Original Research

NUTRITIONAL STATUS OF THE PATIENTS VISITED THE NUTRITION COUNSELLING CENTER OF VIETNAM NATIONAL INSTITUTE OF NUTRITION

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ABSTRACT

Aims: To determine the nutritional status of patients who visited the Nutrition Counseling Center of the National Institute of Nutrition (NIN).

Methods: A cross-sectional study was carried out on 431 patients who visited for nutrition counseling at the Department of Adult Nutrition Consultation (NIN) from May 2021 to April 2022. Nutritional status was classified using BMI cutoffs for Western Pacific Region, with BMI < 18.5 and BMI ≥ 25 kg/m^2 to define chronic energy deficiency (CED) and overweight and obesity, respectively; high body fat percentage was defined as body fat percentage >30% and > 25% for women and men, respectively.

Results: The rates of CED, overweight, and obesity were 29.7%, 13.5%, and 3.7%, respectively. The proportion of overweight and obesity were 21.9% and 6.1% in men; and 10.4% and 2.8% in women, respectively. The figure was significantly higher in men (28%) compared to women (13.2%), while the rate of chronic energy deficiency (CED) was significantly lower in men (22.8%) than that in women (32.2%) (*p* <0.05). The rate of obesity and CED was highest in the 20-29 age group. The rates of overweight, obesity and CED were 13.2, 3.7, and 25.4% in city; and 13.8, 3.8, and 37.1% in countryside, respectively.

Conclusions: The findings alarmed the occurrence of obesity and CED in young population. The similar rate of overweight and obesity in city and countryside while there was significant difference of CED rate between the two regions.

Keywords: nutritional status, overweight-obesity, chronic energy deficiency, patients

I. INTRODUCTION

The increased prevalence of overweight and obesity is currently recorded all over the world. In 2013, it was estimated that more than 2 billion people worldwide were overweight and obese, and about 671 million people were obese. The prevalence of adults with body mass index (BMI) of 25 kg/m^2 and more increased from 29% to 37% in men and from 30% to 38% in women, between 1980 and 2013 [1]. In the United States, more than one-third of adults and 17% of adolescents were obese (2011-2012) [2]. In 2013, the American Medical Association recognized obesity as a disease [3].

According to World Health Organization (WHO), overweight and obesity are increasing at an alarming rate. In developing countries, obesity coexists with undernutrition, more common in cities than in rural areas [4].

The underlying cause of overweight and obesity is an energy imbalance between calories intake and calories expenditure. Studies have shown that an increased consumption of high-energy and high-fat foods, physical inactivity, unhealthy eating/living habits, and urbanization are the risk factors for overweight and obesity [4, 5, 6].

Vietnam is a developing country in nutrition transition. Lifestyle factors like diet and nutrition, physical inactivity, smoking and alcohol consumption contribute significantly to the death and disability burden in the country [7].

Overweight and obesity often coexist with comorbidities such as cardiovascular diseases, type 2 diabetes, mental illness, metabolic disorders, fatty liver, etc., affecting health, and leading to increased mortality [8].

There are several studies investigated factors related to overweight and obesity. However, these studies have not deeply research nutritional status and factors related to adulthood overweight and obesity. Therefore, the study was conducted to determine the prevalence of nutritional status of patients who visit for examination and consultation at the Nutrition Counselling Center of the National Institute of Nutrition.

II. METHODS

2.1. Study design and subjects

A cross-sectional study was conducted on adults visited the Department of Adult Nutrition Consultation-National Institute of Nutrition from May 2021 to April 2022.

Participants were excluded from the study if they had one of the following criteria: birth defects that falsify anthropometric results (deformed limb diseases, kyphosis, scoliosis); mental retardation diseases, unable to answer questions; endocrine diseases such as Cushing's disease, being treated with corticosteroids; an acute illness at the time of the investigation; being pregnant or within 12 months after giving birth.

2.2. Sample size and sampling

Sample size

The sample size was calculated for estimating the prevalence of overweight and obesity:

$$n = Z^2_{1-\frac{a}{2}} \frac{p(1-p)}{(d)^2}$$

- *n*: sample size;
- $Z_{1-\alpha/2} = 1.96$ with 95% confidence;

- *p* = 15.6%: the national prevalence of overweight and obesity, among adults aged 19-64 years nationwide (according to the 2019-2020 Nutrition Census) [9].
- *d* = 0.035: absolute precision

Replace all values above to the equation we had *n* = 413.

2.3. Data collection

The study was carried out in two stages: Face-to-face interviews were conducted first to collect general information related to the participants such as age, sex, occupation, and education level. Then, anthropometry measurement was performed to collect height, weight, waist circumference, body fat, muscle mass, and bone mass data.

Height measurement: A wooden stadiometer with the nearest measurement of 0.1 cm was used for height measurement. The participants were well explained the procedure and asked to take off their shoes/sandals, socks, braids/hats and hair ornament. The participants were asked to stand upright in the natural position with their back against to the stadiometer, head straight with occipital bone, back, buttocks, calves and heels touching to the stadiometer. The results are recorded with the nearest 0.1cm.

Body weight was measured using the Tanita SC-331S Total Body Composition Analyzer scale with the nearest measurement to 0.1kg. The scale is placed in a stable and flat location. Scales were checked and calibrated prior each individual measurement. Participants were asked to stand in the middle of the scale, maintain the posture, eyes looking straight, arms relaxed, and weight evenly distributed on both legs. The participants were weighted in light clothing and without shoes. Results were recorded to the nearest 0.1 kg.

Waist circumference measurement:

waist circumference was measured with a non-stretchable tape. Participants stood upright, legs spread equal to shoulder width, and symmetrical posture. Waist circumference was measured at the midpoint of the lower border of the 12th rib and the superior border of the iliac crest above the mid-axillary line, at the time of expiration. The researcher stood next to the participant, placed the tape tightly parallelly to the ground. The result was recorded to the nearest 0.1cm .

Body fat (%), muscle mass (kg), and bone mass (kg) were measured using the Tanita SC-331S Total Body Composition Analyzer scale.

Anthropometric assessment

High body fat percentage was defined as >30% for women and > 25% for men [10].

BMI classification according to the criteria of the World Health Organization Western Pacific Region 2000 were applied [11]: normal (BMI: 18.5–22.9), chronic energy deficiency (CED) (BMI<18.5); overweight (BMI: 23.0–24.9), obesity class 1 (BMI: 25.0–29.9), obesity class 2 (BMI>30).

2.4. Data analysis

Data was cleaned, entered and analyzed using Stata 14.0 software. The χ^2 test was applied to compare two proportions. The student t-test was used to compare continuous variables between 2 groups. The statistical significance was at $p <0.05$.

2.5. Ethical issues

Ethical issues and research protocols were assessed and approved by the Scientific Committee of Hanoi Medical University. The information collection was obtained with the written consent from the participants. The participants were explained for the objectives of the study and they could withdraw from the research at any time or refuse any question that they did not wish to answer. The data collected is for research purposes only.

III. RESULTS

Of the total 431 participants provided written consent forms, 317 were women accounted for 73.5%. The participants were mainly from urban areas (63.1%), obtained university and graduate degrees (71.5%). The most common occupation of the participants were public official staff and businessmen/businesswomen, accounting for 34.3% and 29.2%, respectively (Table 1).

Table 1. *General information of the participants (n=431)*

Information	N	%	Information	N	%
Residence			Educational level		
City	272	61.3	Undergraduate/Postgraduate	308	71.5
Countryside	159	36.9	Intermediate/College	30	7.0
Sex			High school	78	18.1
Male	114	26.5	Secondary school	15	3.4
Female	317	73.5	Occupation		
Age group (years)			Public official staff	148	34.3
20-29	136	31.6	Business	126	29.2
30-39	94	21.8	Worker	25	5.8
40-49	110	25.5	Retired	65	15.1
50-59	66	15.3	Student	51	11.8
>60	25	5.8	Others	16	3.7

The average weight, height and BMI of the subjects were respectively 53.3 kg, 157.6 cm, and 21.4 kg/m^2, respectively (Table 2). The difference of age and height were significantly different between city and countryside ($p < 0.05$).

Table 2. *Anthropometry of the participants (mean ± SD)*

Index	Age (year)	Weight (kg)	Height (cm)	BMI (kg/m^2)
Gender				
Male (*n*=114)	39.5 ± 12.5	61.1 ± 14.7	163.6 ± 7.5	22.7 ± 4.6
Female (*n*=317)	38.4 ± 12.9	50.5 ± 11.5	155.4 ± 6,1	20.9 ± 4.2
Residence				
City (*n*=159)	39.7± 13.1	53.5 ± 13.3	157.0 ± 7.6	21.6 ± 4.3
Countryside (*n*=272)	37.1 ± 12.3	52.9 ± 13.2	158.6 ± 6.9	21.0 ± 4.6
	p<0.05	*p>0.05*	*p<0.05*	*p>0.05*
All (*n*=431)	38.8 ± 12.8	53.3 ± 13.3	157.6 ± 7.4	21.4 ± 4.4

Table 3 shows that the average muscle mass was 44.8 kg in men and 34.3 kg in women. The mean bone mass was 2.4 kg in men and 2.1 kg in women. Body fat percentage in men was 22.7% while in women was 27%.

Table 3. *Body composition by sex (n=431) (mean ± SD)*

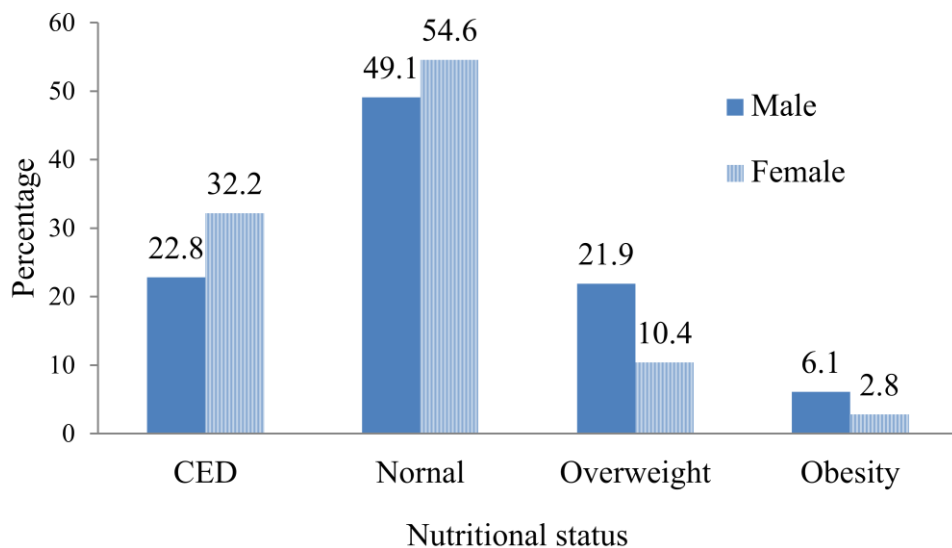| Index	Male (*n* = 114)	Female (*n*=317)
Muscle mass (kg)	44.8 ± 9.3	34.3 ± 5.3
Body fat (%)	22.7 ± 8.4	27.0 ± 7.8
Bone mass (kg)	2.4 ± 0.5	2.1 ± 0.5

Figure 1. *Nutritional status defined by BMI by sex. Normal (BMI: 18.5–22.9), CED (BMI<18.5); overweight (BMI: 23.0–24.9), obesity class 1 (BMI: 25.0–29.9), obesity class 2 (BMI>30) [8].*

Out of 431 participants, the proportion of chronic energy deficiency, overweight, and obesity were 29.7%, 13.5%, and 3.7%, respectively. The rate of overweight and obesity was higher in men compared to women, while the rate of CED was lower in men than that in women (Figure 1).

Figure 2 shows that similar rate of overweight and obesity among people in city and countryside. There was significant difference of CED rate between these areas.
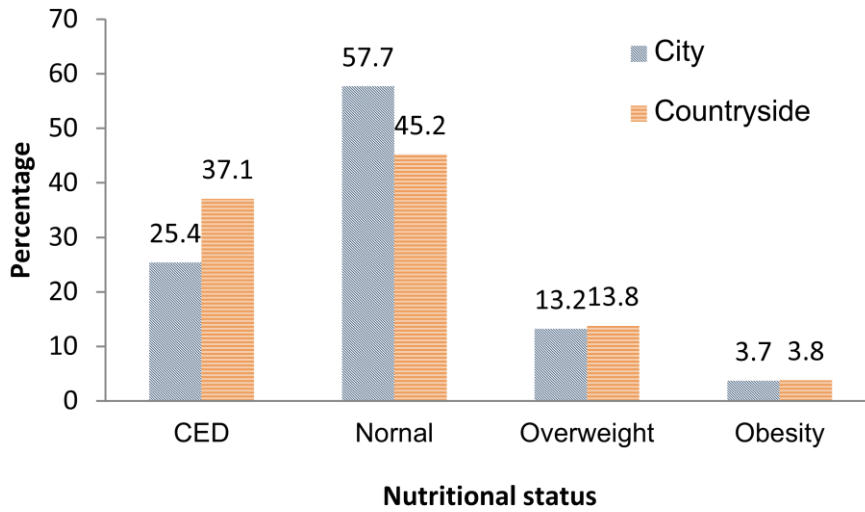
Figure 2. *Nutritional status defined by BMI by region. Normal (BMI: 18.5–22.9), CED (BMI<18.5); overweight (BMI: 23.0–24.9), obesity class 1 (BMI: 25.0–29.9), obesity class 2 (BMI>30) [8])*

Table 4. *Nutritional status defined by BMI by age group*

Age group	CED		Normal		Overweight		Obesity	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
20-29 (n=136)	83	61.1	37	27.2	7	5.1	9	6.6
30-39 (n=94)	26	27.7	47	50.0	16	17.0	5	5.3
40-49 (n=110)	11	10.0	76	69.1	21	19.1	2	1.8
50-59 (n=66)	6	9.1	50	75.8	10	15.2	0	0
≥ 60 (n=25)	2	8.0	19	76.0	4	16.0	0	0

Table 4 shows the classification of nutritional status defined by BMI by age groups. The rate of obesity and CED was highest in the 20-29 age group. The overweight prevalence was highest in the 30-39 age group and lowest in the 20-29 age group. Other age groups had similar overweight rates.

IV. DISCUSSION

Anthropometric indices

The average height of the participants in this research was higher than the figure reported from the STEPS-2015 study (162.4cm in men and 152.6 cm in women) [12]. However, this was much lower than the height achieved by young men and women in the 2020 census of the National Institute of Nutrition (168.1cm in young men and 155.6 in young women) [9]. This may be a result of the improvement of Vietnamese stature in recent years.

The average weight of the participants was lower than that (54.5 kg) in 3,758 subjects aged 18 – 69 years from the STEPS-2015 survey [12]. The average BMI in the study are similar to the mean BMI in the STEPS-2015 study (22.0 kg/m^2).

Mean weight, height, and BMI were not significantly different between urban and rural areas.

Body fat and muscle distribution

The results showed that the average body fat percentage of men was 22.7% lower than that of women by 34.3% ($p <0.05$). Mean muscle mass in men (44.8kg) was higher than in women (34.3kg) in all age groups. This is also relevant because in women, muscle mass is usually only two-thirds the amount of muscle in men, but the amount of fat is often twice that of men.

Overweight and obesity among patients visited the Nutrition Counseling Center of the NIN

Overweight and obesity is a global health problem, increasingly concerned around the world. In Vietnam, particularly in mega cities, where living standards are increasingly improved, along with industrialization and urbanization, with readily available energy-rich foods, a sedentary lifestyle, and physical inactivity, there is an increased prevalence of overweight and obesity in the population. According to the 2000 National Nutrition Survey [13], the overweight rate was 1.8% among people aged 20 to 24 years increased from 2.0% in 2010. The prevalence of obesity in this study was higher than in the national average. This may be explained by the fact that the majority of people who visited the Department of Adult Nutrition Consultation, National Institute of Nutrition already had with nutritional problems. Our study showed that in all age groups, the rate of overweight and obesity in men was higher than that of women (36.4% and 18%). The prevalence of overweight and obesity in urban and rural areas was similar at 16.9% and 17.6%, respectively. This shows the rapid increase of overweight and obesity in rural areas. Nutritional interventions should also target the rural regions.

From the above results, it is necessary to have nutritional intervention strategies, early lifestyle changes and screen to prevent malnutrition, overweight -obesity, reduce the burden of disease and death, conduct communication of nutrition education, proper eating, increased physical activity to prevent overweight and obesity.

V. CONCLUSION

The study on the patients who visited the Nutrition Counseling Center of the National Institute of Nutrition indicated the alarming occurrence of obesity and CED in young population. The similar rate of overweight and obesity in city and countryside while there was significant difference of CED rate between the two regions.

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