25-hydroxyvitamin D (25 (OH)D) and iron, total testosterone status in men, insulin-like growth factor 1 (IGF-1), homocysteine, the omega-3 index (indicator of EPA and DHA intake in erythrocyte membranes), and iodine in urine) [3,14–18].

In addition, various valid methods are available for estimating daily dietary intake that are not always or completely comparable or qualitatively equivalent (e.g., 24 h diet recall, nonweighted food diary for two (non) consecutive days, standardized food frequency questionnaire, multiday (i.e., 3, 4 or 7) weighted food diary, analysis of a theoretical nutrient composition of the proposed diet), and different databases are used as well as several methods of measuring body composition status (e.g., electrical bioimpedance and double X-ray absorptiometry (DEXA) systems from various manufacturers).

In our recent study, we investigated differences in the nutritional, cardiovascular and lifestyle status of ‘health-conscious’ adult vegans ($n = 51$) and nonvegans ($n = 29$) from Slovenia. However, the study was performed during the COVID-19 lockdown and was therefore executed as a self-report survey, with a less rigorous outcome assessment [19]. In the present case study report, we go one step further and partially supplement the missing information on the overall health and lifestyle status of a healthy highly physically active and health-conscious adult man who has followed a well-designed vegan diet for over 12 years. The case is of interest to a wider, healthy and physically highly active adult population in line with the World Health Organization’s (WHO) newest recommendation for physical activity (PA) [20]. Furthermore, the present study might be an incentive for other researchers to study this population on a larger scale.

2. Methods

2.1. Study Characteristics

The adult subject was recruited through personal contact and from our ongoing community-based whole-food, plant-based (WFPB)/vegan type lifestyle program in Slovenia [21]. Of note, Slovenia is a European Union country in Central Europe with a latitude between 45° and 46° north (important for interpretation of serum vitamin D status), with a population of approximately 2 million people. The man included in the study signed a consent form for inclusion in the study and was not remunerated financially for participation in the study. The blood, urine, blood pressure (BP) and body composition (DEXA) tests were performed at publicly accessible medical facilities and as part of an extended annual medical examination of the subject. In return for his participation, we promised the participant a detailed analysis of the results obtained with the interpretation and suggestions for further improvement. Therefore, the additional more expensive assessments in the study were funded by the authors (i.e., DEXA measurement, serum IGF-1 concentrations, testosterone, omega-3 index and iodine in urine).

The subject completed an online standardized food frequency questionnaire (FFQ) [22] regarding dietary intake before entering the WFPB lifestyle program when he was following a typical Western diet and lifestyle. Furthermore, the subjects completed seven-day

weighted dietary records (7-DR) for current dietary intake assessment and four standardized lifestyle questionnaires (described in outcomes). In addition, the subject's current anthropometric and body composition indices were measured by DEXA in the Medical Centre Dravlje d.o.o., Ljubljana, Slovenia, while the biochemical assays, urine analysis, and BP measurement were conducted in the Adria Laboratory d.o.o., Ljubljana, Slovenia, a member of SYNLAB International GmbH (Augsburg, Germany) (i.e., the largest human laboratory analytics company in Europe). Finally, to estimate the omega-3 index status of the subjects, we used services of the Clinical Laboratory Improvement Amendments (CLIA accredited Omega Quant Analytics, LLC, Stirling, UK) certified Omega Quant Analytics (Vulpes s.p., Stara Cerква, Ljubljana, Slovenia). All the measurements were completed, and the results were obtained from the laboratories from 10–24 February 2022.

2.2. Subject

The 36-year-old subject was chosen because he has adhered to the WFPB lifestyle program for a long time (i.e., over 12 years), is very health conscious (i.e., disciplined in consuming a well-designed vegan diet and living a healthy and highly physically active lifestyle (i.e., versatile recreationist on a daily basis)) and otherwise lives a fairly normal life (i.e., is employed and socially active). Furthermore, the subject represents a population that is not sedentary “all day long” or has common chronic noncommunicable diseases but, on the other hand, is physically active according to the new WHO guidelines [20]. This type of adult vegan in regard to lifestyle may be representative of a population that is not represented in scientific research today.

2.3. Assessed Variables

2.3.1. Sociodemographic Factors, Economic Status, and Motive for Vegan Diet Adoption

We adopted and modified the questionnaire provided by the National Institute of Public Health of Slovenia [23]. In addition, to evaluate the motives for following a vegan diet (i.e., health, body mass (BM) management/appearance, environmental concerns, religious reasons, affordable dieting, convenient dieting, animal ethics, and satiety/no hunger), the subjects were asked to rank 8 different motives (i.e., 8: the most important, 1: the least important).

2.3.2. Anthropometric and Body Composition Parameters

The basic anthropometric parameters included body height (BH) and BM, both of which were measured by experienced nurses using a standardized medical approved professional personal floor scale with a stand (Kern, MPE 250K100HM, Kern & Sohn, Balingen, Germany). In addition, body mass index (BMI) was calculated as weight in kg divided by the square of height in metres. Furthermore, for the evaluation of the body composition parameters, DEXA approved by the Slovenian Ministry of Health was used (General Electric Company, model Lunar Prodigy 5 with EnCore software, version 13.31). Measurements were performed by an experienced physician, and a certified technologist performed DEXA measurements. In addition to the current body composition results, we added the data of maximal lifetime BM and body fat percentage (BF%) prior to the adoption of the WFPB lifestyle program, and these parameters were measured by electrical bioimpedance (Tanita BC 601F, Tokyo, Japan). Finally, we compared the results of selected body composition indices (i.e., BMI and BF%) with recommended targets [24,25] and total bone mineral density (BMD total) with the reference values from the National Health and Nutrition Examination Survey (NHANES, 1999–2006) for adult men aged 30–39 years (1.2 g/cm^2) [26].

2.3.3. Dietary Intake

To estimate the subject's dietary intake before initiating the WFPB lifestyle program when he was on a typical Western diet and lived a typical Western lifestyle, we used a standardized food frequency questionnaire (FFQ) [22]. Furthermore, after precise oral and

written instruction on how to record the 7-DR at home, the subject used a KERN 440-21A electronic laboratory scale (Kern & Sohn GmbH, Balingen, Germany) that measured to an accuracy of 0.01 g. The subject precisely weighed and recorded all food and beverages consumed, including dietary supplements and vegan meal replacements (SMR). Foods and ingredients extracted from the 7-DR (five weekdays and a weekend) were carefully entered into the national Open Platform for Clinical Nutrition (OPEN) [27,28], which is a national web-based application developed by the Jožef Stefan Institute in Slovenia and supported by the European Federation of the Association of Dietitians [27]. All foods or ingredients were weighed raw in unprepared form; therefore, there were nutrient losses due to heat treatment. Consequently, for foods and ingredients consumed by the subject in cooked/baked form, we used raw-cooked conversions. In addition, fibre intake contributes 2 kcal per gram in energy intake [29]; therefore, the total energy intake of the subject due to higher fibre intake may have been proportionally higher (i.e., a feature of a well-designed vegan diet). Finally, for the iodine content of the nori algae that was consumed by the subject, we used United States Department of Agriculture compositional data (i.e., the mean iodine content of dried nori algae was 23 µg/g) since the OPEN system used does not contain iodine data for nori [30]. Furthermore, using the unique OPEN system, we were also able to distinguish free sugars from total sugar (i.e., we also added fructose intake to the analysis, a controversial topic in the vegan diet), accurately distinguishing soluble from insoluble fibre. However, missing information on soluble and insoluble dietary fibre in some plant-based ingredients or specific foods might have resulted in an underestimation of the intake of both. The proportions of foods in the database that did not have a delimitation of soluble and insoluble fibre were not estimated. However, authors from Slovenia estimated the share of missing data on the content of (in)soluble dietary fibre in the OPEN system for some foods within plant-based food groups (i.e., nuts and seeds, spices, some vegetables, and fruits) for the needs of the largest Slovenian nutrition study to date (SI.Menu) as 23% of all estimated dietary fibre [31].

In addition, all SMRs were included in the evaluation of dietary intake (i.e., all nutritional labels of the SMRs used are publicly available) but also shown and discussed separately (i.e., what part it represented in a particular nutrient). Moreover, regarding food and SMR data entry, we used a manual method and double-checked it to avoid any possible errors. In addition, to add folic acid from supplementation to the folate/folic acid total intake category, we used the following conversion factor: 0.5 µg of folic acid = 1 µg of folate [32]. The energy and nutrient intake (i.e., primarily from foods) were compared with the reference values for energy and nutrient intake. It should be noted that lower total fat and monounsaturated fatty acid (MUFA) intakes in a well-designed vegan diet were not considered to indicate nutrient deficiencies, as in addition to food sources (plant versus animal), lower intakes are the main contributor to the health benefits of a well-designed vegan diet compared with a balanced (omnivorous) diet for which there are guidelines [33]. The Slovenian national reference values are based on Central European reference values (German (D), Austrian (A), and Swiss (CH) (D-A-CH)) [34,35]. However, current Slovenian dietary reference values do not mention the reference values for saturated fatty acids (SFAs), MUFAs, polyunsaturated fatty acids (PUFAs), cholesterol, EPA or DHA, free sugar, or biotin intake; therefore, the intake of these nutrients (except for free sugar and EPA and DHA) were compared with the D-A-CH reference [34,35], while the intake of free sugar was compared with the UK Scientific Advisory Committee on Nutrition (SACN) recommendation (<5% of daily energy intake) [36]; EPA and DHA intake was compared with the Dietary Reference Values of the European Food Safety Authority (EFSA) [37]. It should also be noted that adequate vitamin D intake is not associated with a dietary pattern per se but with the institutional lifestyle and geographical position of Slovenia [3,38]. Furthermore, the intakes of carbohydrates (e.g., 6–10 g/kg BM/d for 1–3 h/d of moderate-to high-intensity PA) and protein (e.g., 1.2–2.0 g/kg BM/d) were compared with the joint position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine for nutrition and athletic performance [39]. In addition, we did

not compare total water intake with the guidelines, since total water intake depends on the sport, the type of exercise, and the environment [39]. We also showed the total intake of foods from different food groups and the meal plan within the lifestyle during the week and weekdays.

Finally, dietary acid load (DAL) was calculated from daily nutrient intake using validated formulas for potential renal acid load (PRAL) [40] and net endogenous acid production (NEAP_F) [41].

2.3.4. Health Status

Cardiovascular risk and safety factors, important serum micronutrients related to a vegan diet, EPA and DHA in erythrocyte membranes (omega-3 index), and urine micronutrient status were assessed by blood, urine, and BP measurements. The most relevant serum markers were leucocytes (S-L) and haemoglobin (Hb), which were measured using an XN-1000 Sysmex Europe GmbH analyser (Norderstedt, Germany); uric acid (S-uric acid), creatinine (S-creatinine), total cholesterol (S-cholesterol), low-density lipoprotein cholesterol (LDL cholesterol), high-density lipoprotein cholesterol (HDL cholesterol), triglycerides (S-triglycerides), fasting glucose (S-glucose), glycosylated haemoglobin (S-HbA1c), and high-sensitivity C-reactive protein (hs-CRP), which were measured using an Alinity C analyser (Abbott Park, IL, USA); ferritin (S-ferritin), testosterone (S-testosterone), vitamin B₁₂ (S-vit B₁₂), S-vit 25 (OH)D and homocysteine (S-homocysteine), which were measured using an Alinity I analyser (Abbott Park, IL, USA); iodine in urine (U-iodine) and creatinine in urine (U-creatinine), measured using an Agilent 770 series ICP-MS (Agilent Technologies, Santa Clara, CA, USA); and insulin-like growth hormone (S-IGF-1), which was measured using the iSYS analyser (Immunodiagnostic Systems). The omega-3 index was measured by taking a drop of blood and sending it to the CLIA-accredited Omega Quant Analytics Laboratory (LLC, University of Stirling, Stirling, Scotland, UK). Finally, BP was measured using the oscillometric technique with the participant in the supine position after five minutes of rest. The average of two measurements taken three minutes apart was used for the analysis.

To assess cardiovascular health, the blood values obtained were compared with the reference values from the University Medical Centre Ljubljana, Slovenia, the national laboratory [42,43]. For BP reference values, we used the newest recommended targets for cardiovascular disease prevention of the European Society of Cardiology (ESC) [44]. The WHO reference concentration criteria for the median U-iodine reference were used: severe iodine deficiency <20 µg/L, moderate iodine deficiency 20–49 µg/L, mild iodine deficiency 50–99 µg/L, adequate iodine nutrition 100–199 µg/L, above iodine requirements 200–299 µg/L, and excessive iodine (posing risk of adverse health consequences) ≥300 µg/L [45]. For urine creatinine (U-creatinine) and iodine per g of creatinine (U-iodine/g creatinine), we used recommended reference ranges from Synlab (SYNLAB Holding Deutschland GmbH, Augsburg, Germany) where the sample was analysed (U-creatinine: 0.20–1.90 g/L and U-iodine/g creatinine: 100–199 µg/g) [46]. Finally, for omega-3 index status, we used recommendations for the normal structure and function of red blood cells (>5.6%) [47].

2.3.5. Lifestyle Status

Lifestyle assessment of the subject was composed of three aspects: (1) everyday sitting time, transport time, and PA status, (2) perceived stress, and (3) sleep quality and pattern that were measured using standardized questionnaires [48–50]. Standardized questionnaires measuring these important lifestyle aspects have already been described in more detail and used in our two previous studies on people on a vegan diet [19,51].

2.4. Statistical Analysis

The current study is a case study report of a highly physically active and health-conscious long-term vegan individual; hence, only detailed descriptive statistics are used to present the results.

3. Outcome

3.1. Sociodemographic Factors, Economic Status, and Motive for Following a Vegan Diet

The highly physically active and health-conscious long-term vegan man (BM 74.2 kg, BMI 24.1 kg/m²) who never smoked lived in a rural region, finished high school, and was employed (i.e., worked from 7 am to 15:00 pm and ranked himself in the middle socioeconomic class (i.e., earned EUR 1300–1700 per month)). The main motive to adopt a WFPB lifestyle was health and BM management/appearance, followed by environmental concerns, animal ethics, affordable dieting, convenient dieting, satiety/no hunger, and religious reasons. Before initiating the WFPB lifestyle program while following a typical Western diet (energy intake: 2956 kcal/d, carbohydrate intake: 41%, dietary fibre intake: 28 g/d, fat intake: 42%, cholesterol intake: 398 mg/d, protein intake: 13%) and lifestyle, the subject had a higher BM, BMI and BF % (77 kg, 25.7 kg/m² and 16%) than his current levels, and his maximal lifetime BM was 80 kg (BMI 26.7 kg/m²).

3.2. Anthropometrics and Body Composition Parameters

The subject’s BMI and BF% were favourable in terms of targeted values (i.e., BMI and BF % obesity classification). The anthropometrics and complete body composition parameters (i.e., including body fat distribution and topographic BMD) are shown in Tables 1 and S1.

Table 1. Anthropometrics and body composition status.

Parameter	BH (cm)	BM (kg)	BMI (kg)	BF (%)	FM (kg)	LBM (kg)	FFM (kg)	BMC Total (kg)	BMD Total (g/cm ²)
Result	173	74.2	24.1	10.9	7.7	63.1	66.5	3.4	1.4

BH: body height. BM: body mass. BMI: body mass index. BF: body fat. FM: fat mass. LBM: lean body mass. FFM: fat-free mass. BMC: bone mineral content. BMD: bone mineral density.

3.3. Dietary and Food Group Intake

The energy and macronutrient intake compared with recommendations (including foods only) is presented in Table 2. The average energy intake of the subject was 4420 ± 213 kcal/day. The average proportion of ingested energy from each of the macronutrients was 57% from carbohydrate, 6% from fibres, 21% from fat, and 15% from protein. In addition, the protein intake per kg BM exceeded the recommendation (2.2 ± 0.1 g/kg body mass vs. 1.2–2.0 g/kg BM).

Table 2. Energy and macronutrient intake compared with recommendations.

Parameter/7-DR *	Average	Recommendations
Macronutrients (/day)		
Energy intake (kcal)	4420 ± 253	
Foods only	4137 ± 213	3000 †
SMR	283 ± 60	
Carbohydrates (g)	632 ± 55	
(% E)	57 ± 4	
Foods only	604 ± 52	
(% E from foods only)	58 ± 4	>50 †
SMR	28 ± 11	
Carbohydrates (g/kg BM)	8.4 ± 0.9	6–10 g/kg BM ††

Table 2. *Cont.*

Parameter/7-DR *	Average	Recommendations
Total sugars ^{TS} (g)	157 ± 27	
(% E)	14 ± 2	
Foods only	137 ± 24	
SMR	20 ± 10	
Free sugars ^{FS} (g)	21 ± 6	
(% E)	2 ± 1	
Foods only	0.9 ± 1.4	<5 ⁺⁺⁺
(% E from foods only)	0	
SMR	20 ± 6	
Fructose foods only	57 ± 11	
Starches (g)	162 ± 78	
(% E from foods only)	16 ± 7	
Foods only	162 ± 78	
SMR	0	
Dietary fibre (g)	143 ± 11	
(% E)	6 ± 1	
Foods only	126 ± 10	>30 ⁺
Soluble (foods only)	47 ± 10	
Insoluble (foods only)	64 ± 8	
SMR	17 ± 1	
Fat (g)	106 ± 21	
(% E)	26 ± 4	
Foods only	100 ± 21	>30 ⁺ (for high-level of PA)
(% E from foods only)	22 ± 4	
SMR	5.9 ± 1.3	
SFAs (g)	15 ± 2	
(% E)	3 ± 0	
Foods only	14 ± 3	
(% E from foods only)	3 ± 1	≤10 [‡]
SMR	1.3 ± 0.6	
MUFAs (g)	28 ± 13	
(% E)	6 ± 13	
Foods only	27 ± 13	
(% E from foods only)	6 ± 3	≥10 [‡]
SMR	1.4 ± 0.5	
PUFAs (g)	46 ± 5	
(% E)	9 ± 1	
Foods only	43 ± 5	
(% E from foods only)	9 ± 1	7–10 [‡]
SMR	3.1 ± 1.0	
LA (g) foods only	31 ± 5	
(% E from foods only)	7 ± 1	2.5 ⁺
ALA (g) foods only	15 ± 1	
(% E from foods only)	3 ± 1	0.5 ⁺
ARA (g) foods only	0	
EPAs + DHAs (mg) from SMR	0	250 ^{‡‡}
Cholesterol (mg)	0	
(Plant) protein (g)	164 ± 13	
(% E)	15 ± 1	
Foods only	142 ± 13	
(% E from foods only)	14 ± 2	
SMR	22 ± 4	
Foods only (g/kg BM)	2.2 ± 0.1	1.2–2.0 g/kg BM ^{‡‡}
Alcohol (g/d)	0	

Table 2. Cont.

Parameter/7-DR *	Average	Recommendations
Water ^{TW} (L)	4.7 ± 0.8	

* 7-DR = seven-day weighted dietary record. The values of nutrient intake are written in bold when they met the recommendations. E = percentage of total energy intake (general Atwater energy conversion factors were used (kcal/g): carbohydrates and protein = 4, dietary fibre = 2, fat = 9, alcohol = 7) [29]. ^{TS} Total sugars: all monosaccharides and disaccharides: free sugars plus sugars naturally present in foods (e.g., lactose in milk, fructose in fruits) [52]. ^{FS} Free sugars: all monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer (i.e., added sugars) plus sugars naturally present in honey, syrups, fruit juices, fruit juice concentrates and sport drinks (defined by the WHO [52] and adapted by the SACN [36]). SFAs = saturated fatty acids; MUFAs = monounsaturated fatty acids; PUFAs = polyunsaturated fatty acids; LA = linoleic acid; ALA = alpha-linolenic acid; ARA = arachidonic acid; EPAs = eicosapentaenoic fatty acids; DHAs = docosahexaenoic fatty acids. [†] Reference values for energy and nutrient intake of the National Institute of Public Health of Slovenia [33]. ^{††} The intake of carbohydrates and protein (per g/kg BM) was compared with the joint position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine for nutrition and athletic performance (e.g., 1–3 h/d moderate- to high-intensity PA) [39]. ^{†††} The intake of free sugars was compared with the SACN recommendation (<5% of daily energy intake) [36]. [‡] The intake of SFA, MUFA and PUFA was compared with the D-A-CH reference values [34]. ^{‡‡} The intake of EPA and DHA was compared with the Dietary Reference Values of the European Food Safety Authority [37]. ^{TW} Total water from beverages, solid foods and SMR.

The subject met all macronutrient recommendations with foods only (except EPA and DHA). Overall, the subject had low total (food only + SMR) free sugar (2%) and SFA (3%) intake and no cholesterol intake (0%). Furthermore, the subject consumed sufficient amounts of EPA and DHA (from dietary supplement sources). Alcohol was not consumed by the subject.

The average energy intake from SMR was 283 ± 60 kcal/day (27 g/d carbohydrates (of this 20 g/d free sugar), 17 g/d fibre, 5.9 g/d fat, and 22 g/d protein).

Furthermore, in regard to fibre intake (143 g/day), the subject reported normal bowel habits, averaging 3.5 stools daily assessed with the 7-DR. Finally, the calculated DAL scores were as follows: the PRAL and NEAP_F scores were −39.4 mEq/d and 28.8 mEq/d, respectively.

The intakes of 23 micronutrients (13 vitamins, 6 minerals, and 4 trace elements) compared with the recommendations are presented in Table 3. The intake of all micronutrients (including those that are often of concern in a vegan diet: calcium, iron, iodine, and zinc) was adequate from foods only, except vitamin B₁₂ and vitamin D, which were adequate with SMR.

The subject's WFPB diet was primarily based on the following food groups (in descending order by weight): grains, fruits, vegetables, potatoes, legumes, seeds, and nuts. Furthermore, the subject systematically used iodized salt and drank tea but also consumed SMR (Table S2). The meal plan (weekday and weekend) and physical activity are presented in Table S3.

Table 3. Intake of selected vitamins, minerals, and trace elements.

Parameter	Average	Recommendations
Micronutrients (/day)		
<i>Vitamins</i>		
Thiamine (mg)	6.1 ± 0.6	
Foods only	4.1 ± 0.3	1.3 [†]
SMR	2.0 ± 0.6	
Riboflavin (mg)	5.7 ± 0.6	
Foods only	2.7 ± 0.1	1.3 [†]
SMR	2.9 ± 0.7	
Niacin (mg)	48 ± 13	
Foods only	25 ± 8	16 [†]
SMR	23 ± 7	
Pantothenic acid (mg)	19 ± 34	
Foods only	11 ± 2	6 [†]
SMR	7.9 ± 2.4	
Vitamin B ₆ (mg)	6.2 ± 1.1	

Table 3. Cont.

Parameter	Average	Recommendations
Foods only	4.0 ± 0.7	1.6 [†]
SMR	2.3 ± 0.6	
Biotin (µg)	219 ± 24	
Foods only	119 ± 16	40 [‡]
SMR	100 ± 19	
Folate (µg)	1706 ± 370	
Foods only	1254 ± 414	300 [†]
SMR ^{FA}	452 ± 78	
Vitamin B ₁₂ (µg)	431 ± 535	
Foods only	0.1 ± 0.3	4 [†]
SMR	431 ± 535	
Retinol equ. ^{RE} (mg)	4.4 ± 1.0	
Foods only	3.3 ± 1.3	1 [†]
SMR	1.1 ± 0.1	
Vitamin C (mg)	451 ± 106	
Foods only	243 ± 90	110 [†]
SMR	208 ± 57	
Vitamin D (µg)	116 ± 4	
Foods only	0	20 [†]
SMR	116 ± 4	
Vitamin E (mg)	43 ± 5	
Foods only	17 ± 4	15 [†]
SMR	26 ± 3	
Vitamin K (µg)	760 ± 200	
Foods only	656 ± 204	80 [†]
SMR	104 ± 19	
<i>Minerals</i>		
Calcium (mg)	1792 ± 186	
Foods only	1371 ± 197	1000 [†]
SMR	421 ± 421	
Magnesium (mg)	1967 ± 236	
Foods only	1619 ± 237	400 [†]
SMR	348 ± 61	
Phosphorus (mg)	3838 ± 293	
Foods only	3156 ± 303	700 [†]
SMR	682 ± 116	
Potassium (mg)	8922 ± 1125	
Foods only	7951 ± 1102	4000 [†]
SMR	971 ± 197	
Sodium (mg) [‡]	2276 ± 445	
Foods only	2276 ± 445	1500 [†]
SMR	0	
Chloride (mg) [‡]	3511 ± 603	
Foods only	3511 ± 603	2300 [†]
SMR	0	
<i>Trace elements</i>		
Iron (mg)	58 ± 6	
Foods only	42 ± 5	10 [†]
SMR	16 ± 3	
Iodine (µg) [‡]	365 ± 32	
Foods only	180 ± 11	180–200 [†]
SMR	185 ± 29	
Zinc (mg)	40 ± 4	
Foods only	27 ± 3	16 [†]
SMR	13 ± 4	
Selenium (µg)	207 ± 53	

Table 3. *Cont.*

Parameter	Average	Recommendations
Foods only	113 ± 46	70 [†]
SMR	94 ± 25	

The nutrient intake values are written in bold if they met the recommendations. ^{FA} SMR: the folic acid (from supplementation) to folate conversion factor was used: 0.5 µg of folic acid = 1 µg of folate [32]; this conversion is already included in the table. ^{RE} Retinol equivalents = vitamin A + α-carotene (1 mg of retinol equivalent = 12 mg of α-carotene) + β-carotene (1 mg of retinol equivalent = 6 mg of β-carotene) + γ-carotene (1 mg of retinol equivalent = 12 mg of γ-carotene) [33]. [†] Reference values for nutrient intake of the National Institute of Public Health of Slovenia [33]. The intake of biotin was compared with the D-A-CH reference values [35]. [‡] Sodium, chloride, and iodine intake are from food (i.e., dried algae included) and food preparation (i.e., iodized salt included). The SMR consumed by the subject did not contain sodium or chloride.

3.4. Health and Lifestyle Status

All serum cardiovascular risk and safety factors were within reference values/ranges, except S-leucocytes (3.8 10⁹/L vs. 4–10 10⁹/L), S-homocysteine (4.6 µmol/L vs. 5–15 µmol/L) and S-IGF-1 (285 µg/L vs. 83–233 µg/L). Furthermore, all serum micronutrients (i.e., S-ferritin, S-Fe, S-vit B₁₂, and S-vit 25 (OH)D) and the omega-3 index were within the reference ranges. In addition, in regard to urine analysis, U-creatinine and U-iodine levels were lower than the reference range (0.19 g/L vs. 0.20–1.90 g/L); however, the U-iodine/g creatinine value was above the reference range (289 µg/g vs. 100–199 µg/g). The health status of the subjects is presented in Table 4.

Table 4. Health status.

Parameter	BP (mmHg)	S-cholesterol (mmol/L)	LDL Cholesterol (mmol/L)	HDL Cholesterol (mmol/L)	S-triglycerides (mmol/L)	S-testosterone Total [†] (µg/L)	S-IGF-1 ^{††} (µg/L)	S-hs-CRP (mg/L)
Result	110/60	2.7	1.6	1.1	0.5	4.3	285	0.2
Reference values	<130/80	<5.2	<3.4	>1.0	<1.7	2.5–8.8	83–233	<1
Parameter	S-leucocytes (10 ⁹ /L)	S-haemoglobin (g/L)	S-creatinine (µmol/L)	S-UA (µmol/L)	S-glucose (mmol/L)	S-HbA1c (%)	S-HbA1c (mmol/mol)	S-homocysteine (µmol/L)
Result	3.8	143	68	317	4.8	5.2	34	4.6
Reference values	4.0–10.0	130–170	44–97	150–480	3.6–6.1	<6.0	<42	5–15
Parameter	S-ferritin (µg/L)	S-Fe (µmol/L)	S-vit B ₁₂ (pmol/L)	S-vit 25(OH)D (µg/L)	Omega-3 Index (%)	U-creatinine (g/L)	U-iodine (µg/L)	U-iodine/g Creatinine (µg/g)
Results	73	19	330	44	6.9	0.19	55	289
Reference values	20–300	11–29	156–672	30–80	8–12	0.20–1.90	100–199	100–199

The value of the variable that deviates from the recommendation is written in bold. [†] For age ≤ 50 years. ^{††} For the age group of 36–40 years.

3.5. Lifestyle Status

The subject reported the following structure for daily activities: moderate amount of daily transport time (70 min/d), relatively short sitting time (8 h/d and 4 h/d during the week and on weekends, respectively) and a moderate amount of total PA (5398 MET min/w). More specifically, a resistance workout was performed three times weekly for 60 min, whereas brisk walking over rugged terrain or uphill hiking was performed four times weekly for 60 to 90 min. Finally, the subject reported low stress status and adequate sleep quality and pattern (Table 5).

Table 5. Lifestyle status.

Lifestyle Status	Transportation (min/day)	Weekday Sitting (h/day)	Weekend Sitting (h/day)	L-IPAQ score			Total PA (MET min/w)
	70	8	4	Walking PA (MET min/w)	Moderate-int. PA (MET min/w)	Vigorous-int. PA (MET min/w)	5398
	PSQ score			PSQI score		Type of PA	
	Total PSQ index (score)	Stress status [†] (low/moderate/high)	Sleep duration (h)	Sleep efficiency (%)	Global sleep quality ^{††} (score)	Resistance workout (n/w)	Walking [‡] or hiking ^{‡‡} (n/w)
	0.32	low	7	85	3	3 (60 min)	4 (90–120 min)

L-IPAQ = Long International Physical Activity Questionnaire [48]. PSQ = Perceived Stress Questionnaire [50]. PSQI = Pittsburgh Sleep Quality Index [49]. [†] Stress levels: <0.34 (low stress), 0.34–0.46 (moderate stress), and >0.46 (high stress). ^{††} Sum of seven component scores (range: 0–21; ≥5 indicate poor sleep quality). [‡] Walking to a nearby low hill with varied terrain during the week (60 min). ^{‡‡} Hiking to a nearby high hill during the weekend (120 min).

4. Discussion

For the Slovenian audience, we published another scientific paper (in Slovenian) describing a case study with extensive research of a physically highly active and health-conscious long-term vegan older adult [53]. However, to our knowledge, at this scientific level, this is one of the rare (case) studies that comprehensively and with valid methods addresses the main aspects of nutritional and health status and lifestyle of a highly physically active and health-conscious long-term vegan adult. The results confirm the importance of regularly/frequently monitoring individuals who are on a vegan diet, at least for serum variables that are often of concern (vitamin B₁₂ and 25 (OH)D, omega-3 index and potentially iodine in urine) in both the vegan and general populations. Several studied outcomes that are either related to the healthy and active vegan lifestyle or stand out according to the reference will be interpreted shortly.

Analysis of the change in BM and body composition after adopting a WFPB lifestyle compared with when the participant consumed a Western (omnivorous) diet showed that the subject made a large and favourable change, both in terms of loss of BM and of body composition. Our subject’s results are in line with recent review studies that suggest a positive effect of a well-designed vegan diet on BM and body composition [3,54] in comparison with recent trendy dietary patterns (i.e., Mediterranean, animal-based ketogenic diet) [55,56] and with an omnivorous diet [57]. Importantly, a higher BMI (24.2 kg/m²) that still falls within the reference range for a normal BMI is a consequence of high FFM; therefore, the BM status, especially at the individual level, should combine BMI and body composition assessment [58,59]. Finally, the reference values of total BMD are still not uniformly defined, with the subject having a value of total BMD within the reference values (1.4 g/cm² vs. 1.2 g/cm²) [26].

Furthermore, energy and nutrient intake only from foods were all within the recommendations [33–37,39]. The higher-energy well-designed vegan diet consumed by the long-term highly physically active adult vegan included in our study indicates proportionally higher intakes of macro- and micronutrients. The average daily energy intake of the subject was 4420 kcal/d; however, we must emphasize that the subject was physically active above the recommended average level [20,60]. Fibre intake made a significant contribution to the total energy intake (143 g/d, 286 kcal/d, 6% of energy intake). The high-fibre nature of the diet of the subject was the result of a higher intake of whole grains, fruits, legumes, vegetables, potatoes/tubers and seeds/nuts. In addition, the subject met all macro- and micronutrient recommendations (including those that are often of concern in a vegan diet) with foods only (except EPA and DHA, vitamin B₁₂ and vitamin D), which speaks to the importance of proper dietary pattern planning. However, the subject exceeded the protein intake per kg BM recommendation (2.2 g/kg BM/d), which might be associated with higher IGF-1 status (interpreted below) and limited/no intake of free sugar (used only in relation to PA), SFA and cholesterol.

Analysis of the theoretical model of a well-planned whole-food plant-based diet showed borderline insufficiency only for calcium (4% at the reference 1000 mg/d) and

vitamins B₁₂ and D [61]. However, we must emphasize that the limitation of this research is the absence of data on some micronutrients (e.g., iodine, zinc and selenium). In the wider context of other dietary patterns, there might be dietary inadequacies in all dietary patterns (e.g., vegan, vegetarian and omnivorous diets), indicating the need for additional public health strategies to help consumers balance their diet in a sustainable and well-designed manner [13]. For some comparison, a recent national study on adults in Slovenia showed that 90% and 84% of adults and older adults, respectively, had inadequate fibre intake (<30 g/d) [31]; 46% and 61% of adults and older adults, respectively, had a vitamin D intake below 2.5 µg/d [38]; and 32% and 58% of adults and older adults, respectively, had inadequate daily vitamin B₁₂ intake (<4 µg/d) [62]. Importantly, iodine intake from food only was adequate [33], which we see as important since several studies that examined iodine intake among general vegans indicated lower levels than the reference intake (150 µg/d) [18] or among vegan recreational runners (the reference intake was 200 µg/d) [63] indicated inadequate iodine intake (the latter study obtained similar results for individuals following an omnivorous diet).

Furthermore, the calculated DAL scores of the subject (PRAL: −39.4 mEq/d and NEAP_F: 28.8 mEq/d) were an estimation of the effect of foods on acidity or alkalinity of the body based on protein, phosphorus, potassium, magnesium, and calcium nutrient values [40,41]. In line with our estimated DAL values, studies on vegan diets/among vegans are consistently associated with generally lower DAL values [64–66] compared with studies on other diets, including vegetarian dietary patterns [67,68]. Importantly, high DAL scores, particularly higher PRAL values, are negatively associated with cardiometabolic risk factors [69], chronic kidney disease, bone disorders, low muscle mass and other complications [40]. In addition, our subject self-reported “normal” bowel habits, averaging 3.5 bowel movements daily, which is probably the result of a higher energy, fibre and fluid intake, and increased physical activity [70,71]. Normal bowel movement frequency is suggested to be between three per week and three per day [72]. Vegetarian and especially vegan individuals are strongly associated with a higher frequency of bowel movements [73,74]. However, recent reports from the U.S. National Health and Nutrition Examination Survey (NHANES) that included large numbers of nonvegetarians and vegetarians found no association between vegetarian status and bowel movement frequency [70]. The NHANES results are not surprising, since the fibre intake of vegetarians (21 g/d) did not meet the daily fibre recommendation [70]. In addition, findings from recent studies suggest that stool frequency might be associated with the richness and community composition of the gut microbiota [75].

The serum micronutrients and omega-3 index status of the subject were all within the reference range; however, S-vit B₁₂, S-vit 25 (OH)D and omega-3 index were within the reference range due to supplementation. The serum vitamin B₁₂ status of our subject (330 pmol/L), and vegans in general, was the result of supplementation. In the case of our subject, two doses of 1000 µg weekly plus what was included in the SMR daily (on average a total of 431 µg/d) were consistently used. In addition, the serum homocysteine level of our subject was 4.6 µmol/L. Interestingly, a recent national study on adults in Slovenia showed that the average serum vitamin B₁₂ level was 322 pmol/L; however, 21% and 46% of older adults had serum vitamin B₁₂ levels below the cut-off point (<221 pmol/L) [62]. This prevalence might be of great importance since the Slovenian research group also identified 75% and 89% of adults and older adults, respectively, as having high serum homocysteine status (>10 µmol/L) and 21% and 40% of adults and older adults, respectively, as having even higher serum homocysteine status (>15 µmol/L) (98% and 99% of adults and older adults, respectively, were on an omnivorous diet) [62]. Furthermore, our subject’s S-vit 25 (OH)D was 44 µg/L (110 nmol/L), while a national study showed that 25% of adults and 23% of older adults showed S-vit 25 (OH)D deficiency (<12 µg/L (<30 nmol/L)), and 58% and 63% of adults and older adults, respectively, showed S-vit 25 (OH)D insufficiency (20 µg/L (<50 nmol/L)). When the cut off for insufficiency was 30 µg/L (<75 nmol/L), the prevalence increased to 83% and 84% of adults and older adults, respectively [76]. Of note,

the recruitment period for the national study spanned the entire year (from May–August, the UVB index in Slovenia is on average most days over 6). The subject's omega-3 index status was 6.9%, which is in line with the recommended value of >5.6% [47] and was likely due to an intake of 625 mg/d of EPA and DHA (fish oil derived), regular intake of flaxseed and walnuts and lower total fat and SFA intake. According to general knowledge, the intake of flaxseeds has a beneficial effect on at least a portion of the conversion of ALK to EPA and DHA, and the conversion rate is more effective in women than in men and in individuals consuming a low-fat diet and following a healthy lifestyle [77]. However, in a recently published scoping review of 13 randomized controlled studies on the effect of the conversion of ALK (e.g., from flaxseeds) into EPA and DHA, they showed that even a higher intake of flaxseeds is not reflected in an increase in the omega-3 index, and even resulted in a decrease in some research [78], most likely due to unfavourable nutritional factors that inhibit the process of conversion of ALK to EPA and DHA [79]. Furthermore, some researchers suggested that the optimal omega-3 index range is 8–11% [80]. A recent Australian cross-sectional study compared the value of the omega-3 index in male endurance athletes on a vegan diet ($n = 12$) and on a mixed diet ($n = 8$) and found that the values of the omega-3 index were suboptimal in both groups (4.1% and 5.4%) [16]. In addition, in an intervention study, American researchers administered 254 mg/d EPA and DHA supplements for four months among vegans who had an initial value of the omega-3 index <4% (on average 3.1%), and after the intervention, they increased the omega-3 index to >4% (on average 4.8%) [81]. In the majority of comparative studies, the vegans had low baseline omega-3 levels, but the levels were not lower than those of omnivores who also consume very little EPA and DHA (consumed little or no fish) [81]. Furthermore, S-Fe (19 $\mu\text{mol/L}$) and S-ferritin (73 $\mu\text{g/L}$) status were adequate and comparable between recreational vegan and omnivore runners (13 $\mu\text{mol/L}$ and 40 $\mu\text{g/L}$ vs. 19 $\mu\text{mol/L}$ and 59 $\mu\text{g/L}$) [12].

Although our subject had low values for iodine in urine (55 $\mu\text{g/L}$) (of note, for the determination of iodine in urine, there is no consensus on official reference intervals for an individual, but there are recommendations intended for the determination of iodine in a certain population) [45]. Furthermore, we believe that these values are not alarming and do not indicate deficiency. They can be the result of a single measurement, as the value of iodine in urine per gram of creatinine was above the reference range (289 $\mu\text{g/g}$ vs. 100–199 $\mu\text{g/g}$) [46], and the total intake of iodine (180 $\mu\text{g/d}$ only from food and 365 $\mu\text{g/d}$ in total intake) was adequate [33]. In this regard, experts emphasize that even people on a plant-based diet can ensure sufficient iodine intake by eating sea vegetables (e.g., seaweed or kelp) or using appropriate supplementation [3]. Whenever salt is used, unless otherwise restricted, it should be iodized; however, a sufficient amount of iodine in Slovenia cannot be consumed only with iodized salt, as that would require significantly exceeding the recommended total intake of salt [82].

Based on the general beliefs regarding dietary regimes, especially those associated with the fitness industry and the results of an older, smaller study that associated a vegan diet with lower total testosterone values [83], it is believed that consuming a vegan diet may reduce testosterone availability. Nevertheless, the subject's total S-testosterone level was 4.3 $\mu\text{g/L}$ (the reference range is 2.5–8.8 $\mu\text{g/L}$) [43]. In a study conducted in the United Kingdom, serum hormone concentrations were compared among subjects on a vegan ($n = 233$), a lacto-vegetarian ($n = 237$), and an omnivorous diet ($n = 226$). Contrary to common belief, subjects on a vegan diet had significantly higher total testosterone levels than subjects on omnivorous (by 13%) and lacto-vegetarian (by 8%) diets [14]. In a smaller study that included 51 vegans and 57 omnivorous subjects, vegans had 7% higher total testosterone values [15]. Finally, in a recent study, the researchers found no significant difference in serum total testosterone values between omnivores and those who had a plant-based diet [84]. In regard to health status, we found that the participant was in good general health; however, his S-IGF-1 level needed improvement (lower). The subject's IGF-1 level of 289 $\mu\text{g/L}$ was above the reference range and well above the average values that we found after our 36-week interventional study using a well-designed vegan diet

(185 µg/L) [85]. This might be partly related to higher protein intake per BM and the use of more complete protein sources (i.e., soy tofu, soy protein within MR); however, the intake of soy protein from MR and conventional soy foods (i.e., tofu, beverages) was on average only 22 g/d and 57 g/d, respectively. Of note, our subject did not participate in the previous study. In one comparative study in which the researchers explored IGF-1 levels among adult vegans, vegetarians and meat-eaters, the vegans had an 11% lower average IGF-1 level (141 µg/L). Protein and energy intake among vegans was the lowest (13% of energy and 1900 kcal/d) [14]. These values were in line with a recent meta-analysis that suggesting that IGF-1 levels between 120 and 160 µg/L were associated with the lowest mortality [86]. Furthermore, in a more comparable study in terms of a greater energy intake (2283 kcal/d) and protein intake (20% of energy with only 2 g of animal-based protein intake) and the use of soy food products and isolate supplementation (40 g/d) among men with early, low-grade prostate cancer [8], the researchers saw an average increase in IGF-1 levels compared with their baseline values (from 168 µg/L to 199 µg/L) after one year of a mostly vegan intervention [87]. However, the progression of prostate cancer was inhibited, and the rise in IGF-1 levels could also be influenced by intensive lifestyle changes (i.e., aerobic exercise, yoga-based stretching, breathing, weekly meditation group support) [88]. In a recent review, the authors that explored the effect of soy protein on circulating levels of IGF-1 suggested that clinical data showed unconvincing evidence that large amounts (40 g/day) of soy protein do not clinically significantly increase IGF-1 levels, especially compared to the less favourable effects of milk proteins [89]. Although our subject also had other favourable measured markers, we recommend further studies on highly active adult vegan populations with higher energy and protein needs in relation to IGF-1 and other markers associated with the impact on common chronic diseases and longevity. Finally, the subjects' lower values of S-leucocytes (3.8×10^9 /L) may be a favourable reflection of a large intake of plant-based food sources, especially vegetables [90]. Although it is impossible to attribute the subject's favourable lower leucocyte level to diet alone, according to some authors this can only be seen in the presence of normal S-hs-CRP values (0.2 mg/L) [91,92].

In addition to a healthy diet and other lifestyle factors, appropriate PA and regular exercise are well known to play important if not key roles in health and disease prevention, affecting life expectancy and quality of life [51,93]. However, adhering to both a high-quality diet and sufficient PA is important to optimize health benefits [94]. It is not surprising that with an extensive support system of health coaches [95] or ongoing, community-based support systems [51,96,97], long-term BM/body composition management and health status can be improved [21,85,96,97].

Finally, important for the wider context, a vegan dietary pattern during the COVID-19 epidemic as an important component of a healthy and active lifestyle has been associated with prevention of several common health outcomes of COVID-19 (including reducing long-term consequences), hospital treatment, (pre)mature mortality and the consequences of a possible upcoming coronavirus pandemic [98–100]. Furthermore, a vegan diet may be a good choice for individuals whose immune response to vaccination is poor; a vegan diet may support the effectiveness of vaccination against COVID-19 [99]. A recently published study on health care workers from six countries who were regularly exposed to COVID-19 patients examined the association of dietary patterns with the incidence of COVID-19 infection, the severity of the disease and the duration of the disease. Researchers have found that a plant-based diet (including whole-food, plant-based diets and vegetarian diets) or pescetarian diet may protect against severe COVID-19 [98]. There is an assumption from the pre-pandemic period, based on the favourable results of various observational and clinical studies on the effects of a plant-based diet on various preventive aspects of common chronic noncommunicable diseases, that a plant-based diet may be generally beneficial for several clinical conditions that can also be found in individuals with a severe course of COVID-19 [100].

5. Conclusions

The present study is one of the rare, comprehensive and valid studies examining the actual nutritional status, health status and lifestyle of a highly physically active and health-conscious long-term vegan adult. The regular monitoring of the essential aspects of the impact of a vegan diet on humans is beneficial for the individual, the community of people on a vegan diet, and for the scientific community. The case study report is not intended to uncritically transfer the obtained results to other subjects who eat any kind of vegan diet, but it can serve as an encouragement for researchers in designing long-term interventional or observational studies on a larger sample of physically highly and health-conscious adult vegans. Furthermore, with other great compilations of information and data from other studies [3], it may serve as a springboard to incorporate appropriate planning that suits individuals' more demanding dietary needs with regard to health status, goals and personal circumstances.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/reports5040045/s1>: Table S1: Body fat distribution and topographic BMD; Table S2: Intake of food groups; Table S3: Example of meal plan and lifestyle.

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Informed Consent Statement: Written informed consent was obtained from the subject to publish this paper.

Data Availability Statement: The data used to support the findings of this study are included within the article.

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Conflicts of Interest: B.J. created the WFPB lifestyle program, and S.P. is an active contributor. Part of the supplemented WFPB diet uses Herbalife Nutrition products from which B.J. (indirectly through his wife) and S.P. receive royalties.

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