Article

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A Comprehensive Examination of Vegan Lifestyle in Italy

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Abstract: Veganism and the interest towards a plant-based diet are experiencing exponential growth worldwide, and in Italy more and more individuals and families are adopting this lifestyle and diet, too. Such a change in eating habits also imperatively implies the support and expertise of medical and health care professionals, who to date are still often unprepared and skeptical about this dietary pattern, despite scientific evidence. The present survey collected and evaluated various aspects related to the lifestyle of the Italian vegan population residing in Italy and abroad, including food frequency consumption, vitamin-mineral supplementation, relationship with medical-health figures and perceived difficulties in daily life, placing particular emphasis on potentially critical aspects for those who make this dietary choice. A nationwide cross-section survey was conducted between March and April 2022 by distributing a questionnaire through social platforms such as Instagram, Facebook and Telegram. 2180 vegan Italian adults completed the questionnaire.
The vegan population taken into consideration is predominantly represented by the female gender, shows to be more sensitive to ethical aspects, to be aware of the need for vitamin B12 supplementation, and to correctly follow the Guidelines for Healthy Eating. It is also evident that despite the growing popularity of this dietary pattern, many medical and health professionals are still wary and reluctant to recommend a plant-based diet.

Keywords: plant-based diet; vegan diet; healthy habits and eating trends; dietary patterns

1. Introduction

A vegan diet is defined by the total absence of animal foods, including meat and fish as well as dairy products and eggs. In the past recent years, the attention toward plant-based diets has seen exponential growth among the population of Westernized countries, including Italy: in 2023 to adhere to a vegan diet was 2,4% of the Italian population [1], while only 1,4% of the respondents stated this in the year 2022 [2]. In the Italian survey, a vegetarian diet was mainly chosen by women, whereas those who followed a vegan one were predominantly male. In 2021, the motivation behind the vegan/vegetarian choice, for the majority of the population, was related to a broader philosophy of life, followed by the health choice, related to mental and physical well-being, and in third place was ethics and respect for animals. Respectively in fourth, fifth and sixth place in the ranking, the main choice behind the vegetarian practice was environmental protection, the desire to experiment with new eating styles and the belief in sacrificing food quantity in favor of quality, thus eating less and better [2].

This significant rise may be driven by increased consideration and sensitivity to their own health, a growing concern for environmental sustainability and increased popularization of animal welfare issues, as shown in other populations [3].

In fact, scientific literature confirms that with an adequate vitamin B12 supplementation and by paying attention to potentially critical nutrients (protein, omega 3, iron, calcium, zinc, iodine and

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vitamin D) a plant-based diet promotes health status and is the only one that to date has been associated with a lower risk of all-causes mortality and is also effective in treating, stopping, and regressing some of the major diseases worldwide, as diabetes type 2, cardiovascular disease and cancer onset [4–6]. Furthermore, the Academy of Nutrition and Dietetic (AND) states that plant-based diets, whether vegetarian or vegan, if appropriately planned and supplemented, are healthy, nutritionally adequate, and appropriate at every stage of life [7].

In relation to the environmental aspect, since both emissions of harmful substances and land and water use are closely related to diet, a plant-based diet is to date the dietary model evaluated as most efficient [8]. A vegan diet has a favorable footprint with regard to many ecological indicators and is compatible with the "diet for planetary health" recommended by the EAT-Lancet Commission to address the environmental crisis, to possibly feed the entire world population and to prevent chronic diseases [9].

Despite these evidences and confirmations, it is still a common opinion among medical professionals that a vegan diet is nutritionally deficient and may not be suitable for different categories of patients, especially in the most sensitive segments of the population, such as pregnant and lactating women and children: a research done in 2020 In Italy, reports that about half of vegan parents state the inability of their PCP (Primary Care Pediatrician) to provide sufficient guidance for vegan weaning, while almost 80% state that their PCP was against vegan weaning [10]. Also 36.2% of parents raising children on a plant-based diet did not inform their PCP, and in 70.8% of cases the PCP was skeptical or opposed to the child's fully plant-based diet. The professional figure in question was in most cases a dietitian, followed by a medical dietitian [11].

Misinformation in this area may have serious consequences, since those who wish to approach the vegan diet by relying on their doctor do not receive the necessary knowledge about supplementation, controls and proper planning of their diet, risking first and foremost compromising their health but also discrediting the validity of plant-based diets.

To date, there is a lack of knowledge about the health and supplementation behavior of Italian vegans. The main objective of the study was to investigate the habits and behaviors of the Italian vegan population, including vitamin-mineral supplementation with special emphasis on vitamin B12, as well as the frequencies of consumption of processed foods and belonging to the Mediterranean food pyramid, the reasons why the participants adopted a vegan diet, and lastly what are the major perceived difficulties in social settings and in the exchange with health professionals, in order to assess any possible and potential critical issues. For the purposes of the research, it was also interesting to know the relationship between participants' social and food choices and their health status, to observe any attitudinal and medically important differences.

The study represents a qualitative analysis of lifestyle and perceived difficulties, as well as a quantitative and frequency analysis of supplementation and staple foods based on the VegPlate recommendations [12].

2. Materials and Methods

2.1. Study Design and Participants

The study was conducted between March 9th and April 6th 2022, through the administration of a questionnaire.

This research is a cross-sectional web-based study collecting data on eating habits and lifestyle choices of the vegan population living in Italy and abroad. Subjects were recruited mainly via *social media channels*, such as Instagram, WhatsApp, Telegram and Facebook. The sample was selected according to the following criteria:

Italian nationality

adoption of the vegan diet for more than 365 days

age above 18 years

The sample was asked biographical and socioeconomic items; motivation for choosing a vegan diet; items about whether they had children and the decisions resulting from that; eating habits and behaviors items; vitamin-mineral supplementation questions; perceived difficulties in dealing with

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health professionals; other general questions (anthropometric data, personal choices, type of vegan diet).

To our knowledge, these items have not been tested for reliability or validity. Our survey, before being applied in this study, underwent face validity pretesting in a sample of ten individuals who provided feedback on the understandability, functionality, content, and completion time. Participation in the survey was anonymous and voluntary and could be terminated at any time without justification.

2.2. Data Assessment

The questionnaire was online for a period of 1 month from March 9th 2022 to April 6th 2022.

2.3. Tool

The questionnaire was created *ex novo* using Google Forms and consisted of 46 items in total, divided into 11 sections (general demographic questions, main reason behind the vegan choice, other vegan family members, vegan weaning, intentional exceptions, purchase and consumption habits, food frequency consumption, lifestyle, supplementation, relationship with professionals in nutrition and source of nutritional information), with a variable duration of approximately 8-12 minutes (depending on individual responses). The items asked were structured and semistructured, as some included the option of answering with "Other" and specifying an unanticipated response.

2.4. Data Analysis and Statistics

With reference to each variable considered in the study, absolute and percentage frequencies were calculated, supplemented, where appropriate, by indicators of centrality and variability.

The study of the association between the characteristics of the respondents (gender, age, level of education, geographical area of residence, state of health) and the main variables under study (alcohol intake, smoking status, type of products consumed, type of diet, etc.) was conducted by means of Pearson's X2 test and Fisher's exact test, also in the extended version of Fisher-Freeman-Halton. To assess the correlation between ordinal variables, Spearman's Rho correlation coefficient was estimated.

A value of $p < 0.05$ was considered statistically significant. All analyses were performed using IBM SPSS statistical software (Vers. 20.0).

3. Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

3.1. Study Participants

2180 subjects were included in the study, who declared that they had been following a vegan diet for more than one year (365 days). Of the total number of subjects, 69.1% (n: 1783) stated that they had been vegan for between 1 and 5 years, 10.9% (n: 282) for between 5 and 10 years and 4.5% (n: 115) had been vegan for 10 years or more.

3.2. Sample Characteristics

Baseline characteristics of the participants are shown in the Table 1.

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Table 1. Baseline characteristics.

Total Subjects, % (n)	**100.0% (n=2180)**
Females, % (n)	90.2% (n=1967)
Males, % (n)	8.4% (n=184)
Others[1], % (n)	1.4% (n=29)
Age, years (median±SD[2], range)	28±8.9 (18-74)
Height, cm (median SD[2], range)	165.0±7.6 (145-203)
Weight, kg (median SD[2], range)	58.0±10.7 (37-135)
Total weight status*	n=2180
BMI[3], kg/m² (mean SD[2], range)	21.8±3.4 (14.7-45.1)
Underweight, % (n) (BMI[3]<18.5)	10.0% (n=217)
Normal weight, % (n) (BMI[3] 18.5-24.9)	77.0% (n=1678)
Overweight, % (n) (BMI[3] 25-29.9)	10.2% (n=222)
Obesity, % (n) (BMI[3]>30)	2.9% (n=63)
Female weight status*	n=1967
BMI[3], kg/m² (mean SD[2], range)	21.7±3.3 (14.7-45.1)
Underweight, % (n) (BMI[3]<18.5)	10.2% (n=200)
Normal weight, % (n) (BMI[3] 18.5-24.9)	77.4% (n=1522)
Overweight, % (n) (BMI[3] 25-29.9)	9.7% (n=190)
Obesity, % (n) (BMI[3]>30)	2.8% (n=55)
Male weight status*	n=184
BMI[3], kg/m² (mean SD[2], range)	22.7±3.3 (16.2-40.1)
Underweight, % (n) (BMI[3]<18.5)	7.1% (n=13)
Normal weight, % (n) (BMI[3] 18.5-24.9)	75% (n=138)
Overweight, % (n) (BMI[3] 25-29.9)	15.2% (n=28)
Obesity, % (n) (BMI[3]>30)	2.7% (n=5)
Geographical area	
North-West Italy, % (n)	38.8% (n=846)
North-East Italy, % (n)	27.3% (n=593)
Central Italy, % (n)	16.0% (n=349)
South Italy, % (n)	7.9% (n=172)
Islands, % (n)	4.3% (n=93)

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Abroad, % (n)	5.8% (n=127)
Marital status	
Engaged, % (n)	31.6% (n=686)
Single, % (n)	28.0% (n=611)
Cohabit, % (n)	21.7% (n=474)
Married, % (n)	15.0% (n=324)
Divorced, % (n)	1.5% (n=32)
Widowed, % (n)	0.1% (n=2)
Polyamorous relationship, % (n)	0.1% (n=2)
Profession	
Full-time employee, % (n)	32.9% (n=718)
Student, % (n)	31.9% (n=695)
Freelance worker, % (n)	13.5% (n=295)
Part-time employee, % (n)	10.0% (n=219)
Unemployed, % (n)	4.4% (n=97)
Housewife, % (n)	2.2% (n=47)
Student worker, % (n)	1.9% (n=41)
Retired, % (n)	0.4% (n=9)
Education	
High school diploma, % (n)	42.3% (n=923)
Bachelor, % (n)	24.2% (n=527)
MA/MSc, % (n)	27.8% (n=607)
Secondary school diploma, % (n)	3.8% (n=82)
PhD, % (n)	1.7% (n=38)

[1] Other: not declared, non-binary, agender, transgender. [2] SD (Standard Deviation). [3] BMI (Body Mass Index) based on self-reported indications of body weight and size and calculated kg/m2.

In relation to the profession held, the majority of the sample surveyed, i.e. 32.9% (n: 718), report being full-time employees, followed by students with 31.9% (n: 695), freelance workers with 13.5% (n: 295) and part-time employees with 10% (n: 219). The remaining percentage is distributed in a decreasing but relatively homogeneous manner: 4.4% (n: 97) are unemployed, 2.2% (n: 47) are housewives, 1.9% (n: 41) are student workers, 0.4% (n: 9) are retired and the remaining 1.7% (n: 38) prefer not to answer.

With reference to the highest educational qualification obtained, 42.3% (n: 923) of the participants hold a high school diploma, while 24.2% (n: 527) and 27.8% (n: 607) claim to have obtained a Bachelor's degree and a Master's degree and/or a Master's degree respectively. 3.8% (n:

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82) of the participants obtained a secondary school diploma and the remaining 1.7% (n: 38) completed a PhD. 7% (n: 0.3%) preferred not to answer.

3.2.1. Type of Vegan Diet

The majority of the participants, 95.6% (n: 2084), reported to follow a standard vegan diet, while 1.6%, (n: 34) adopts a high-protein vegan diet. Whole Food Plant Based diet (WFPB) is followed by 0,4% (n:8), a gluten-free vegan diet by 0,6% (n:13), low carb diet by 0,8% (n:17), a raw vegan diet by 0,4% (n:9), a macrobiotic vegan diet by 0,7% (n:15). A strictly fruitarian and liquid/juice-based vegan diet is not followed by any respondent.

3.2.2. Medical Conditions

83.3% (n: 1805) of the subjects stated that they do not suffer from any chronic pathology, while 1.0% (n: 22) stated that they suffer from endometriosis, 3.7% (n: 84) from asthma, 1.2% (n: 26) from dyslipidemia, 1.5% (n: 34) from chronic inflammatory bowel disease, 3.3% (n: 75) from thyroiditis and 5.1% (n: 115) from other unidentified pathologies.

3.3. Vegan Choice: MAIN Motivation

The main reasons for choosing a vegan diet are listed in Table 2.

Table 2. What is the MAIN reason that made you turn vegan?

	Percentage (%)
Total	**100.0% (n=2180)**
Environmental sustainability	21.2% (n=462)
Health and general wellbeing	14.5% (n=316)
Health (suffering from a chronic illness)	1.3% (n=29)
Ethics / animal rights	61.2% (n=1334)
Food preferences	0.8% (n=17)
Foods scandals	0.01% (n=1)
Social influence (from friends, relatives, partner…)	0.4% (n=9)
Social justice / world's hunger	0.5% (n=11)
Curiosity / current trend	0.01% (n=1)
Religious and spiritual beliefs	0.0% (n=0)

3.4. Vegan Diet in the Family

57.4% (n: 1365) of the subjects claim to be the only member in their family to follow a vegan diet, while 21.7% (n: 517) says their partner also adopts this diet. 8.7% (n: 207) declared that other family members are also vegan, 5.9% (n: 140) specified that their father or mother is also vegan, 5.4% (n: 128) said at least one of their children is vegan, and the remaining 0.9% (n: 22) in which both parents are vegan.

3.4.1. Children

Out of 2180 participants, 88.6% (n: 1937) reported not having any children in the age range of 0-18 years, 6.9% (n: 151) say they have one, and 4.4% (n: 97) have more than one.

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3.4.2. Weaning

Out of a total of 356 children, 23.9% (n: 85) were raised with a vegan weaning, 12.8% (n: 49) with a vegetarian weaning and 63.3% (n: 222) with an omnivore weaning. 14.9% (n: 37) of the subjects declared that their pediatrician was in favor of vegan weaning, the same percentage as those who were against it, 14.9% (n: 37). For 14.1% (n: 35) of the respondents, the pediatrician disagreed but the weaning was still vegan, while 21.1% (n: 60) never confronted their pediatrician and 32.1% (n: 80) had no intention of vegan weaning. In the present moment, 33.1% (n: 118) of the children currently follows an omnivorous diet, 26.7% (n: 95) follows a vegan diet, 14% (n: 50) follow a vegetarian diet, and 26.1% (n: 93) eat vegan at home but as they wish when outside. Out of those children not currently adopting a vegan diet, 45.2% (n: 100) says they do not consider it a suitable choice at the present moment, while 22.2% (n: 49) attribute the reason to the fact that their partner does not want to. 17.2% (n: 38) affirms that the parent himself or herself does not consider it the suitable choice and 14.5% (n: 32) says that a vegan menu cannot be found at the canteen. Only in 0.9% (n: 2) of cases is the reason due to opposition by the pediatrician.

3.4.3. Exceptions

In the past year, 48.6% (n: 1060) of the subjects stated they didn't do any intentional exception to the vegan diet, while in 21.5% (n: 468) of cases happened less than 3 times, in 12.1% (n: 263) between 3 and 5 times and 17.8% (n: 389) more than 5 times. The circumstances in which the exceptions occurred were for 40.4% (n: 668) due to lack of other vegan options, for 18% (n: 298) so as not to disappoint others, for 17.9% (n: 297) because of a desire to taste, for 14% (n: 231) for other reasons, and 9.7% (n: 161) so as not to feel embarrassed. Overall, 96.1% (n: 2096) of respondents reported having difficulties in finding vegan options when dining out.

3.5. Frequencies

Table 3. Frequency of different foods consumption.

Food	**Frequency % (total population *n* = 2180)**						
	>1/day	**1/day**	**3-5/week**	**1/week**	**1 every 2 weeks**	**1/month**	**Never**
Fruits and vegetables	89.2% (n=1945)	8.1% (n=176)	2.1% (n=45)	0.5% (n=11)	0.1% (n=2)	0.0% (n=0)	0.01% (n=1)
Cereals (pasta, rice, bread..)	75.9% (n=1654)	19.7% (n=429)	3.7% (n=80)	0.5% (n=11)	0.1% (n=2)	0.0% (n=0)	0.2% (n=4)
Legumes (beans, lentils..)	42.9% (n=936)	41.0% (n=894)	14.5% (n=317)	1.0% (n=21)	0.2% (n=5)	0.2% (n=5)	0.1% (n=2)
Soy products (tofu, tempeh..)	22.3% (n=487)	37.8% (n=825)	30.0% (n=653)	6.6% (n=144)	1.7% (n=37)	0.8% (n=18)	0.7% (n=16)
Seeds and dried fruit	25.0% (n=546)	43.4% (n=946)	21.0% (n=457)	6.3% (n=138)	2.2% (n=49)	1.4% (n=30)	0.6% (n=14)
Extra virgin olive oil	74.2% (n=1618)	20.2% (n=441)	3.1% (n=67)	1.0% (n=22)	0.3% (n=7)	0.4% (n=9)	0.7% (n=16)
Sugary drinks (Coca-Cola, Sprite..)	0.6% (n=13)	0.6% (n=12)	3.1% (n=67)	14.6% (n=319)	9.9% (n=215)	20.3% (n=442)	51.0% (n=1112)

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Other vegetable oils (corn, peanut..)	3.6% (n=79)	9.2% (n=200)	21.2% (n=462)	27.2% (n=593)	12.0% (n=262)	15.9% (n=347)	10.9% (n=237)
Industrial and packaged products (cookies, chips)	3.1% (n=68)	16.8% (n=366)	24.1% (n=526)	27.3% (n=595)	9.3% (n=202)	12.9% (n=281)	6.5% (n=142)
Fried foods	0.0% (n=0)	0.3% (n=7)	3.4% (n=75)	19.2% (n=419)	22.6% (n=493)	39.0% (n=850)	15.4% (n=336)
Meat alternatives (meatballs, burgers..)	0.5% (n=10)	2.7% (n=58)	20.4% (n=444)	40.9% (n=891)	14.3% (n=312)	13.1% (n=285)	8.3% (n=180)
Coconut oil based cheeses substitutes	0.2% (n=5)	0.5% (n=10)	6.1% (n=134)	15.0% (n=326)	15.3% (n=334)	27.0% (n=588)	35.9% (n=783)
Nuts based cheeses	0.2% (n=4)	0.8% (n=17)	4.7% (n=103)	11.9% (n=260)	12.7% (n=276)	29.1% (n=634)	40.6% (n=886)
Frozen ready meals (pizza, lasagne…)	0.01% (n=1)	0.4% (n=9)	2.4% (n=53)	12.9% (n=282)	10.1% (n=221)	23.5% (n=513)	50.5% (n=1101)
Preserved ready products (hummus, noodles…)	0.01% (n=1)	0.7% (n=16)	5.9% (n=108)	10.9% (n=237)	11.6% (n=253)	20.7% (n=452)	51.1% (n=1113)
Protein rich products (bars, protein powder)	0.5% (n=10)	3.2% (n=70)	5.2% (n=114)	4.6% (n=101)	4.5% (n=98)	9.3% (n=2023)	72.7% (n=1584)
Meal replacements	0.2% (n=4)	0.1% (n=3)	0.4% (n=9)	0.7% (n=15)	0.7% (n=15)	1.7% (n=37)	96.2% (n=2097)

3.6. Lifestyle

3.6.1. Physical Activity, Tobacco and Alcohol

75.4% (n: 1643) of the subjects practices regular physical activity several times a week for 1-2 hours, 24.6% (n: 537) sporadically. Non-smokers account for 56.7% (n:1237) of the respondents, while ex-smokers account for 20% (n: 435). Occasional smokers and those who smoke less than 20 cigarettes per day account for 13.1% (n: 285) and 7.8% (n:170), respectively. Only 0.3% (n: 7) smokes more than 20 cigarettes per day. Regarding the intake of alcoholic beverages, 16.7% (n: 636) refers to never drink alcohol, 27.6% (n: 602) to drink it maximum once per month, 37.8% (n: 824) 2 to 4 times per month, 15.9% (n: 347) 2 to 4 times per week and 2.0% (n: 44) 5 or more times per week. 80.7% (n: 1466) refers to drink less than 2 alcoholic units.

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3.6.2. Medical Aspects

The results show that 49.2% (n: 1073) of the respondents perform blood exams in order to control their vitamin-mineral status once or more a year, 19.3% (n: 420) once every 2 years, while 21.4% (n: 466) and 10.1% (n: 221) do not do them regularly and rarely or never, respectively.

Table 4. Vitamin-mineral supplementation.

Supplement	Regularly % (n)	Occasionally % (n)	By Prescription % (n)	Never % (n)
Vitamin B12	89.0% (n=1941)	6.3% (n=138)	0.9% (n=20)	3.7% (n=81)
Vitamin D	28.9% (n=629)	16.8% (n=367)	9.3% (n=203)	45.0% (n=981)
Omega 3 (EPA[1]/DHA[2])	8.2% (n=179)	11.1% (n=241)	1.7% (n=36)	79.1% (n=1724)
Iron	4.2% (n=91)	7.6% (n=166)	7.3% (n=159)	80.9% (n=1764)
Calcium	1.8% (n=39)	4.0% (n=87)	1.3% (n=28)	92.9% (n=2026)
Multivitamin	6.0% (n=131)	18.1% (n=394)	2.8% (n=61)	73.1% (n=1594)
Protein powder/BCAA[3]/EAA[4]	5.7% (n=124)	9.0% (n=196)	0.6% (n=13)	84.7% (n=1847)
Other	5.6% (n=123)	4.4% (n=97)	1.8% (n=40)	88.1% (n=1920)

[1] EPA (Eicosapentaenoic Acid). [2] DHA (Docosahexaenoic Acid). [3] BCAA (Branched-Chain Amino Acids). [3] EAA (Essential Amino Acids).

3.7. Relationship with Professionals in Nutrition

Professional nutritional advice has never been taken by 69% (n: 1547) of the participants, whereas 17.2% (n: 385) has been followed by a nutritionist, 7% (n: 158) by a dietitian, 6.3% (n: 142) by a medical dietitian and 0.4% (n: 10) reported being followed by a non-professional figure not belonging to any of the above categories. 51.3% (n: 1209) declared they had encountered reticence by their general practitioner, 12.6% (n: 297) by gynecologists, 10% (n: 235) by nutritionist, 6% (n: 141) by pediatricians, 5.3% (n: 126) by dietitians, 6.5% (n: 154) medical dietitians and 8.3% (n: 196) by other medical figures.

3.8. Source of Nutritional Knowledge

28.8% (n: 1761) of respondents usually sources information about the vegan diet from the web (Instagram, blogs, groups, etc.), 23.4% (n: 1426) from scientific articles, 20.7% (n: 1238) relies on nutritional practitioners, 18.8% reads books and magazines on the topic, 4.2% (n: 256) from acquaintances and friends, and 3.6% (n: 221) by taking courses and seminars. Only 0.4% (n: 22) reports to never search for nutritional information.

4. Discussion

This study investigates the eating habits and behavior of the Italian vegan population, with particular attention to food frequency consumption, vitamin-mineral supplementation and the relationship with medical professionals.

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A large portion of the sample follows a vegan diet for one year, but less than 5. These data further confirm the increasing interest in plant-based diets in recent years in Italy, as already shown in Eurispes Italy Report [1].

In our study vegans were predominantly female (90.2%) and young (median 28 years), as well as in a normal weight status. Only a small percentage of the total was found to be underweight or overweight.

Restrictive and potentially dangerous dietary patterns, such as fruitarian or raw diets, do not hold any interest among the surveyed population: in fact, almost the totality follows a 'standard' vegan diet, with no particular dietary restrictions within the plant food groups.

An absence of chronic pathologies was observed in more than 80% of the total subjects, and a percentage of the presence of diseases of 'well-being', i.e. potentially associated with incorrect lifestyles (heart disease, type 2 diabetes mellitus, MICI, dyslipidemia and arterial hypertension) in less than 5%. Although it is crucial to consider the low average age of the sample, these results could confirm two hypotheses: first, that an entirely plant-based diet may have positive consequences on the health of individuals, and second, as suggested by the literature, that those who follow a plant-based diet not only make more careful and conscious food choices, but also tend to have a healthier and more active lifestyle in general than the omnivorous population, taking care of their health in all respects, as shown in other studies [7,14]. Further investigation is needed to confirm this hypothesis.

Within the investigated population, the main motivation behind the shift towards a plant-based diet was ethics and animal rights for more than half of the subjects, followed by environmental sustainability and lastly by health and general wellbeing, as already shown in similar previous studies conducted in Australia, America, Canada, Great Britain and Holland [15–18].

As far as weaning is concerned, the majority of children follows an omnivorous weaning, preferred to a vegan and to a vegetarian one. As similarly shown in another research, pediatricians were partly against the adoption of a vegan weaning, a stance that is furthermore reaffirmed by the position paper of the Italian Society of Preventive and Social Pediatrics [10,11]. However, one third of the subjects had no intention of weaning their child(ren) onto a vegan regime anyway, highlighting the fact that the pediatrician's opposition is most often not a deterrent to this.

Despite the fact that there is extensive literature supporting the validity of a vegan diet even during the early years of human development, the contrary conviction from professionals is still strongly rooted, perhaps also due to a lack of academic offer on the subject [7]. It is therefore necessary to implement and offer educational and training courses aimed at pediatricians, with the intention of eliminating such uncertainties towards plant-based diets in childhood.

Most of the children who currently are not vegan, do not consider this dietary model to be a suitable choice for themselves at this stage of their lives. The remaining percentage is not vegan due to the opposition of one or both of their parents or due to the impossibility of a fully vegan option at school. This reflects the strong need to incentivize canteens and the government to provide a fully plant-based menù in schools.

A considerable obstacle for those approaching a vegan diet found by this survey is the lack of 100% vegan options on convivial occasions, which demonstrates the need to make exceptions, therefore not accidental, to one's diet. In fact, although about half of the sample stated they had never diverged from the vegan diet, the other half preferred to make an intentional exception to their plant-based diet, driven by the desire to taste, not to disappoint others or not to feel embarrassed. All of these motivations are also reflected in another research [19], and are again confirmed by other results of this study: according to the majority of respondents it is still quite or very difficult to find a vegan option when going out to eat. Probably also for this reason, more than three quarters of the population analyzed in the study almost always eat meals at home. Promoting the integration of plant-based options into the menus of restaurants, canteens, hospitals, bakeries and fast food outlets in order to listen to consumer demands is therefore becoming an increasingly pressing need. This can help not only to normalize this dietary pattern, but also to more easily convey that the vegan choice is not restrictive nor limiting.

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However, cooking more frequently at home, as shown by research, is also associated with a higher score on the Healthy Eating Index-2015 [20]. Amongst other things, it can be observed in the literature that the vegan population is much closer to the Mediterranean diet's indications than the vegetarian and omnivorous population, consuming significantly more fruit and vegetables, pulses and dried oleaginous fruits [21]. Evidence of this is again confirmed in the sample of this study: the consumption of fruit and vegetables appears more than once a day for nearly the totality of the subjects, while legumes are consumed at least one per day by more than 80% of the respondents. Similar trends occurred for the category oilseeds and nuts as well as extra virgin olive oil, which remains the most frequently used source of fat. As for all the above categories, the frequency is also totally in line with the guidelines for cereals and cereal products [22].

Again according to guidelines [22], sugary soft drinks and fried foods, defined as 'voluptuous' foods, should be consumed with occasional frequency and limited to special events, an indication that is decisively adhered to by almost all subjects. A very similar trend is also evident for frozen and preserved convenience products, coconut oil-based vegan cheeses and ready meals, again demonstrating a similarity with what is stated in the frequency of consumption indications.

A figure which deviates slightly from the trends described above is the frequency of consumption of the category 'burgers and meat substitutes': one fifth of the respondents eat these products three to five times a week, and as these are processed foods, their consumption should be limited as much as possible. However, this figure, while showing a tendency for vegans to consume more ultra-processed foods than vegetarians and omnivores [23], it does not provide any excuse to categorize the vegan diet as nutritionally poor or unbalanced: in fact, it is still entirely plant-derived products - thus cholesterol-free, often lower in calories and with a fair proportion of fiber - that when compared to their animal counterparts, have demonstrated several health benefits [24,25].

The widespread consumption of such foods by consumers can be explained by analyzing the factor that most influences their purchase, i.e. 'taste': in fact, those who become vegan, often only reject the *modus operandi* by which certain products are made, but do not want to give up the component of pleasure and joy in eating. This is also the reason why the market for plant-based alternatives is continuously and rapidly growing [26].

Shifting the focus to lifestyle, as has been reported numerous times in the literature, it is evident that those who regularly practice physical activity have a better general health status, experiencing both clinical-metabolic, psychological and behavioral benefits [27]. In fact, sedentary and unhealthy eating habits, so frequently associated [28], play a decisive role in the spread of serious pathological frameworks, defined as 'diseases of well-being' [29]. Against this data, however, this analysis shows that more than three quarters of the sample practice physical activity regularly several times a week for an average duration of 1-2 hours, figures that are very close to the WHO recommendations [30]. Similarly, with regard to smoking and alcohol consumption, the results are more than positive: non-smokers and ex-smokers make up the largest percentage of the sample, as do teetotalers and occasional drinkers. It is well known that alcohol consumption is one of the most important risk factors for the development of cancer after smoking, obesity, physical inactivity and poor fruit and vegetable consumption [31] as well as for the development of blood diseases. Smoking, on the other hand, is an important risk factor for numerous diseases (e.g. cancer and cardiovascular diseases).

As various position papers from numerous institutions have well emphasized, vitamin B12 supplementation is absolutely necessary for a vegan diet to be considered nutritionally balanced and healthy [7]. In fact, no plant-based food contains B12, which is crucial to regulate hemoglobin and DNA synthesis, plus it is necessary for the proper functioning of the central nervous system. A deficiency might cause depression, memory disorders up to dementia, spinal cord suffering up to tetra-paresis, and neuropathies affecting the peripheral nervous system [32].

Almost the totality of the sample is aware of these indications, in fact almost 90% regularly supplement it. However, it is worth noting and monitoring the small percentage of the investigated population that claims never to use the supplement: although this is a very small share, the health risks are obvious and not negligible. It is therefore of the utmost importance to continue informing patients and instructing medical professionals to demonstrate that they have taken this

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recommendation on board. On the other hand, the supplementation of other supplements, such as iron, omega 3 and multivitamins, is not of equal interest, for which the same urgency is not apparent - except for vitamin D, which is supplemented regularly by almost one third of the sample analyzed. The organism's vitamin D status depends solely on sun exposure: in the absence of adequate sun exposure, it must be introduced into the diet via fortified plant foods or supplements. This recommendation is valid for the general population, not only for vegans, as vitamin D is not diet-dependent [33].

In this regard, it is striking to note that although less than 70% of the sample sought support and had direct experience with a nutrition professional for vegan eating, almost three quarters of the total encountered resistance or skepticism on the part of the same or other medical professionals several times. It is general practitioners (GPs) in particular who have been reported to show the most skepticism among all other professionals in nutrition. On one hand this could significate a potential lack of expertise and knowledge regarding vegan diets, on the other hand this higher frequency could be due to them being the most frequently addressed medical figures.

The reasons why a vegan diet is not recommended by professionals, are repeatedly refuted by the literature, as reported above. This suggests the urgent need to educate and make health professionals - nutrition specialists or not - aware of the validity of 100% plant-based diets, which if correctly planned and integrated, are perfectly applicable to every patient at every stage of life and can also play a preventive role in the onset of certain diseases. This issue could be addressed implementing academic lessons during university and training courses for all health-related medical professionals, as previously referred to.

In any case, almost all of the sample proved to be eager to learn and receive information about vegan nutrition, independently searching for useful notions from numerous sources, such as nutrition professionals, scientific articles, books and magazines, friends and acquaintances, and above all from the web (Instagram, blogs, groups, etc.). It is worth mentioning that Instagram plays a crucial role in the dissemination of content, which helps to share the message in a conscious and effective manner.

This study provided interesting results that could be useful both as a benchmark and for monitoring purposes. Furthermore, the present data could be used as a reference for other studies aimed at collecting information on the same indicators in specific contexts, which could then be compared with data on a national level.

4.1. Limits of the Study

The present work has some possible limitations. First of all, only Italian participants are incorporated in the sample of this study, therefore this sample cannot be considered representative for the population of other nations.

Then there are some possible biases that can be found in the study: selection bias, performance bias and recall bias.

The selection bias is related to the fact that those who filled in the questionnaire, and thus decided to join the survey, were recruited on a voluntary basis through social channels. The sample is therefore limited to users subscribed to the dissemination channels and platforms Instagram, Facebook and Telegram, and further limited to users of the accounts of those who participated in the dissemination of the study. Consequently, all Italian vegan subjects not falling into the above-mentioned categories were unable to take part in the survey.

The performance bias is present as the participants were aware that they were taking part in a study aimed at analyzing the eating behavior and habits of the vegan population in Italy, and the possibility may persist that this influenced the answers given. In addition, completing the questionnaire online allows less control over the respondent compared to an in-person questionnaire. With this type of administration it is not possible, in fact, to check the veracity of the answers given and who actually fills out the questionnaire.

The recall bias, on the other hand, can be attributed to the possible inaccuracy or incompleteness of the memories retrieved from the study participants, especially concerning the frequency of food

consumption, vitamin-mineral supplementation and in general the experiences investigated related to the past.

5. Conclusions

In conclusion, our results show a population in which the number of people choosing the vegan option appears to be increasing, where the greatest involvement is found among the female population, which far exceeds the male one. Among the reasons for choosing a completely plant-based diet, ethics and animal rights hold the main position.

Eating meals mainly at home is associated with higher diet quality: indeed, among the vegan population surveyed, greater attention to their eating habits is denoted when compared with the general omnivorous population. The consumption of fruits and vegetables, cereals and cereal derivatives, legumes, oleaginous nuts and extra virgin olive oil totally complies with the recommendations of the Guidelines, as also the use of processed and sugary products does not exceed the maximum intake limits indicated. Proper supplementation of vitamin B12 is also respected by the vast majority of the survey sample, demonstrating widespread knowledge of the medical and nutritional indications reported by the institutions.

Such attentions, probably dictated primarily by the desire to avoid the onset of possible deficiencies, also lead to the development of greater awareness: in fact, those who, out of desire or necessity, approach the vegan diet often increase not only their nutritional knowledge, but also indirectly improve various other aspects of their lifestyle. In fact, a reduced percentage of smokers and drinkers and instead a high number of individuals who practice regular physical activity are denoted among the respondents.

The skepticism encountered by much of the sample when approaching medical and health figures about a plant-based diet has no reason to be: the hypothesized deficiencies or the occurrence of physical and nutritional problems derived from the vegan diet are unfounded concepts that are disproven by the literature, and it is more necessary than ever that they be overcome.

In light of the findings, the introduction of educational courses and seminars or the implementation of nutrition education classes in the curriculum of medical and health professions degree programs, performed by professional figures with expertise in plant-based nutrition such as dietitians, dietitians, and specialized nutritional biologists, could be useful. All this is done in order to increase the awareness of the above-mentioned health figures about the feasibility and invalidity of an all-plant-based diet, as well as to convey up-to-date and scientifically based information to their patients. The main objective of the proposed interventions would be to make health professionals informed and aware of plant-based diets and consequently to reduce the risk of developing nutritional deficiencies in patients.

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