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Frequency of online food ordering not risk factor of central obesity in women aged 20-49 years

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ABSTRAK

***Latar belakang**: Obesitas adalah masalah kesehatan dunia dengan prevalensi terus meningkat dari tahun ke tahun. Wanita secara umum lebih banyak mengalami masalah berat badan dibandingkan dengan laki-laki. Perkembangan teknologi berpengaruh terhadap gaya hidup sedentari yang menyebabkan kenaikan berat badan. Wanita paling sering melakukan pemesanan makanan online dibandingkan laki-laki.*
***Tujuan**: menganalisis hubungan frekuensi pemesanan online food dengan obesitas sentral pada wanita usia 20 -49 tahun.*
***Metode:** jenis penelitian ini adalah penelitian observasional analitik dengan rancangan potong lintang (cross-sectional). Populasi adalah wanita dewasa usia 20 – 49 tahun. Total 120 wanita usia 20 - 49 tahun diobservasi status gizi dan frekuensi pemesanan online food. Lingkar perut digunakan untuk menentukan status obesitas sentral dari wanita. Wanita dikategorikan obes jika dia mempunyai lingkar perut >80 centimeter dan tidak obes jika lingkar perut ≤80 centimeter. Variabel paparan utama adalah frekuensi pemesanan online food yang dikategorikan menjadi ≥ 3 kali dan < 3 kali dalam seminggu. Kovariat adalah karakteristik responden yang meliputi usia, tingkat pendidikan, status pekerjaan, status pernikahan, dan aktivitas fisik. Data dianalisis menggunakan analisis univariat (frekuensi dan persentase) dan analisis bivariat (chi-square).*
***Hasil**: Hasil penelitian ini menunjukkan bahwa 70,8% responden mengalami obesitas sentral. Rata-rata lingkar perut responden adalah 85,0 centimeter. Sebagian besar responden (60,8%) pernah melakukan pemesanan online food. Makanan yang paling banyak dipesan responden antara lain ayam goreng, nasi goreng, martabak / roti panggang, dan pizza. Analisis bivariat menunjukkan bahwa karakteristik responden tidak berhubungan signifikan dengan kejadian obesitas sentral. Tidak ada hubungan signifikan antara frekuensi pemesanan online food dengan kejadian obesitas sentral pada wanita dewasa usia 20 - 49 tahun (p=0,325).*
***Kesimpulan**: frekuensi pemesanan online food ≥ 3 kali seminggu bukan faktor risiko obesitas sentral pada wanita dewasa.*

***KATA KUNCI:** aplikasi smartphone; obesitas sentral; online food; wanita*

ABSTRACT

***Background**: Obesity is a global health problem with prevalence increasing from year to year. Women, in general, have more weight problems than men. Technological developments affect sedentary lifestyles that cause weight gain. Women are more often ordering food online than men.*
***Objectives:** To analyze the relationship between the frequency of online food ordering with central obesity in women aged 20 - 49 years.*
***Methods:** This study was an analytic observational study with a cross-sectional design. The population was women aged 20 - 49 years. A total of 120 women aged 20-49 years were observed for their nutritional status and frequency of online food ordering. Waist circumference was used to determine the status of central obesity in women. The woman was categorized as obese if she has waist circumference > 80-centimeters*

and not obese if waist circumference ≤ 80 centimeters. The main exposure was the frequency of online food ordering that was categorized into ≥ 3 times and < 3 times a week. Age, education level, employment status, marital status, and physical activity were analyzed using univariate analysis. The bivariate analysis was also conducted to analyze relations between variables.

Results: *Results showed that 70.8% of respondents have central obesity. Respondent's average waist circumference was 85.0 centimeters. Most of the respondents (60.8%) have ordered food online. Respondents' top-ordered foods include fried chicken, fried rice, martabak (fried crepe filled with egg, and vegetable) and pizza. Bivariate analysis showed that there was no significant relationship between characteristics of respondents with central obesity. There was no significant relationship between the frequency of online food ordering with central obesity in women aged 20 - 49 years (p = 0.325).*

Conclusion*: online food ordering frequency 3 times a week is not a risk factor for central obesity in women aged 20 - 49 years.*

KEYWORDS: *central obesity; online food; smartphone applications; women*

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INTRODUCTION

Obesity is a global health problem. Obesity contributes to increased morbidity and mortality because someone who is obese has a high risk of suffering from cardiovascular disease, diabetes mellitus, and some types of cancer. Besides, obesity affects increasing medical costs, both costs for weight loss and treatment for diseases caused by being obese (1,2). A study conducted in the United States showed that every year individuals who experience weight gain (overweight) can spend as much as the US $ 266 more than individuals who have normal weight. The burden of costs that should be borne by individuals with obesity reaches US1,723 more than normal individuals. The costs are estimated to reach 5-10% of the health budget in the United States or around US $ 170 billion in 2008 (3).

The prevalence of obesity is increasing over the years. No country has reduced its prevalence in the last 33 years. In 2013, the prevalence of overweight and obesity worldwide was estimated to be 36.9% in men and 38.0% in women (4). In Indonesia, the result of the Basic Health Research (Riskesdas) 2018 showed that the proportion of obesity based on the Body Mass Index (BMI) category reached 21.8%. The proportion of the adult population (over 18 years old) by sex showed the proportion of obesity in men is 14.5% and in women is 29.2%. This percentage tends to increase in the age group of 19 - 49 years. The proportion of obesity by BMI category in the Special Region of Yogyakarta reaches 21.4%. The proportion of central obesity in the population aged ≥ 15 years is 31.0%. The proportion of central obesity in women (46.7%) is greater than in men. In the Special Region of Yogyakarta, the proportion of central obesity is 32.0% (5). Biologically, women store fat more easily than men because of the influence of hormones, especially estrogen (2).

Results of a systematic review in a previous study showed a trend of overweight and obesity in the world in the last three decades. In general, the number of individuals who are overweight and obese is higher in developed countries compared to developing countries. In developed countries, more men are overweight and obese compared to women. Conversely, in developing countries, the amount of overweight and obesity is more experienced by women. The peak age for overweight and obesity is 55 years for men and 60 years for women. The fastest rate of weight gain is in the age group of 20-40 years both in people who live in developing and developed countries (4).

Many factors can cause obesity. These factors include excessive food intake, lack of knowledge, lack of physical activity, technological advances and transportation, psychological factors, and genetic factors. Advances in science, technology, and economics have created an environment with a sedentary lifestyle and a high-calorie and fat diet. Prevention of the emergence of these nutritional problems requires the socialization of Balanced Nutrition guidelines which can be used as a guide to eating, physical activity, personal hygiene and sanitation, and monitoring body weight regularly to maintain normal body weight (6).

People in Yogyakarta experienced not only changes in terms of physical activity but now there has also been a change in eating patterns in the community as a result of current globalization. One of the most striking signs is the rise of fast food outlets in Yogyakarta, shifting traditional restaurants and food stalls. Besides, processed / instant foods and beverages that contain high calories are also very easy to find. Also, with advances in information technology, easy access to the internet, and advances in transportation services, residents of Yogyakarta City have increasingly easy access to food and drinks through applications that can be accessed using smartphones. This causes a decrease in physical activity and increased energy intake. All of these factors will have a major impact on causing weight gain and obesity (2).

There are more than 1.46 million internet users worldwide and the number is growing rapidly day by day. Statistical results show that 28 million portions of food were ordered online only in 2011 (7). The frequency of electronic orders varies by age and gender. Younger customers (especially those aged between 25 and 39 years) are more likely to use online, mobile, or text reservations. Younger customers place greater value on comfort and speed than older users do. Female customers are users who more often make electronic orders in general, and appreciate the convenience and related controls (8). The most frequent users of online food ordering applications are women (9,10). Based on the frequency and reason for ordering food online (at least once a month), 75.1% of respondents reported the most frequent reason they ordered food was for social events, followed by 50.8% who said they ordered because they didn't want to cook. The most impossible time for respondents to order electronically is for business and romantic events (9).

Yogyakarta City is one of the major cities in Indonesia which, like other cities, has undergone a transformation towards modernization and has an impact on lifestyle changes. In the past more than a decade, with more choices and more affordable prices for private vehicles, the use of private vehicles is increasingly being used by people in the city of Yogyakarta. The existence of private cars and motorbikes has shifted the use of mass transportation facilities and bicycles. This shift in transportation facilities harms physical activity because the use of private vehicles tends to reduce one's physical activity (2).

Pringwulung Village is located in an area with easy access and health facilities. This strategic location will facilitate the public to obtain sources of health and nutrition information from health service facilities. It is close to modern shopping centers and easy to access various types of fast food. Not much research has been done about online food ordering and nutritional status. This was also stated in previous studies that there is very little literature related to ordering online food (10) and there is currently no research to support how digital food ordering affects health and wellness on an individual level (11). Therefore, this research can be a preliminary study that discusses the use of food ordering applications with health or nutritional status.

MATERIALS AND METHODS

This study was an analytic observational study with a cross-sectional design. The study was conducted in Pringwulung, Condong Catur, Depok, Sleman from February 2019 to January 2020. The source population was women aged 20-49 years old who live in Pringwulung. Based on the population book 2016, the number of women aged 20-49 years is 543 people (12). The number is reduced because

some of them no longer live in Pringwulung, about 25% of 543 people. So, the numbers become about 400. The sample size for this study was 120. The subjects were women aged 20 - 49 years old. Inclusion criteria were as follows: the subject was female, aged 20-49 years old, and lived for at least 6 months in the study area. Exclusion criteria are as follows: the subject was pregnant, the subject is suffering from diabetes mellitus, and was not able to respond to the interview.

Central obesity was the main outcome of this study. It was assessed by measuring waist circumference. The woman was categorized as obese if she has waist circumference > 80 centimeters and not obese if waist circumference ≤ 80 centimeters (5). The main exposure was the frequency of online food ordering. In this study, the frequency of online food ordering was defined as the number of online food ordering through online food applications (Gojek and Grab) that were categorized into ≥ 3 times and < 3 times a week. Covariates are characteristics of respondents including age (20 - 29 yo, 30 -39 yo, and 40 - 49 yo); education level (high if the respondent had completed a minimum education of senior high school and as low if respondent completed junior high school or lower); employment status (employed and unemployed), marital status (married and unmarried); physical activity (<30 minutes and ≥30 minutes). A structured, validated questionnaire was adapted from a previous study. Data on online food ordering were obtained from a quantitative study about the potential of online food shopping (13) containing 4 questions related to online food ordering.

Types of data are primarily from the results of measuring the waist circumference by enumerators. Data collection was carried out by researchers with 6 enumerators, namely students of the Bachelor of Nutrition Study Program, School of Health Sciences Panti Rapih Yogyakarta. The enumerators have received training in using household questionnaires and measuring waist circumference. Data analysis used univariate analysis and bivariate analysis. Univariate analysis is carried out to describe the research variables in frequency and percentage. Bivariate analysis was conducted to examine the association of exposure and outcome using the chi-square test. Data was analyzed by SPSS version 21. Permission to collect data in Pringwulung was obtained from the local authority. The enumerators explained the research objectives and requested respondents to sign an informed consent form before beginning the interview and taking waist circumference measurements.

RESULTS AND DISCUSSION

A total of 120 women aged 20 - 49 years participated in this study. Characteristics of the subjects are shown in **Table 1**.

Table 1. Distribution of subject's characteristics

Characteristics	Mean (SD)	n	%
Age (years old)	35,5 (7,7)		
20 - 29		28	23.3
30 - 39		55	45.8
40 - 49		37	30.8
Education level			
Low		20	16.7
High		100	83.3
Employment status			
Employed		81	67.5
Unemployed		39	32.5
Marital status			
Married		95	79.2
Unmarried		25	20.8
Physical activity			
< 30 minutes		19	15.8
>= 30 minutes		101	84.2

Table 1 shows that the mean (SD) age of respondents was 35.5 (7.7) years with the highest percentage in the age group of 30-39 years (45.8%) and the lowest in the age group 20-29 years (23.3%). Most of the respondents have completed high education (83.3%), are employed (67.5%), and are married (79.2%). More than 80% of respondents did a physical activity in a day for at least 30 minutes. Physical activity that is often done by respondents is presented in **Figure 1**.

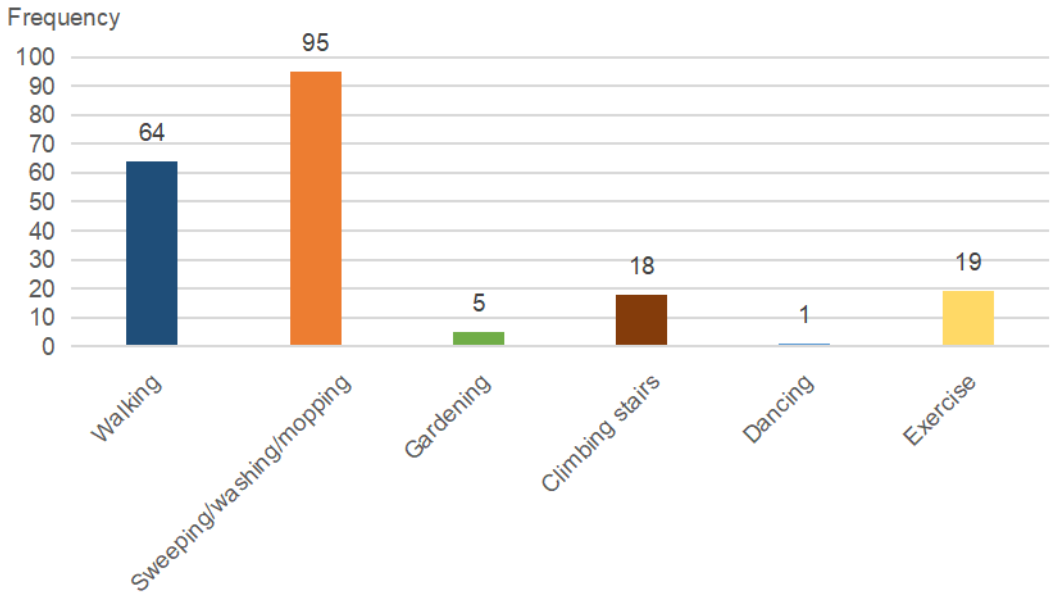

Figure 1. Respondent's Physical Activity

Figure 1 shows that the physical activity that is often carried out by most of the respondents is household chores namely sweeping, washing, and mopping whereas few respondents spend their time gardening and dancing. A few respondents do regular exercise every day.

Table 2. Exposure and Outcome Variables

Variable	Mean (SD)	n	(%)
Waist circumference (cm)	85 (12.2)		
Obesity status			
Obese		85	70.8
Non - obese		35	29.2
Status of ordering online food			
Ever		73	60.8
Never		47	39.2
Frequency of online food ordering			
≥3 times per week		18	15.0
< 3 times per week		102	85.0

Based on **Table 2**, 70.83% women were obese, and 29.2% were not obese. The mean (SD) waist circumference of respondents was 85.0 (12.2). Most of the respondents (60.8%) have made online food orders and are included in the frequency of ordering less than 3 times a week (85.0%). The frequency of ordering less than three times a week also includes a category that has never made an order.

Many kinds of food are available on online food applications. **Figure 2** shows that the most often ordered food was fried chicken, while the ones that were rarely ordered were french fries, porridge, *batagor / cilok (batagor* is an abbreviation of *Bakso Tahu Goreng* - fried meatball and tofu, consisting of fried fish dumpling with tofu and vegetables in peanut sauce; *cilok* is an abbreviation of *aci dicolok* or "poked tapioca". *Cilok* is made from tapioca ball dumplings served in peanut sauce or sambal) vegetables/salad, and meat.

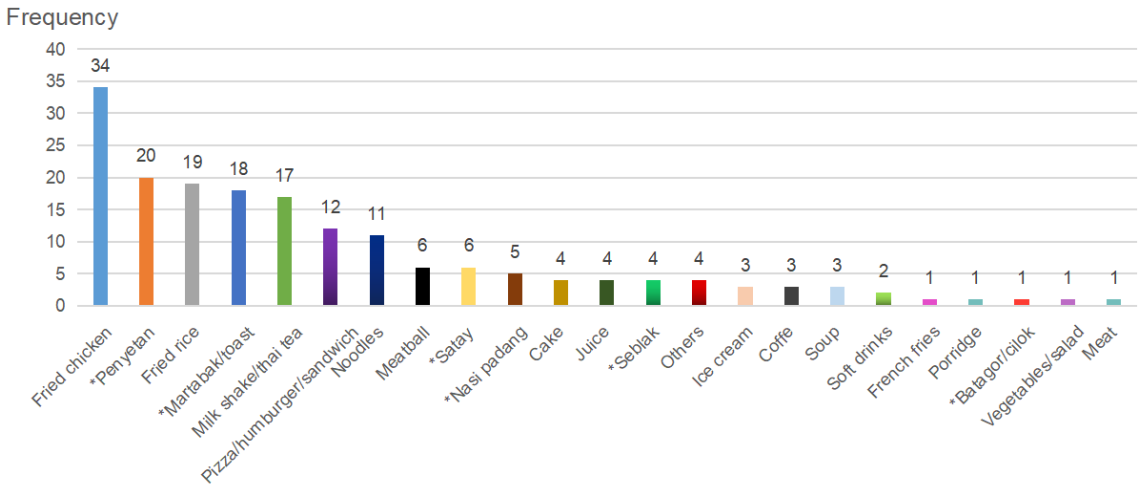

Figure 2. Respondents' Top Ordered Foods

Table 3. Bivariate Analysis of Factors Associated with Obesity in Women Aged 20-49 Years

Characteristics	Central Obesity				*p*-value
	Obese (n=85)		Non-obese (n=35)		
	n	%	n	%	
Age (years old)					
20 - 29	17	60.7	11	39.3	0.221
30 - 39	43	78.2	12	21.8	
40 - 49	25	67.6	12	32.4	
Education level					
Low	15	75.0	5	25.0	0.653
High	70	70.0	30	30.0	
Employment status					
Employed	57	70.4	24	29.6	0.872
Unemployed	28	71.8	11	28.2	
Marital status					
Married	69	72.6	26	27.4	0.398
Unmarried	16	64.0	9	36.0	
Physical activity					
< 30 menit	11	57.9	8	42.1	0.176
≥30 menit	74	73.3	27	26.7	
Frequency of online food ordering					
>=3 times a week	11	61.1	7	38.9	0.325
<3 times a week	74	72.5	28	27.5	

Based on **Table 3**, there was no significant relationship between age, education level, employment status, marital status, and physical activity with central obesity in women (p> 0.05). **Table 3** also shows that there was no significant relationship between frequencies of online food ordering with central obesity in women (p>0.05).

This study shows that there is no significant relationship between frequencies of online food ordering with central obesity in women aged 20 - 49 years. These results are different from a previous study that showed there was a significant relationship between frequencies of online food ordering with obesity in students of Medan Area University. The more often students order food online, the greater the risk of being obese. Obesity in the previous study was measured using the Body Mass Index (BMI) (BMI; obtained by dividing the individual's weight in kilograms by the squared height in meters) (14). In this study, central obesity was measured using waist circumference.

Positive energy balance occurs when an individual's caloric intake exceeds their energy expenditure, leading to weight gain (1). Energy intake that is caused by high food intake is a direct cause of obesity. Several factors can be a risk of increasing food intake, including the price of food that is getting cheaper, a portion of food that is getting bigger, taste that is increasingly in demand, variety of foods available, access to more affordable food, methods for preparing food that is getting faster and simple, and social and cultural impulse towards food (15). One of the disadvantages of easy access to information, such as the online food ordering application is reducing the physical activity of users. Application users are made easy to not do activities outside the house but the food they want can be delivered to the house (14). According to the Ministry of the Health Republic of Indonesia, current physical activity guidelines for the prevention of chronic diseases recommend ≥30 min of moderate physical activity on most days of the week. In this study, there was no difference between the physical activity of respondents who were experiencing central obesity and not being central obesity. The respondents did physical activity for more than 30 minutes every day. The physical activity that is often carried out by respondents was washing/mopping/sweeping. Those activities are categorized as low physical activity that causes energy expenditure <3.5 kcal/minutes (16). Ordering online food might lessen women's activity in cooking but they were still doing other activities like washing/mopping/sweeping. In this study, physical activity is only based on the duration of activity according to the respondent's answers and does not measure physical activity using special instruments for assessing physical activity that contribute significantly to energy expenditure.

Shopping online allows customers to find more different types of products than shopping traditionally. It becomes possible to compare products, compare prices, and shop from different magazines at the same time (7). The kind of food and drinks that are available in online food applications are diverse. Due to diverse and competing food-delivery platforms, users have the potential to select healthy options when opting to use digital ordering (11). However, in this study, the type of food or drink that was most often ordered by respondents was high-calorie food such as fried chicken, *penyetan*, fried rice, *martabak*/toast, and pizza. Respondents hardly ever ordered low-calorie food such as vegetables. This study is only limited to assessing the frequency of ordering online food from respondents without delving deeper into whether food ordered through the online food application is consumed by respondents only or for other family members who live together.

CONCLUSIONS AND RECOMMENDATIONS

There was no significant association between the frequency of online food ordering and central obesity. Frequency online food ordering 3 times or more was not a risk factor for central obesity in women aged 20 - 49 years. Further study should examine the nutrient content in the types of food provided in online food applications.

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