Original article

NUTRITIONAL DISORDERS AND RELATED RISK FACTORS IN A COHORT OF YOUNG MEDITERRANEAN POPULATION

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ABSTRACT

Today, obesity and thinness have a high impact on young generations which could affect their entire lifetime. The aim of our study was to investigate possible relationships between nutritional disorders and the presence of some risk factors in childhood/youth. An observational study was conducted from March to April 2019 through the administration on individuals 18-35 years old of age of both sexes using an ad hoc online questionnaire. We analysed a sample of 310 young adults (22.26 years ±6.49 SD) and we found that about 50% of the subjects were underweight or overweight. We noticed some common traits between these two groups: low income and familiarity for nutritional deficits in underweight subjects, parents' low degree of education, skipping breakfast/meals in the day, low consumption of fruit/vegetables and inability to control certain aspects of one's life, dissatisfaction and problems in interpersonal relationships. Distinctive between the two groups was the different consumption of junk food (predominant in the obese and absent in underweight) and the level of physical activity (mostly performed by underweight). Our study highlights the need for public health decision makers to reduce prevalence of nutritional disorders that could be important risk factors to the development of chronic diseases.

1. Introduction

Obesity can be described as the "New World Syndrome" with high prevalence in all age groups in high-income countries. Statistical data reveals that the problem of obesity has increased from 12–20% in men and from 16–25% in women over the last ten years [1,2]. Young adulthood, typically defined as 18–35, is associated with a variety of life events that could be a stress factor (such as enrolling in college, getting married, pregnancy in women and beginning a family) and so could lead to development of eating disorders, especially weight gain [3-6].

Also, young adults often purchase and eat food outside of their homes and this could lead to unhealthy food habits [7]. Nutritional and eating habits are important determinants of health and play an important role in the choices of food which vary per socioeconomic status [8,9]. Furthermore, other factors could contribute to the development of obesity such as physical activity, parental habits, their education degrees [10], childhood

behaviour and moreover, stress and mental status could be important factors into onset of these disorders [11].

The aim of our study was to investigate possible relationships between nutritional disorders and the presence of some early risk factors in childhood (such as diet and familiarity for obesity in parents and their educational degree), socioeconomic status, dietary patterns, physical activity, mental and emotional status in the young adult age group.

2. Methods

An observational study was conducted in Sicily from March to April 2019 through the administration on individuals between the ages of 18 and 35 of both sexes using an ad hoc online questionnaire specifically designed to search for personal information, social determinants and lifestyle habits with particular reference to the feeding of the subject in adult age (through

the KIDMED questionnaire) and childhood, to the type and intensity of the performed physical activity.

The KIDMED questionnaire was used to evaluate the adherence to a Mediterranean diet in adolescents.

It consists of 16 items, where there are 4 questions denoting a negative connotation to the Mediterranean diet (consumption of fast food, baked goods, sweets, and skipping breakfast) and 12 questions denoting a positive connotation (consumption of oil, fish, fruits, vegetables, cereals, nuts, pulses, pasta or rice, dairy products, and yoghurt). Questions denoting negative connotation are scored with −1, while positive connotation questions are scored with +1. According to the KIDMED index, a score of 0–3 reflects poor adherence to the Mediterranean diet, a score of 4–7 describes average adherence, and a score of 8–12 as good adherence. The emotional-relational sphere was also investigated through an ad hoc questionnaire integrated with the PSS 4-item assessment. We also asked for anthropometric parameters (weight and height) to calculate Body Mass Index (BMI) to evaluate ponderal status.

The sample size was determined considering a prevalence of overweight and obesity of 45.6% in Italy in adult age and considering the resident population in Italy on 1° January 2019 from 18 to 35 years of age, estimating a 95% Confidence Interval (CI) and absolute precision of 10%. We stratified the sample by BMI into four classes: normal weight (BMI 18.51 - 25), overweight (BMI 25.01 - 30), obesity (BMI > 30) and underweight (BMI < 18.5). Exclusion criteria: we excluded people with obesity secondary (i.e. due to endocrine, genetic or polymalformative diseases or iatrogenic effects) [12-14]. Chi-Square test of independence was used to determine any statistically significant associations between the four classifications of weight (underweight, normal weight, overweight, obese) and all the categorical variables, adopting a relative partition model where the null hypothesis was rejected.

P-values <0.05 were considered significant. Statistical analysis was performed using the EPIINFO Software [15].

3. Results

We analysed a sample of 310 young adults (mean age 22.26 years ±6.49 SD) of which 19% were males and 81% females. We obtained an average BMI for all samples of 22.73±5.02 SD; the sample was stratified into four classes by BMI: underweight (19.61%;n=61), normal weight (53.38%;n=166), overweight (19.29%;n=60) and obese (5.79%; n=13) (1.61% ;n=5 did not answer).

Socio-economic status and ponderal status of the parents
Socio-economic and ponderal status of the parents were summarized in Table 1. We found statistical differences in relationship with the fathers' educational degree in the four classes of BMI (p<0.05). No correlations were found between socio-economic status or familiarity for obesity in our sample.

Life habits of the sample, diet and physical activity

We investigated the life habits of the sample: in particular, we asked "with whom you usually live": in particular, those who answered "alone" showed 6.56% underweight, 6.02% normal weight and for overweight and obesity respectively 5.00% and 11%; respectively, we also found those who lived with "roommates" showed 11.48% of the first category, 20.48% of the second one and 15.00% and 11% of the third one. Finally,

we obtained the answer "at home" from 81.97% of the underweight, 72.89% of normal weight and finally 80.00% and 72% of the overweight/obese.

Socio economic status, % (n)		
Middle income (25,000 – 30,000 € /year)	40.0 (124)	
Low income (< 25,000 € /year)	52.3 (162)	
High income (> 30,000 €/year)	5.8 (18)	
No reply	1.9 (6)	
Parents' educational degree, % (n)		
	Mother	*Father*
Elementary	2.6 (8)	4.5 (14)
Lower secondary	31.3 (97)	33.2 (103)
Upper secondary	43.2 (134)	43.9 (136)
University	21.3 (66)	16.1 (50)
No reply	1.6 (5)	2.3 (7)
Parents' BMI, % (n)		
	Mother	*Father*
Normal weight (BMI 18.51 - 25)	66.8 (207)	65.5 (203)
Overweight (BMI 25.01 - 30)	28.1 (87)	28.4 (88)
Obesity (BMI > 30)	1.0 (3)	1.9 (6)
Underweight (BMI < 18.5)	2.6 (8)	1.3 (4)
No reply	1.6 (5)	2.9 (9)

Table 1. Socio-economic and ponderal status of the parents

Other items investigated in our study was the feeding habits "where and with whom you usually eat": we found that in the underweight category a higher percentage eat at home (81.97%) while only 6.56% eat in the bar and 11.48% in a refectory. Additionally, 91.80% eat lunch with their family while only 4.92% alone and 3.28% with friends.

	Underweight N=61 % (n)	Normal weight N=166 % (n)	Overweight N=90 % (n)	Obese N=13 % (n)	P value
Diet in childhood					
Make breakfast	77.05% (47)	66.27% (110)	66.67% (40)	72.22% (18)	<0.001
Make 5 meals a day	34.43% (21)	36.75% (61)	38.33% (23)	27.78% (5)	0.31
Eat fruit and vegetables	55.74% (34)	59.04% (98)	55.00% (33)	33.33% (6)	0.01
Eat junk food and snacks	32.79% (20)	28.92% (48)	33.33% (20)	38.89% (7)	0.35
Drink sugar or sodas	19.67% (12)	14.46% (24)	20.00% (12)	0.00% (0)	n.a.
Diet in adult age (KIDMED test)					
A piece of fruit every day	50.82% (31)	63.25% (105)	53.33% (32)	50.00% (9)	<0.001
Has a second piece of fruit every day	22.95% (14)	27.71% (46)	15.00% (9)	11.11% (2)	<0.001
Has fresh or cooked vegetables regularly once a day	60.66% (37)	66.27% (110)	68.33% (41)	44.44% (8)	<0.01
Has fresh or cooked vegetables more than once a day	37.70% (23)	36.75% (61)	23.33% (14)	16.67% (3)	<0.01
Consumes fish regularly (at least 2–3x/week)	45.90% (28)	50.00% (83)	48.33% (29)	50.00% (9)	0.05
Goes >1x/week to a fast food restaurant (hamburger)	13.11% (8)	7.23% (12)	13.33% (8)	5.56% (1)	0.53
Likes pulses and eats them >1x/week	65.57% (40)	69.88% (116)	70.00% (42)	66.67% (12)	<0.01
Consumes pasta or rice almost every day (5x or more per week)	75.41% (46)	77.71% (129)	63.33% (38)	66.67% (12)	<0.001
Has cereals or grains (bread, etc) for breakfast	39.34% (24)	43.37% (72)	36.67% (22)	33.33% (6)	<0.05
Consumes nuts regularly (at least 2–3x/week)	14.75% (9)	28.31% (47)	20.00% (12)	16.67% (3)	<0.05
Uses olive oil at home	98.36% (60)	99.40% (165)	100.00% (60)	100% (18)	Na
Skips breakfast	37.70% (23)	27.11% (45)	43.33% (26)	50.00% (9)	0.12
Has a dairy product for breakfast (yoghurt, milk, etc)	62.30% (38)	65.66% (109)	60.00% (36)	38.89% (7)	<0.001
Has commercially baked goods or pastries for breakfast	36.07% (22)	21.69% (36)	25.00% (15)	44.44% (8)	<0.01
Eats two yoghurts and/or some cheese (40 g) daily	39.34% (34)	36.75% (861)	38.33% (23)	44.44% (8)	<0.01
Eats sweets and candy several times every day	22.95% (14)	12.65% (21)	13.33% (8)	22.22% (4)	0.06

Table 2. Diet in childhood and adult age (KIDMED TEST). * We didn't report the "no answer" and negative answer in Table 2.

^ KIDMED Index: Adherence to Med Diet - Score ≤ 3 points Poor; Score 4-7 points Medium; Score ≥ 8 points High.

in dissatisfied subjects.

This pattern was also found for the other two categories both for "where" (only 6.02% eat in the bar for normal weight people and 5% and 11% of overweight and obese; also 20.48% of the first category eat lunch in a refectory and 15% and 17% of the second one) and for "with" (2.41% of the normal weight and 4.92% of the obese eat alone; 5.42% eat meals with friends for the first one and 3.28% of the second one). We didn't find any statistical differences for the investigated items of our sample.

We investigated also voluptuous habits: smoke cigarettes/electronic cigarettes and alcohol consumption. We obtained that in underweight people, 72.13% did not smoke cigarettes and 85.25% did not drink alcohol. For cigarette use, the percentage dropped down in obese people to 67% while alcohol consumption remained very low (only 6%). Only 29.52% of normal weight people and 18.34% of those overweight smoked cigarettes and 16.26% and 11.67% drank alcohol, respectively.

Other investigated factors were feeding in childhood and in adult age with KIDMED test. Results were reported in Table 2 and Table 3.

KIDMED index AND PSS 4 SCORE (%)					P value
	Underweight	Normalweight	Overweight	Obese	
KIDMED SCORE					
<3	34.04%	17.73%	31.48%	35.29%	
4-7	59.57%	73.05%	61.11%	52.94%	0.10
8	6.38%	9.22%	7.41%	11.76%	
PSS SCORE					
VERY LOW HEALTH CONCERN	60.66%	60.49%	64.29%	44.44%	
LOW HEALTH CONCERN	34.43%	30.25%	35.71%	44.44%	
AVERAGE HEALTH CONCERN	4.92%	9.26%	0.00%	11.11%	NA
HIGH HEALTH CONCERN	0.00%	0.00%	0.00%	0.00%	

Table 3. KIDMED index AND PSS 4 score stratified by BMI (please insert in the table the p-value).

Statistical differences in relationship with skipping breakfast in childhood, with lower BMI index in subjects that had breakfast regularly were observed (p<0.001).

Also, were obtained statistical differences in the diet in adult age in relationship with many variables (see Table 2).

However, KIDMED Test did not return any statistical difference between the four BMI groups.

Moreover, we investigated physical activity of the sample (Table 4) and we obtained that 57.4% in the underweight, 51.20% in normal weight people, 45.00% of overweight and 39% of obese did not practice any sport. Of the total sample, 11.3% play competitive sports and followed a particular diet. No correlation was found between the four classes of BMI and physical activity (Table 4)

	Underweight	Normal weight	Overweight	Obese	P-value
No	57.4 (35)	51.2 (85)	45 (41)	39 (7)	> 0.05
Yes	41.6 (26)	49.8 (81)	55 (50)	61 (11)	

Table 4. Physical activity in the sample by BMI (n, %).

Stress perception and psychic status of the sample

Finally, stress perception with perceived stress scale 4 and mental-emotional status was investigated. Results were summarized into Table 5. We found that the psychic state could contribute to a variation of BMI: in fact, we found statistical differences for items "d" (p<0.001), "e" and "P" (p<0.05) between underweight, normal weight and obese with higher BMI

	Underweight		Normal weight		Overweight		Obese		P-value
	Not satisfied	Satisfied	Not satisfied	Satisfied	Not satisfied	Satisfied	Not satisfied	Satisfied	
A	50	11	134	31	48	12	14	4	Ns
	82.0%	18.0%	80.7%	18.7%	53.3%	13.3%	77.8%	22.2%	
B	26	35	85	81	30	30	12	6	Ns
	42.6%	57.4%	51.2%	48.8%	33.3%	33.3%	66.7%	33.3%	
C	45	16	105	60	35	25	15	3	Ns
	73.8%	26.2%	63.3%	36.1%	38.9%	27.8%	83.3%	16.7%	
D	46	14	124	10	52	28	14	4	<0.001
	75.4%	23.0%	74.7%	6.0%	57.8%	31.1%	77.8%	22.2%	
E	23	37	45	121	17	43	11	7	<0.05
	37.7%	60.7%	27.1%	72.9%	18.9%	47.8%	61.1%	38.9%	
F	26	35	57	109	17	43	9	9	Ns
	42.6%	57.4%	34.3%	65.7%	18.9%	47.8%	50.0%	50.0%	
G	27	34	59	107	19	41	9	9	Ns
	44.3%	55.7%	35.5%	64.5%	21.1%	45.6%	50.0%	50.0%	
H	26	35	53	113	18	42	8	10	Ns
	42.6%	57.4%	31.9%	68.1%	20.0%	46.7%	44.4%	55.6%	
I	26	35	54	112	12	48	7	11	Ns
	42.6%	57.4%	32.5%	67.5%	13.3%	53.3%	38.9%	61.1%	
J	33	28	82	84	28	32	12	6	Ns
	54.1%	45.9%	49.4%	50.6%	31.1%	35.6%	66.7%	33.3%	
K	32	29	81	85	26	34	12	6	Ns
	52.5%	47.5%	48.8%	51.2%	28.9%	37.8%	66.7%	33.3%	
L	33	28	72	94	22	38	11	7	Ns
	54.1%	45.9%	43.4%	56.6%	24.4%	42.2%	61.1%	38.9%	
M	22	39	54	112	15	45	6	12	Ns
	36.1%	63.9%	32.5%	67.5%	16.7%	50.0%	33.3%	66.7%	
N	25	36	64	102	21	39	8	10	Ns
	41.0%	59.0%	38.6%	61.4%	23.3%	43.3%	44.4%	55.6%	
O	44	17	108	58	38	22	15	3	Ns
	72.1%	27.9%	65.1%	34.9%	42.2%	24.4%	83.3%	16.7%	
P	33	27	79	86	17	43	11	7	<0.05
	54.1%	44.3%	47.6%	51.8%	18.9%	47.8%	61.1%	38.9%	

^ Normal weight (BMI 18.51 - 25), overweight (BMI 25.01 - 30), obesity (BMI > 30) and underweight (BMI < 18.5

* Legend

a. In the last month how often have you felt that you are not able to control the important things in your life?

b. In the last month how often have you felt confident about your ability to manage your personal problems?

c. In the last month how often did you feel that things were going well (your way)?

d. In the last month how many times have you felt overwhelmed with difficulties and that you couldn't overcome them?

e. How do you rate the quality of your life?

f. How satisfied are you with your health?

g. How satisfied are you with yourself?

h. How satisfied are you with your ability to perform daily tasks?

i. How satisfied are you with your personal relationships?

j. How satisfied are you with the place where you live?

k. How satisfied are you with the way you use your time?

l. Do you have enough enthusiasm in everyday life?

m. How much control do you have on the things you like to do?

n. How satisfied are you with your opportunities to reach the goals of your life?

o. Do you have enough money to meet your needs?

p. How satisfied are you with the interpersonal relationships of your life?

1. Very dissatisfied
2. Dissatisfied
3. Middle
4. Satisfied
5. Very satisfied

Table 5. PPS 4 and emotional-mental status of the sample stratified by BMI.

4. Discussion and conclusions

In our sample that about 50% of the interviews had a nutritional problem, particularly underweight or overweight/obesity. Many factors could contribute to these problems and in our analysis, we noticed some common traits between subjects with deficit and excess weight: for example, low income and familiarity for nutritional deficits according to the findings of other authors [16-17].

Another factor in our study that could contribute to excessive weight was the parents' degree of education, in particular of the father, such as detected in other studies [11,18].

2000;22(2):261–274.

The evaluation of the food profile showed further similarities: since childhood uncorrected habits emerged, such as skipping breakfast or other meals in the day, and the low consumption of fruit / vegetables that persisted in adult life. Evaluating the KIDMED test we obtained a score <3 respectively in 36% of the underweight, 32% of the overweight / obese and 18% of the normal weight. In recent years, an important modification of the dietary habits has been observed in Mediterranean countries, especially among young adults. These modifications were due to several factors, such as less time and attention devoted to food acquisition and preparation, resulting in an increase in the consumption of unhealthy foods, inadequate consumption of products of animal origin, an excessive intake of processed sugars and a substantial increase of saturated fats and cholesterol in the diet [19].

In fact, in our study distinctive between the two groups was the consumption levels of junk food predominant in the obese and absent in the others; the former also eat their own meals in the familial environment while the latter eat meals together with their friends [20]. Both profiles were associated with the inability to control certain aspects of one's life, insecurity and personal, economic dissatisfaction and problems in interpersonal relationships [21].

Moreover, underweight may be attributed to the 'slim-fit' syndrome because this age range is unduly concerned about their shape and make deliberate efforts to maintain it for social reasons. This could lead to malnutrition or undernutrition and, greater mortality risk with more vulnerability also to infectious diseases[22].

Finally, the level of physical activity was also different, mostly performed by subjects with nutritional deficiency and / or normal weight and moderately by subjects with excess weight [23].

Eating disorders are a current and important problem: the world faces an epidemic of obesity, especially in high-income countries for which continuous monitoring in the general population and actions aimed at modifying individual behaviours are fundamental public health interventions with a high cost-benefit ratio like water purification, vaccinations and hospital infection prevention measures [24-35]; on the other hand, under-nutrition mainly affects the younger generations, where being thin is a symbol of aesthetic achievement and success.

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