

## Total working period and other risk factors related to eating protein foods habits among civil pilots in Indonesia

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### Abstrak

**Latar belakang:** Kebiasaan makan protein yang berlebihan dapat menyebabkan penyakit ginjal dan hati serta meningkatkan risiko penyakit kardiovaskular yang dapat menyebabkan terjadinya inkapasitasi pada pilot. Tujuan penelitian ini adalah mengidentifikasi faktor sosiodemografi dan faktor lainnya terhadap kebiasaan makan protein berlebih pada pilot sipil di Indonesia.

**Metode:** Penelitian potong lintang menggunakan data sekunder Survei kebiasaan makan, minum dan latihan fisik pada pilot sipil di Indonesia 2016. Data yang dikumpulkan adalah karakteristik demografi, kebiasaan latihan fisik, pengetahuan, indeks massa tubuh dan karakteristik penerbangan. Analisis regresi cox dipakai untuk menganalisis faktor-faktor dominan yang berhubungan dengan kebiasaan makan protein berlebih.

**Hasil:** Di antara 528 pilot yang berusia 19-64 tahun, 194 (36.74%) pilot memiliki kebiasaan makan protein berlebih. Lama masa kerja dan indeks massa tubuh menjadi faktor risiko dominan yang berkaitan dengan kebiasaan makan protein berlebih pada pilot. Jika dibandingkan dengan pilot dengan lama masa kerja 1 – 9 tahun, pilot dengan masa kerja 10 – 40 tahun berisiko 35% lebih kecil memiliki kebiasaan makan protein berlebih (RRa = 0.65 ; 95% CI 0.49 – 0.87). Jika dibandingkan dengan pilot dengan indeks massa tubuh normal, pilot yang overweight berisiko 34% lebih kecil memiliki kebiasaan makan protein berlebih (RRa = 0.66 ; 95% CI 0.47 – 0.93).

**Kesimpulan:** Masa kerja yang lebih panjang dan overweight merupakan faktor protektif terhadap risiko kebiasaan makan protein berlebih. (*Health Science Journal of Indonesia 2016;8(1):43-48*)

**Kata kunci:** kebiasaan makan protein, lama masa kerja, indeks massa tubuh, pilot sipil Indonesia

### Abstract

**Background:** Excessive protein eating habits may cause kidney and liver disease and increase the risk of cardiovascular disease leading to incapacitation of the pilot. The purpose of this study was to identify sociodemographic and other factors on protein eating habits among civilian pilots in Indonesia.

**Methods:** A cross-sectional study using secondary data from the survey of eating, drinking and physical exercise habits among civilian pilots in Indonesia 2016. Data collected were demographic characteristics, physical exercise habits, smoking habits, knowledge, body mass index and flight characteristics. Cox regression analysis was used to analyze the dominant factors associated with protein eating habits.

**Results:** Among 528 pilots aged 19-64 years, 194 (36.74%) pilots had excessive protein eating habits. Long working period and body mass index were the dominant risk factors associated with protein eating habit in pilots. Compared to pilots with 1-9 years working period, pilots with 10-40 years working period had 35% lower risk of excessive protein eating habits (RRA = 0.65; 95% CI 0.49 - 0.87). Compared to pilots with normal body mass index, overweight pilots had 34% lower risk of excessive protein eating habits (RRA = 0.66; 95% CI 0.47 - 0.93).

**Conclusion:** Long working period and overweight were protective factors from the risk of excessive protein eating habits. (*Health Science Journal of Indonesia 2016;8(1):43-48*)

**Keywords:** protein eating habits, total working periode, body mass index, civilian pilots Indonesia

Eating habits are the way an individual or group of individuals in choosing and consuming food in response to the effects of physiological, psychological, social and cultural, which will affect dietary pattern.<sup>1</sup> Excess or deficiency of a nutrient element in food may cause illness.<sup>2</sup> Excess animal protein eating habit may cause kidney and liver damage and cardiovascular disease.<sup>3</sup> Excess protein intake will be stored as fat and if it continues would result in obesity.<sup>4</sup> Tessa research in 2015 found that among 259 subjects, 184 (71%) subjects were obese.<sup>5</sup> Obesity is a multifactorial disease that can be associated with other health problems such as diabetes mellitus, hypertension, hypercholesterolemia and cardiovascular disease. Cardiovascular disease may cause acute incapacitation for pilots while performing flight duties.<sup>6-7</sup>

Animal protein eating habit was associated with several factors such as age, marital status, physical exercise habits, knowledge about the disease impact of excessive protein consumption, body mass index and flight factors. Donini et al study found that age was associated with protein eating habit.<sup>8</sup> Wu study showed an association between marital status with protein eating habit.<sup>9</sup> Other studies found that physical exercise, knowledge of excessive protein eating impact and body mass index were associated with protein eating habit.<sup>10-12</sup>

Study on the factors associated with protein eating habit in civilian pilots in Indonesia has not been done before. In addition there has been no study on the relationship between inflight factors on protein eating habits. Therefore it is necessary to study about research on the length of employment relations and other risk factors with eating protein habit on a civilian pilot in Indonesia.

The purpose of this study was to determine the dominant factors associated with eating proteins habit in civilian pilots in Indonesia.

## METHODS

This study was conducted on June 2016 using cross-sectional design. The data used was from the Survey of Eating Habits, Drinking and Physical Fitness among Civilian Pilots in Indonesia 2016. How sampling in this study is total sampling. The inclusion criteria in this study were male pilots, Asian race,

age  $\geq 19$  years, holder of CPL, PPL and ATPL with 6 months or more working period. While the exclusion criteria in this study were women pilots, non-Asian race, age  $\leq 19$  years, licensees SPL, rotary wing and  $< 6$  months working period.

The outcome of this study was protein eating habit obtained from the frequency of animal protein (meat, fish, eggs) eating habit per day. It was categorized adequate if the frequency of protein eating habit was 1-2 times / day and excessive protein eating habits if the frequency was 3-4 times / day and  $\geq 5$  times / day. Another factor studied in this study was working period. Total working period was the total length of work starting from the first working as professional pilots in the airline until the moment of filling the questionnaire. It was categorized into 1-9 years and 10-40 years. Age was categorized into 19-35 years, 36-55 years,  $> 55$  years. Marital status was categorized into not married and married. It also studied the physical exercise factors obtained from frequency of physical exercise per week as recommended by the American College of Sports Medicine. It was categorized as appropriate if physical exercise  $\geq 3$  times / week with intensity  $\geq 30$  minutes and inappropriate if physical exercise  $< 3$  times / week with intensity  $< 30$  min. Factor of knowledge about disease impact from excess protein eating was also examined. Respondents were given three questions i.e. 1. Over intake of protein causes cardiovascular disease (Agree / Disagree) 2. Over intake of protein causes kidney disease (Agree / Disagree) 3. Over intake of protein causes liver disease (Agree / Disagree). Every question answered correctly was given a score of 1. It was categorized as good knowledge when the score was  $\geq 2$  and poor knowledge if the score was  $\leq 1$ . In addition it also examined Body Mass Index (BMI) factor. BMI was categorized into normal when BMI 18.5 to 22.99 kg / m<sup>2</sup>, overweight when BMI 23.00 to 24.99 kg / m<sup>2</sup>. obese when BMI  $\geq 25$  kg / m<sup>2</sup>.

This study used cox regression analysis. Bivariate analysis was performed with STATA 10 to determine the relationship between each independent variable and the outcome. From bivariate analysis results, independent variables that had p-value  $< 0.25$  was used as candidates for the multivariate analysis with Cox regression. This study was conducted after obtaining ethical approval from the Ethics Committee of the Faculty of Medicine, University of Indonesia.

## RESULTS

Of 644 secondary data obtained, subjects who meet the criteria as many as 528 subjects met the inclusion criteria. Of 528 subjects, 194 (36.74%) pilots had excess protein eating habit and 334 (63.26%) subjects with adequate protein eating habit.

Table 1 showed that subjects with adequate and excess protein eating habits were similarly distributed in terms of physical exercise. Compared to the reference group, subjects aged 36-55 years and > 55 years seems less likely to have excess protein eating habit. Compared to respective reference groups, married,

overweight and obese groups seemed less likely to have excessive protein eating habits. Compared to subjects with good knowledge, subjects with poor knowledge about the disease impacts of excess protein eating habit seemed likely to have a higher risk of excessive protein eating habits.

Table 2 showed that the subjects with adequate and excess protein eating were similarly distributed in terms of type of license. Compared to respective reference groups, subjects with 4611-30500 flying hours and 10-40 years working period seems less likely to have excess protein eating habits.

Table 1. Relationship between Sociodemografi factors with protein eating habit

	Protein eating habit				Crude Relative Risk	95 % Confidance Interval	P
	Enough (n=334)		Excess (n=194)				
	n	%	n	%			
Age							
19-35 years	198	58.1	143	41.9	1.00	Reference	
36-55 years	107	71.3	43	28.7	0.68	0.49 – 0.96	0.029
>55 years	29	78.4	8	21.6	0.52	0.25 – 1.05	0.068
Marital Status							
Not married	145	56.2	113	43.8	1.00	Reference	
Married	189	70.0	81	30.0	0.68	0.51 – 0.91	0.009
Physical exercise							
Appropriate	184	65.0	99	35.0	1.00	Reference	
Inappropriate	150	61.2	95	38.8	1.10	0.84 – 1.47	0.474
Knowledge about the impact of the disease of excessive protein eating habits							
Good	235	65.6	123	34.4	1.00	Reference	
Poor	99	58.2	71	41.8	1.22	0.91 – 1.63	0.190
Body mass index							
Normal	72	54.5	60	45.5	1.00	Reference	
Overweight	93	72.7	35	27.3	0.60	0.39 – 0.91	0.017
Obese	169	63.1	99	36.9	0.81	0.59 – 1.12	0.205

Table 2. Relationship between Flight Characteristic with protein eating habit

	Protein eating habit				Crude Relative Risk	95% Confidence Interval	p
	Enough (n = 334)		Excess (n = 194)				
	n	%	n	%			
Total flight hours							
40 - 4610 hours	214	59.8	144	40.2	1.00	Reference	0.038
4611 - 30500 hours	120	70.6	50	29.4	0.71	0.52 – 0.98	
Total working periode							
1-9 years	204	58.1	147	41.9	1.00	Reference	
10-40 years	130	73.4	47	26.6	0.63	0.46 – 0.88	0.007

Table 3. Several risk factor associated with protein eating habit

	Protein eating habit				Adjusted Relative Risk	95% Confidence Interval	p
	Enough (n = 334)		Excess (n = 194)				
	n	%	n	%			
Total working periode							
1-9 years	204	58.1	147	41.9	1.00	Reference	
10-40 years	130	73.4	47	26.6	0.65	0.49 –0.87	0.003
Body mass index							
Normal	72	54.5	60	45.5	1.00	Reference	
Overweight	93	72.7	35	27.3	0.66	0.47 –0.93	0.018
Obes	169	63.1	99	36.9	0.92	0.72 –1.18	0.509

\* Adjusted each other between the variables in this table

Table 3 was the final analysis model, there were two dominant factors i.e. long working period and body mass index. Compared to subjects with 1-9 years working period, subjects with 10-40 years working periods were 35% less to have excess protein eating habit risk. Compared to subjects with normal BMI, overweight subjects were 34% less likely to have excess protein eating habits.

## DISCUSSION

This was the first study about relationship between sociodemographic factors and excess protein eating habit in civilian pilots in Indonesia. The limitation of this study was information bias, due to the possibility of recall bias regarding protein eating habit, which should have been assessed using 24 hour recall or food frequency questionnaire (FFQ). Another limitation was this study used cross-sectional design in which independent and dependent variables were measured simultaneously, so the causality relation could not be determined. The use of secondary data also led to the limitation of the variables that could be studied.

In this study, 194 pilots (36.74%) had excessive animal protein eating habit. Riskesdas 2010 research stated that the average quality of protein consumed per person per day was still low because the source mostly from plant protein.<sup>13</sup> In terms of pilot's income, most pilots could afford to consume enough animal protein. While 36.74% pilots had excess protein eating habits due to lack of knowledge and awareness to consume nutrition balance diet.

Final analysis showed that pilot with 10-40 years working period had smaller risk of excessive protein eating habits (RR = 0.65; p = 0.003). Study about total working period on protein eating habits in

civilian pilots in Indonesia has not been done before. Working period was directly proportional to the age of pilots. The longer the working period is, the pilots also got older. The results showed with increasing age, the risk of having excess protein eating habits was decreased (p = 0.029; p = 0.068). It can be caused by with increasing age, energy intake including protein would decreased.<sup>14</sup> Wakimoto study using cohort and cross sectional analysis showed that increasing age, especially in older adults, would be followed by reduced motivation to eat which results in decreasing food intake. This is partly due to the physiological and physical factors. Physiologically, the appetite center in the brain (both opioids and neuropeptide Y effects) appeared to decline with age. Besides adaptation declining of the relaxation of the gastric fundus causes early satiety, while increasing cholecystokinin may cause anorexia. Physical factors such as taste and smell changes could influence food choices and limited the type and amount of food consuming.<sup>15</sup>

Changes in taste and smell of the food could be experienced by pilots because of flight environmental exposure they received. Flight exposure such as the drop of atmospheric pressure related to altitude and dry air due to decreasing cabin moisture could affected the taste and smell so the food would be flavorless, due to the reducing sensitivity of our taste buds so the appetite would also decreased. The perception of saltiness and sweetness dropped up to 30% in altitude, consequently the food would be tasteless. Reduced air pressure in the cabin cause mucous membranes swelling, nasal congestion and reduce of odor molecules to evaporate and enter into the nose. Dry air could lower our sense of smell. Generally, scent was transported to the olfactory receptors in the nose through the mucus layer. When the nasal cavity is dry, the efficiency of aroma detection by the brain decreases. The loss of smell

components led to lose of food flavor components.<sup>16</sup> All of these conditions was likely to decrease pilots' appetite while on duty, including protein intake.

This study also showed that compared to pilots with normal body mass index (BMI <25 kg / m<sup>2</sup>), overweight pilots (BMI> 25 kg / m<sup>2</sup>) had smaller risk of excessive protein eating habits. Reduced excess protein eating habits may affect the fulfillment of calorie intake from another source such as carbohydrates and fats. But overweight may also be considered as an early sign of danger that showed there was a tendency of excessive protein eating habits, so overweight pilots would reduce excessive protein eating habits. So the overweight pilots supported with good knowledge about the disease impact of excessive protein consumption and aware of the dangers of excess protein would have a lower risk of excessive protein eating habits.

Marital status was not a dominant factor, but in bivariate analysis, married subjects were related to excessive protein eating habits. (P = 0.009). Woo J study showed nutritionally balanced diet was mostly found in married subjects than in unmarried subjects. Possible subjects who married will have a more regular diet and the selection of food with nutritional balance.<sup>17</sup>

Physical exercise was not proven to be a risk factor of excessive protein eating habits. Physical exercise increased protein breakdown and synthesis of muscle protein, therefore it is necessary to take amino acids for protein re-synthesis through the transport of amino acids into the intramuscular compartment. According to the American College of Sports Medicine, American Dietetic Association and dieticians of Canada there were increased need for protein in minimal, moderate and intense physical exercise respectively of 1.0; 1.3 and 1.6 grams of protein per kilogram of body weight per day.<sup>18</sup> According to Campbell et al, subjects with moderate or intense physical exercise, including muscle endurance training, required more protein than subjects who did not do physical exercise, which could be obtained from whole foods and additional source of high quality protein such as whey and casein protein.<sup>19</sup> Increased demand should be followed by an increase in excessive protein eating habits, but it was not proven in this study. There were several possible causes, the first was in this study only the eating habits of intact animal

protein consumption habits was asked and it did not include questions about other protein sources such as protein supplement drinks. The second possibility was the respondents only did light or aerobic exercise instead of endurance training so the need for protein synthesis requirements was not high.

Good knowledge about the disease impacts of excess protein eating habits was proven to reduce the risk of excessive protein eating habits. General or nutritional and health knowledge would affect food composition and consumption of a person, but someone whose good nutritional knowledge was not automatically change his eating habits.<sup>20</sup> Geisler stated that in general, a person whose good nutritional knowledge would have better intake, but with good knowledge only, eating habits was not automatically be healthy. The lack of support of the environment (friends and family), difficulty in obtaining healthy food and other obstacles were barriers better and healthy eating habits.<sup>1</sup>

In conclusion, 10-40 years working period and overweight would reduce the risk of excessive protein eating habits among civilian pilots in Indonesia. Education about good diet, especially excess eating protein habits protein needed attention from the related authorities. Excessive protein diet was often ignored because many people still did not know about the long term impact for health issues. Aviation medicine specialists are responsible to educate pilots about well-balanced diet and regular physical exercise to balance pilot lifestyle that tends to be sedentary and to monitor health issues monthly. With good education, it was expected that health level of the pilots could be increased so the performance would be better to ensure flight safety.

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