Article

Profil of omega-3 food intake and its association with socioeconomic status in smoker on online motorcycle drivers

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Abstract

Introduction: Omega-3 fatty acids were found to be effective in reducing inflammation and free radicals caused by air pollution (cigarette smoke), as well as improving lung function. Furthermore, economic conditions can influence a person's food consumption habits. The type of food consumed will certainly affect the amount of omega-3 absorbed by the body, and the quality of food consumed is influenced by socioeconomic status (SES). Therefore, the purpose of this study was to determine omega-3 intake and its relationship with the socioeconomic status of online motorcycle drivers.

Design and Methods: This was an observational study with a cross-sectional method of measuring omega-3 consumption using a 24-hour food recall questionnaire and assessing the mean of omega-3 intake after 3 days. The was conducted from May-August 2020, in Kali Rungkut, Surabaya City, and the subjects were online motorcycle drivers. A Chi-square test was used to assess the relationship between omega-3 intake and SES (income and education).

Results: There were 49 respondents in this study with most of them having a classification of omega-3 intake at the deficit level (57.14%), and none belonging to the good and more level. There was a significant difference in omega-3 intake on income (p=0.000) and education (p=0.000).

Conclusions: Income and education must be prioritized to improve a healthy diet that includes omega-3.

Introduction

Despite the long distance, the community's high mobility necessitates quick movement from one location to another.[1] The existence of online motorcycle drivers is one of the newest transportation media that overcomes congestion. It is an online application-based transportation development supported by communication technology through smartphones, motorcycle services, and communication technology.[2] The high risk of online motorcycle drivers being exposed to vehicle air pollution increases the prevalence of chronic lung diseases and this is supported by smoking habits. Previous studies show that smoking is significantly associated with the incidence of COPD (chronic obstructive pulmonary disease).[3] Therefore, smokers have greater respiratory problems and are less physically active than non-smokers.[4]

Smoking is a problem because it causes numerous losses in terms of social, moral, economic, health, death, and a decrease in human resources.[5] Tobacco content in cigarettes can affect almost all organs of the human body. Hence, smoking is linked to a variety of non-communicable diseases such as cancer, heart disease, chronic respiratory disease, and diabetes.

In Indonesia, smoking is responsible for a high proportion of morbidity and mortality. Furthermore, the percentage of Indonesian men who smoke has dramatically increased from 56.2% in 2000 to 76.2% in 2015.[6] Another effect is the loss of human resources as a result of smoking-related morbidity and mortality.[7] This contributes to poverty by diverting household spending away from basic needs such as food and shelter to cigarettes. Since the tobacco in cigarettes is very addictive, this behavior is difficult to overcome. Additionally, the economic costs of smoking are high because of the healthcare costs associated with smoking-related diseases.[8,9] Attempts to quit smoking often experience obstacles, such as low self-confidence and self-esteem among smokers, and depression is a significant factor in smoking cessation failure. There are several drug therapies for smoking cessation, such as nicotine replacement therapy which is the first line of smoking cessation treatment that should be used with caution in patients with arrhythmias and myocardial infarction. Nicotine can cause adverse cardiovascular effects by increasing myocardial workload through increased heart rate and blood pressure. It can also cause coronary artery constriction, resulting in cardiac ischemia.[10,11,12]

Nutrients, which are included in the COVID-19 prevention treatment, are particularly effective in maintaining health and improving lung function.[13] Omega-3 is effective in reducing inflammation and free radicals caused by air pollution and cigarette smoke and improves lung function.[14,15] Therefore, a person's food intake can affect the health of the lung function,[16] and

Significance for public health

Due to continuous exposure to pollution, online motorcycle drivers, including 49 respondents, are at a high risk of chronic lung function decline. The health of lung function can be affected by the dietary intake of omega-3, while the quality of food can affect the amount of omega-3 in the body. Therefore, this study examines the relationship between socioeconomic status and omega-3 in 49 online motorcycle drivers' diets.

amount of omega-3 in the body. By causing oxidative stress, cigarette smoke can enhance PUFA (Polyunsaturated Fatty Acid) lipid peroxidation. Low PUFA concentrations will in turn affect neurotransmission in the central nervous system, such as dopaminergic increases nicotine addiction, thereby inhibiting efforts to quit smoking.[17,18]

According to lower levels of DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid), smokers consume less fish rich in omega-3 fatty acids than non-smokers. The importance of omega-3 intake is that it can normalize the dopaminergic system and reduce addiction, hence reducing the desire to smoke significantly. The anti-inflammatory effect of omega-3 is due to the content of EPA which is a competitive substrate with arachidonic. Therefore, it has the potential to reduce inflammation and bronchoconstriction in the respiratory tract. These anti-inflammatory effects can aid improve lung function and influence smoking patterns.[18] Cigarettes contain high concentrations of free radicals and oxidants which cause systemic oxidative stress and lipid peroxidation, hence affecting the levels of omega-3 PUFAs, specifically EPA and DHA. According to the theory, cigarette smoke induces oxidative stress by peroxidation of polyunsaturated fatty acids which lowers the levels of omega-3. Hence, it can affect nerve transmission and cause hypofunction in the mesocortical system associated with the dependence mechanism, and increased desire to smoke. Omega-3 deficiency, particularly EPA and DHA, has also been associated with poor psychological health and the inability to cope with stress.[19,20] The effectiveness data of omega-3 fish oil revealed a relationship between illness perception and chronic respiratory disease. Although the influence of illness perception was significant, the length of time that respiratory symptoms were experienced was not.[21]

Epidemiological studies reveal that omega 3 has a protective effect against cardiovascular disease, myocardial or cerebral infarction, hypertension, and hyperlipidemia. Additionally, it is beneficial against chronic inflammatory diseases including COPD, asthma, rheumatoid arthritis, and inflammation of the gut.[14,22,23] Higher omega-3 intake and fish consumption are associated with better lung function in smokers and ex-smokers, with EPA and DHA acting as antioxidants and reducing oxidative stress.[17,18] Epidemiological studies reveal that EPA and DHA are the main omega-3 PUFAs found in fish, fish oil, and fish oil supplements. Furthermore, omega-3 are easily obtained from foods such as salmon, sardines, seafood, and others.[20,24,25] According to the recommended nutritional adequacy rate for Indonesians, the nutritional adequacy rate for omega-3 is 1.6 g/day for men 18 years.[26]

Given the beneficial cardiovascular effects of omega-3s, it is important to understand the sociocultural factors that influence adequate intake to improve dietary quality in minorities.[27] According to the results of omega-3 intake, all respondents consumed less omega-3 containing foods (<1,600 mg), with the average total intake of foods containing omega-3 being 226.47 mg. The most consumed omega-3s were eggs (average: 19.46 mg/day) and chicken (average: 10.74 mg/day), both of which contain low omega-3. Meanwhile, based on data collection per day using the 24-hour food recall, the average daily consumption of respondents was only 249.05 mg. Therefore, further analysis of the processing pattern of the food consumed and the factors that influence their diet is neccessary.[26]

Omega-3 cannot only be obtained by taking supplements, but also from the foods we consume on the daily basis.[21] Economic circumstances can have an impact on a person's food consumption habits and the type of food consumed will certainly affect the omega-3 content absorbed by the body.[28] Also, the quality of food consumed is influenced by socioeconomic status (SES). Several studies linked an individual's socioeconomic status to health, with positive associations of SES (income, education, occupation), fruit, vegetable intake, and nutrition,[28,29] but negative associations with chronic disease.[30] For example, income, and educational attainment are recognized as fundamental factors influencing heart disease rates in minority and low-income populations.[31]

A 24-hour food recall can be used to determine the pattern of omega-3 intake.[32,33] Using this method, individuals are asked to describe the food and drinks consumed for three days. The 24-hour food recall method gathers information about the food consumed at a certain time. In addition, this can be performed at all survey locations such as the community, and hospitals or installations by housewives. The data obtained is in the form of protein intake, carbohydrates, sugar, water, salt, and calcium in calorie units.[34,35] Therefore, this study aims to determine omega-3 intake and its relationship to the socioeconomic status of online motorcycle drivers.

Design and Methods

A retrospective cohort study was used as its design, and the measurement of omega-3 intake was performed using a 24-hour food recall. The subjects were online motorcycle drivers and this was performed in Kali Rungkut, Surabaya City from May to August 2020. Furthermore, ethical permission was received from the University of Surabaya Ethics Committee Number 016-OL/KE.VII/2020.

The independent variables were omega-3 food intake and socioeconomic status. This was all performed around the Rungkut area in Surabaya, East Java, Indonesia, which was conducted from May to August 2020. Online motorcycle drivers provided public transportation in the form of motorcycles that could be ordered over the internet or through mobile phone applications. They not only deliver and pick up customers but also foods and goods.

The 24-hour food recall method was used and interviews were conducted with the help of a food photo book to aid in the estimation of the household size. An analysis of the adequacy of values for adults was performed in the Rungkut area, Surabaya City on online motorcycle drivers. Subsequently, the value was adjusted to the Nutrition Adequacy Rate (RDA),[34,35] which was 75 g protein/day while omega-3 was 1600 mg/day.[21]

The participants were online motorcycle drivers in the Surabaya City area. Therefore, the target population that met the inclusion criteria were: i) Aged 18 years; ii) an active smoker smoking 100 cigarettes in his life until now, or respondents smoking 1 cigarette/day; iii) Worked on weekdays regularly (min ±7 hours/day); iv) Having no eating disorders and gastrointestinal diseases such as Gastroesophageal Reflux Disease (GERD), gastritis and dyspepsia. The purposive sampling technique was used, while the 24-hour recall method was an interview guide measuring food consumption in the preparation of interview questions. This method was performed three times but was not successive, namely twice on workdays and once on holidays, because the scheme could illustrate the variability of calorie and nutrient intake. Respondents were interviewed about food and drinks consumed in the past 24-hours, including portion sizes with the help of a photograph of household sizes, such as a spoon, plate, glass, or another size commonly used daily as stated in Food Photo Book by the Ministry of Health of the Republic of Indonesia in 2014.[36] Then, the results were synchronized to the average intake per day. Primary data was obtained directly from study subjects through direct dialogue (interviews) and presented descriptively. The classification of omega-3 intake was divided into 5, namely: deficit

(<70% of the value of the minimum measure of intake); less (70-80% of the value of a minimum measure of intake); sufficient (80-100% of the value of a minimum measure of intake); good (100-110% of the minimum size measure of intake); and more (>110% of the minimum intake measure value).[37] Respondents were interviewed about food and drinks consumed in the past 24 hours, including portion sizes with the help of a photograph of household sizes, such as a spoon, plate, glass, or other sizes commonly used daily as stated in Food Photo Book. The results were then synchronized to an average intake per day. Table 1 shows the List of Food Intake Composition Containing Omega-3.[38,39,40] The data in this study was obtained from subjects through direct dialogue (interviews).

Subsequently, the obtained data were processed using one of the Nutrisurvey programs, which was software designed for non-commercial use. This was useful for analyzing food nutrients from a menu or a consumption survey. After collecting the calorie intake, the data was entered into SPSS version 24, and the chi-square test was used to assess the relationship between omega-3 intake and SES (income and education).

Results and Discussions

Characteristics of respondents

This study made use of 49 respondents working as online motorcycle drivers in the Rungkut area. During the collection of respondents, 5 drivers refused to be involved in the study because of a call to order from a passenger. The prevalence of smoking in Indonesia is very high, specifically in men ranging from children, adolescents, to adults. Furthermore, 12 of the respondents were 40-44 years (24.49%), and this is not in accordance with Tomioka et al.[41] that stated that people aged 45-64 years tend to smoke more than those aged <45 years or >65 years. Table 2 described the characteristics of the respondents. Most of the smoking severity was light (48.98%) with an income mostly around <1 million rupiahs (61.22%). In terms of education level, most of them were high school seniors (73.47%).

A total of 49 respondents' data from online motorcycle drivers were analyzed descriptively. Table 3 described the average (212.7 mg/day), minimum (0 mg/day), maximum (1,069.43 mg/day) and standard deviation (264.1 mg/day) of the consumption of omega-3. These fatty acids were one of the nutrients needed by the body. However, the body does not produce it naturally, and therefore needs to get it elsewhere. Eicosanoids, which are chemicals that provide signals to the cardiovascular, pulmonary, endocrine, and immunological systems, are formed by omega-3 fatty acids. According to the data obtained, consumption of omega-3 per day was not sufficient, both on workdays and holidays. This is because it did not meet the recommended nutritional adequacy rate (RDA) of 1600 mg/day. Furthermore, the minimum average consumption of omega-3 was 0 mg/day, the maximum average was 1069.43 mg/day and the standard deviation (SD) was 277.18 mg/day. These

results were influenced by the level of income obtained. Due to the corona pandemic and ignorance of foods containing omega-3, some respondents did not consume foods containing omega-3 at all, resulting in an average result was 0. Meanwhile, other respondents obtained omega-3 through eggs, chicken, catfish, and anchovies.

Eggs

Respondents consumed chicken eggs, but not those containing omega-3. Omega-3 chicken eggs are produced from laying hens fed a diet containing omega-3 supplements for three consecutive

Table 1. List of Food Intake Composition Containing Omega-3.[37, 38,39]

Food	Gram	Omega-3 Content (mg/serving)
Anchovy	57	1,165
Catfish	85	151
Shells	85	241
Crab	85	351
Lobster	100	84
Salmon	85	1,825
Tuna	85	228
Sardines	57	556
Shrimp	85	267
Egg	63	22
Beef	100	22
Chicken	100	19
Goat meat	100	18

Table 2. Characteristics of respondents.[9]

Characteristics of respondents	Frequency (n=49)	Percentage (%)
Age (years)		
18-25	9	18.40
26-35	17	34.70
36-45	17	34.70
46-55	4	8.20
56-65	2	4.10
Smoking severity		
Light	24	45.99
Moderate	23	46.93
Severe	2	4.08
Income (IDR)		
<1 million	30	61.22
1-3 million	19	38.78
Education Degree		
Elementary school	3	6.10
Junior high school	2	4.10
Senior high school	36	73.50
Bachelor degree	8	16.30

Table 3. Omega-3 intake profile based on 24-hour food recall.

	1st Meeting (mg/day)	2nd Meeting (mg/day)	3rd Meeting (mg/day)	Average (mg/day)	
Average	275.0	152.7		210.5	212.7
Minimum	0	0		0	0
Maximum	2105.6	1062.1		2107.26	1,069.1
SD	581.0	279.2		393.1	264.1

weeks. Farmers in Indonesia use waste oil that is waste from the fish processing industry. Consumption of enriched hen eggs containing a mixture of omega-3 PUFA (ALA+EPA+DHA), causes changes in the microvascular reactivity, blood pressure, and triglyceride level in healthy subjects that are associated with cardiovascular benefits. This suggested that daily consumption of omega-3 PUFA-enriched eggs in healthy individuals may potentially contribute to cardiovascular risk factor attenuation and disease prevention.[42]

Chicken

The two types of chicken frequently consumed are local chicken (boras/kampung) and broiler chicken. Since chicken consumption has steadily increased in recent decades, meat enriched with long-chain polyunsaturated fatty acids (LC-PUFA) has become an important source of nutrients to humans. The meat of broilers fed diets with fish oil and either flaxseed or rapeseed for two weeks before the slaughter is believed to be "high in omega-3 fatty acids." A 100 g portion of such breast or thigh meat would provide on average 33% and 15.5%, respectively, of the recommended daily intake of EPA and DHA for humans. Therefore, enriched chicken meat was a superior source of LC-PUFA than lean fish meat.[43]

Catfish

Catfish can serve as a potential source of essential fatty acids to human nutrition particularly in Nigeria with the growing popularity of catfish consumption.[44] Pangasius micronemus (*Black pangasius* sp.) and Pangasius nasutus (*Fruit pangasius* sp.) are two species of silver catfish. Both *Pangasius* sp. are good supplies of omega-3 and omega-6. Morover, *P. micronemus* from Sg. Kanchong was the best choice because it was high in EPA and DHA.[45] Most of the respondents' classification of omega-3 intake was at the deficit level (57.14%), and none belonged to the good and more level. Classification of omega-3 intake was divided into 5, namely, deficit (<70% of the value of the minimum measure of

omega-3 intake); less (70-80% of the value of a minimum measure of omega-3 intake); sufficient (80-100% of the value of a minimum measure of omega-3 intake); good (100-110% of the minimum size measure of omega-3 intake); and more (>110% of the minimum omega-3 intake measure value) (Table 4). Prolonged omega-3 deficiency can affect neurodevelopment and cause neurological and visual disturbances. In addition, this could lead to immune, memory, and mental disorders. By increasing neurogenesis and neurotransmitters in the brain, DHA in omega-3 can promote memory and cognitive development in children. It also plays a role in increasing the activity of the prefrontal part of the brain used for thinking and behaving.[46]

In this study, Socioeconomic Status (SES) consisted of Income (IDR) and education degree. Table 5 showed that there was a significant difference in omega-3 intake based on income (p=0.000) and education (p=0.000). Also, the amount of EPA and DHA consumed daily varied greatly depending on income. Much less is known about the potential role of other demographic factors on n-3 LCPUFA intakes, such as ethnicity, income, and education level. However, according to a recent analysis of NHANES 2011–2014, n-3 LCPUFA intake varies by ethnicity in the US, with non-Hispanic Asians consuming significantly more EPA and DHA than Hispanics, non-Hispanic Whites, and non-Hispanic Blacks.[47] There is a relationship between the price OF omega-3 supplements with, EPA and DHA content, as observed from relative percentage. Product A1 (with the lowest price), has a relatively lower percentage, compared to brand A2 (with the highest price), with a relatively higher grade.[48]

Participants with higher school education had a significantly higher dietary intake of EPA and combined EPA+DHA than those with lower school education.[47] Other studies revealed the association of SES with omega-3 intake. Although socioeconomic status may play a role in the relationship between these factors and maternal omega-3 DHA status.[49] After adjusting for energy intake, education was significantly correlated with EPA + DHA intakes, and acculturation was significantly correlated with Total n−3, ALA, and EPA + DHA intakes. Foods sources of EPA + DHA eaten by at least 50% of participants were chicken, shrimp, tuna, and eggs.[29]

The data collected using the 3 x 24-hour food recall method was the limitation of this study because it mainly relies on the respondent's memory. To overcome this bias, a description of the food that might be consumed was provided. Once the respondent could not still remember, a 3x24 hour food recall data processing is issued using the Nutri Survey program. This has a weakness of not covering all types of food consumed by the respondent, but can be analyzed with the program to enable manual calculation. Additionally, the process of serving food can also affect the levels of omega-3 in food which was not considered in this study.

Table 4. Classification of Omega-3 Intake.

Classification of Omega-3 intake	Frequency (n=49)	Percentage (%)
Deficit (<70%)	28	57.15
Less (70-80%)	16	32.65
Sufficient (80-100%)	5	10.20
Good (100-110%)	-	-
More (>110%)	-	-

Table 5. Cross-tabulation of your Omega-3 food intake its association with socioeconomic status.

Socioeconomic Status	Classification of Omega-3 intake			Total	P value (Chi Square Test)
	Deficit	Less	Sufficient		
Income (IDR)					
<1 million	21	9		30	0.000
1-3 million	7	7	5	19	
Education Degree					
Elementary school	3	-	-	3	0.000
Junior high school	2	-	-	2	
Senior high school	23	12	1	36	
Bachelor degree		4	4	8	

Conclusions

The choice of omega-3 foods was influenced by Socioeconomic Position (SES), which includes Income (IDR) and education level. Therefore, the higher the income and education level, the better the intake of omega-3 by online motorcycle drivers.

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