Flight hours of unplanned flight and other risk factors affecting exercise habit among commercial pilots in Indonesia

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Abstrak

Latar belakang*: Kebiasaan melakukan latihan fisik antara lain berguna bagi kebugaran fisik serta kognitif, serta mencegah inkapasitasi akibat nyeri punggung bawah, kelelahan, dan penyakit kardiovaskular. Penelitian ini bertujuan untuk mengetahui gambaran kebiasaan latihan fisik pada pilot sipil di Indonesia serta faktor-faktor yang mempengaruhinya.*

Metode*: Penelitian ini dilakukan dengan desain potong lintang menggunakan data sekunder dari Survey Terhadap Kebiasaan Hidup Sehat Pilot Sipil di Indonesia Tahun 2016. Pada penelitian ini, yang dianalisis adalah data pilot dengan lisensi CPL dan ATPL. Kebiasaan latihan fisik sesuai dengan rekomendasi latihan fisik American College of Sports Medicine (ACSM). Data yang diambil meliputi data demografi, pekerjaan, kepuasan hidup, indeks massa tubuh, dan lingkar pinggang. Analisis regresi Cox digunakan untuk menganalisis faktor-faktor dominan yang mempengaruhi kebiasaan latihan fisik.*

Hasil*: Di antara 644 data pilot, terdapat 332 data yang memenuhi kriteria. Proporsi pilot sipil yang memiliki kebiasaan latihan fisik yang sesuai rekomendasi adalah 44%. Faktor dominan yang mempengaruhi latihan fisik adalah usia. Pilot sipil berusia 50 sampai 65 tahun memiliki kebiasaan latihan fisik 40% lebih rendah dibandingkan dengan pilot sipil berusia 20 – 29 tahun (risiko relatif suaian (RRa) 0,60; Interval Kepercayaan (IK) 95% 0,38 – 0,94; P 0,026). Sedangkan jam terbang di luar jadwal dan indeks massa tubuh yang berlebih nampaknya berpengaruh terhadap kebiasaan latihan fisik (secara berurutan: RRa 0,58; IK95% 0,30 – 1,13; P 0,112 dan RRa 0,79; IK95% 0,62 – 1,02; P 0,072).*

Kesimpulan*: Usia, jam terbang di luar jadwal, dan IMT berlebih nampaknya berpengaruh terhadap kebiasan latihan fisik pada pilot sipil di Indonesia.* ***(Health Science Journal of Indonesia 2016;8(1):36-42)***

Kata kunci*: latihan fisik, jam terbang, pilot sipil, Indonesia*

Abstract

Background: Physical exercise habit has some benefits, among others, for physical fitness and cognitive function, as well as preventing incapacitation events caused by low back pain, fatigue, dan cardiovascular diseases. The aim of this study was to find out the description of physical exercise habit among commercial pilot in Indonesia and its affecting factors.

Methods: This study was conducted with cross sectional design using secondary data from Healthy Lifestyle Survey of Commercial Pilot in Indonesia 2016. In this study, data of pilots with CPL and ATPL was analysed. Physical exercise habit was defined appropriately with American College of Sports Medicine (ACSM) recommendation**.** Data taken were demographic data, job factors, satisfaction of life, body mass index, and waist circumference. Cox regression analysis was used to analyse dominant factors which affect physical exercise habit.

Results: Among 644 pilots' data, there were 332 data met the criteria in this study. Proportion of commercial pilots who had appropriate exercise habit was 44%. Dominant factor which affecting exercise habit was age. Compared to pilots aged 20 to 29 years old, pilots aged 50 to 65 years old had 40% less likely to have exercise habit (adjusted relative aisk (RRa) 0.60; 95% Confidence Interval (CI) 0.38 – 0.94; P 0.026). Moreover, flight hours of unplanned flight and overweight were likely to affect physical exercise habit (consecutively aRR 0.58; 95%CI 0.30 – 1.13; P = 0.112 and aRR 0,79; IK95% 0,62 – 1,02; P 0,072).

Conclusion: Age group, flight hours of unplanned flight and overweight were likely to affect exercise habit among commercial pilots in Indonesia. ***(Health Science Journal of Indonesia 2016;8(1):36-42)***

Keywords: physical exercise, flight hours, commercial pilot, Indonesia.

Physical exercise was known to have several benefits for individual's health, particularly cardiovascular health and cognitive function.[1,2] Among pilots community, some benefits of physical exercise was include to prevent incapacitation caused by low back pain, fatigue, and cardiovasular diseases.[3,4,5]

American College of Sports Medicine (ACSM) recommended adults to do moderate – intensity exercise at least 30 minutes per session with frequency of at least 5 times per week (≥ 150 minutes per week), or vigorous – intensity exercise at least 20 minutes per session with frequency of at least 3 times per week (≥ 75 minutes per week), or the combination to achieve energy expenditure of 500 – 1000 *Metabolic Equivalent* (MET)/week.[6]

Previous study conducted by British Airline Pilot Asociation (BALPA) published that proportion of pilots who did physical exercise with frequency of 2 or more times per week was 49.9%.[7] Conversely, 5.5% of surveyed pilots had never done physical exercise at all. Several previous studies pointed out that there were some factors which affecting physical exercise habit, such as demographic factors (age, marital status, education level) and job factors.[8] One of job factors which could be a barrier for an individual to have exercise habit was long work hours and overtime works. A study conducted among workers in The Netherlands found out that additional working hours was related to less physical activities and could increase the risk of unhealthy habit such as smoking.[9] Furthermore, satisfaction of life was related to an individual's healthy habit as well. From a research carried on among workers in Germany, it was noted that workers who were more satisfied with their lives had better physical exercise habit.[10]

To date, studies concerning factors which can affect physical exercise habit among commercial pilots were still scarce. Therefore it was necessary to conduct a research to find out several factors affecting exercise habit among commercial pilots, particularly with regard to flight hours of unplanned flight.

METHODS

This cross sectional design study was conducted in June and July 2016. Research samples were taken from secondary data of Healthy Lifestyle Survey of Commercial Pilot in Indonesia 2016 which conducted in Civil Aviation Medical Center, Directorate General of Civil Aviation, Jakarta. Sampling method was total sampling, collected all 644 data. Data which met the inclusion criteria of this study were analysed, those were the data of pilots holding CPL and ATPL. Exclusion criteria of this study included data of pilots who were grounded in 30 consecutive days before the survey was conducted.

The outcome of this study was physical exercise habit which was appropriate with ACSM recommendation, which was doing moderate exercise in duration of at least 150 minutes per week or vigorous exercise in duration of at least 75 minutes per week. Exercise habit data was obtained from the intensity, frequency, and duration of exercise done per week in the last 6 months. The main risk factor analysed in this study was flight hours of unplanned flight, defined as cumulative flight hours of flight duty (or duties) which was not scheduled beforehand or flight duty which was performed on pilots' day off, on 30 consecutive days before survey was conducted. Flight hours of unplanned flight was categorised based on Receiver Operating Characteristic (ROC) analysis, into: none (0 hour), 1 – 4 hours, and 5 – 30 hours. Other factor analysed was frequency of unplanned flight performed on 30 consecutive days, and was categorised based on ROC into: never, 1 – 3 times, and 4 – 10 times. Flight sectors in 24 hours was categorised into 2 subcategories based on ROC analysis into: 1 – 3 sectors and 4 – 10 sectors. We also investigated whether there was any exercise facility available in hotel or lodge provided for pilots on layover period.

Other factor included age, which was divided into 4 subcategories based on previous study, into: 20 – 29 years old, 30 – 39 years old, 40 – 49 years old, and 50 – 65 years old.[7] Marital status was categorised into: not married, married, and divorced. Satisfaction of life was calculated using validated questionnaire *Satisfaction With Life Scale* (SWLS) with Cronbach's α 0,9.[11] Level of satisfaction of life was categorised into 3 subcategories: low and average (SWLS score 5 – 24) and high (SWLS score ≥25). Body mass index (BMI) was categorised according to WHO criteria, into: underweight and normal (BMI <23 kg/m^2 for Asian, and BMI <25 kg/m^2 for non-Asian), overweight (BMI 23 – 24.99 kg/m^2 for Asian, and BMI 25 – 29.99 kg/m^2 for non-Asian), and obese (BMI <23 kg/m^2 for Asian, and BMI ≥25 kg/m^2 for Asian and BMI ≥30 kg/m^2 for non-Asian). Waist circumference group was also categorised according

to WHO into: normal waist circumference (<90 cm for men and <80 cm for women) and central obesity.

Bivariate analysis was performed using STATA 10 to find out each factor's effect on outcome. From bivariate analysis results, some independent variables which p value were <0.25 then became candidates for multivariate analysis using Cox regression. This study was conducted after the ethical clearance was issued by Ethical Committee Faculty of Medicine, University of Indonesia.

RESULTS

Secondary data were counted 644 data, and pilots data which licensed CPL and ATPL were 578 data. After adjustment was done according to exclusion and drop out criteria, 332 data were obtained to be analysed. Table 1 presented that most of subjects were in age group of 20 – 29 years old. Subjects with CPL and ATPL were almost the same in number, and most of subjects flew medium haul flight (flight duration 4 – 6 hours). Thirty seven percent of all subjects had been performed unplanned flight duty at least once in 30 consecutive days, with flight hours varied from 1 to 30 hours. The proportion of commercial pilot who performed physical exercise appropriately was 44%.

Table 2 presented bivariate analysis results from various factors which were analysed in this study, such as: demographic factors (included age and marital status), flight hours of unplanned flight, frequency of unplanned flight, number of sectors, satisfaction of life, BMI and waist circumference. From this table, it was figured out that physical exercise habit was likely to be evenly distributed according to number of sectors, exercise facility, satisfaction of life and waist circumference. Age, marital status, flight hours of unplanned flight, and BMI were likely to decrease the probability of exercise habit among commercial pilots, proven by P value <0.25. These factors were then became candidate for multivariate analysis.

Table 3 presented final model of multivariate analysis in this study. From the result, it was seen that older age was likely to decrease the probability to have physical exercise habit. Pilots aged 30 – 39 years old and 50 – 65 years old had 30% and 40% less probability to have physical exercise habit, respectively (aRR 0.70; 95% CI 0.51 – 1.00; P 0.052 and aRR 0.60; 95% CI 0.38 – 0.94; P 0.026).

This table also presented information that compared to subjects who had never performed unplanned flight, subjects who had 1 – 4 hours of unplanned flight had less probability to have exercise habit, however it was not statistically significant (aRR 0.58; 95% CI 0.30 – 1.13, P 0.112). Compared to normal BMI, the overweight subjects were also less likely having exercise habit, even though it was not statistically significant (aRR 0.79; 95% CI 0.62 – 1.02, P 0.072).

Table 1. Demographic, job, anthropometric characteristics and physical exercise habit of subjects

	n	%
Age group		
20 - 29 years old	130	39.2
30 - 39 years old	77	23.2
40 - 49 years old	71	21.4
50 - 65 years old	54	16.3
Marital status		
Not married	117	35.2
Married	211	63.6
Divorced	4	1.2
Type of license		
CPL	175	52.7
ATPL	157	47.3
Type of aircraft		
Fixed wing	307	92.5
Rotary wing	25	7.5
Type of flight		
Short haul	77	23.2
Medium haul	223	67.2
Long haul	32	9.6
Total flight hours		
159 – 6.500 hours	208	62.7
6.501 – 13.000 hours	71	21.4
13.001 – 30.500 hours	53	16.0
Flight hours in 30 days		
10 – 70 hours	199	59.9
71 – 120 hours	133	40.1
Frequency of unplanned flight		
Never	209	63.0
1 – 3 times	91	27.4
4 – 10 times	32	9.6
Flight hours of unplanned flight		
None	209	63.0
1 – 4 hours	27	8.1
5 – 30 hours	96	28.9
Number of sectors		
1 – 3 sectors	255	76.8
4 – 10 sectors	77	23.2
Physical exercise habit		
Inappropriate	186	56.0
Appropriate	146	44.0
Exercise facility		
Not available	126	38.0
Available	206	62.0
Satisfaction of life		
Low and average	129	38.9
High	203	61.1
Waist circumference		
Normal	178	53.6
Central obesity	154	46.4
Body mass index		
Underweight & normal	64	19.3
Overweight	93	28.0
Obese	175	52.7

Table 2. Factors affecting physical exercise habit

	Physical exercise habit				Crude relative risk	95% Confidence interval	P
	Inappropriate (n = 186)		Appropriate (n = 146)				
	n	%	n	%			
Age group							
20 - 29 years old	62	47.7	68	52.3	1.00	Reference	
30 - 39 years old	49	63.6	28	36.4	0.69	0.45 – 1.07	0.105
40 - 49 years old	37	52.1	34	47.9	0.91	0.60 – 1.38	0.674
50 - 65 years old	38	70.4	16	29.6	0.56	0.32 – 0.97	0.041
Marital status							
Not married	52	44.4	65	55.6	1.00	Reference	
Married	133	63.0	78	37.0	0.66	0.47 – 0.92	0.015
Divorced	1	25.0	3	75.0	1.35	0.42 – 4.20	0.611
Frequency of unplanned flight							
Never	114	54.5	95	45.5	1.00	Reference	
1 – 3 times	54	59.3	37	40.7	0.91	0.62 – 1.32	0.622
4 – 10 times	18	56.3	14	43.8	0.96	0.55 – 1.69	0.907
Flight hours of unplanned flight							
None	113	54.1	96	45.9	1.00	Reference	
1 – 4 hours	20	74.1	7	25.9	0.56	0.26 – 1.21	0.144
5 – 30 hours	53	55.2	43	44.8	0.97	0.68 – 1.30	0.891
Number of sectors							
1 – 3 sectors	142	55.7	113	44.3	1.00	Reference	
4 – 10 sectors	44	57.1	33	42.9	0.96	0.65 – 1.42	0.866
Exercise facility							
Not available	75	59.5	51	40.5	1.00	Reference	
Available	111	53.9	95	46.1	1.13	0.81 – 1.60	0.452
Satisfaction of life							
Low and average	77	59.7	52	40.3	1.00	Reference	
High	109	53.7	94	46.3	1.14	0.81 – 1.61	0.422
Waist circumference							
Normal	95	53.4	83	46.6	1.00	Reference	
Central obesity	91	59.1	63	40.9	0.87	0.63 – 1.21	0.433
Body mass index							
Underweight & normal	33	51.6	31	48.4	1.00	Reference	
Overweight	58	63.4	35	37.6	0.74	0.53 – 1.03	0.080
Obese	108	61.7	67	38.3	0.70	0.25 – 1.93	0.501

Table 3. Association of factors affecting physical exercise habit

	Physical exercise habit				Adjusted relative risk	95% Confidence interval	P
	Inappropriate (n = 186)		Appropriate (n = 146)				
	n	%	n	%			
Age group							
20 - 29 years old	62	47.7	68	52.3	1.00	Reference	
30 - 39 years old	49	63.6	28	36.4	0.71	0.51 – 1.00	0.052
40 - 49 years old	37	52.1	34	47.9	0.97	0.72 – 1.31	0.863
50 - 65 years old	38	70.4	16	29.6	0.60	0.38 – 0.94	0.026
Flight hours of unplanned flight							
None	113	54.1	96	45.9	1.00	Reference	
1 – 4 hours	20	74.1	7	25.9	0.58	0.30 – 1.13	0.112
5 – 30 hours	53	55.2	43	44.8	0.98	0.75 – 1.28	0.893
Body mass index							
Underweight & normal	33	51.6	31	48.4	1.00	Reference	
Overweight	58	63.4	35	37.6	0.79	0.62 – 1.02	0.072
Obese	108	61.7	67	38.3	0.71	0.32 – 1.59	0.410

*Adjusted among variables in this table

DISCUSSION

The strength of this study was that it was conducted among commercial pilots population which had homogenicity in some area such as job characteristics, level of education and socioeconomic factors. Furthermore, studies which investigated pilots' habit were still scarce, therefore this study could present a description of healthy habits among commercial pilots. This study had some limitations, such as the data used were secondary data, hence several variables were not appropriate with the researchers' need. Moreover, some data such as job factors were not available so it was impossible to analyse their effect on exercise habit.

Some of the results in this research were not similar with previous studies, it might because of the difference of subjects' characteristics and methods to measure variables. The outcome which was investigated was physical exercise habit, with the main factor analysed was flight hours of unplanned flight. However, previous studies regarding exercise habit among commercial pilot were still limited.

There was a difference between this study and the previous one in proportion of commercial pilots who had exercise habit. A study which conducted among European commercial pilots figured out that 59.9% of pilots performed physical exercise twice or more times per week, however the intensity and duration were unknown.[7] In the contrary, this study resulted that a part of subjects (44%) performed physical exercise appropriately according to the recommended level.

Multivariate analysis of this study figured out that even though subjects with more flight hours of unplanned flight were less likely to have exercise habit, the stasistical result was not significant. This result was inconsistent with previous research in Japan which concluded that subjects with work hours more than 45 hours per week performed exercise less than subjects who had normal work hours (crude OR 0.89; 95% CI 0.79 – 1.00; P 0.06).[12] The inconsistence was probably resulted from the difference of subjects' and job characteristics, although they were exposed with same risk factor. The difference of subjects characteristic between this study and the previous one was age group. In this study, pilots performed flight duty of unplanned flight were dominated by young age group of 20 – 29 years old. In the other hand, there was no difference of age between the overworked group and normal-work-hour group in previous study. The discrepancy of the pilots' age between those group resulted in the variance of work load, which was not measured in this study.[7] Furthermore, there were other factors such as flying license which could affect the work load. The difference of work load could probably affect the statistical analysis of flight hours of unplanned flight on exercise habit.

In Indonesia, despite the limitation of flight hours and rest period had been regulated in CASR part 121, in unusual circumstances the airlines had to add flight tasks or flight hours which had not been scheduled beforehand. This could be resulted to the prolongation of work hours and decreased rest period of pilots.[13] A theory about behavioural lifestyle mechanism explained that the effect of overwork and lack of resting or leisure time, affected the decision to choose or conduct a behaviour. In most cases, the behaviours chosen were unhealthy, such as smoking, eating fatty foods, and lack of physical activities. Basically, the decision to perform healthy or unhealthy lifestyle was a response against challenge from the environment, including job stress.

In the current study, age was considered as an affecting factor on exercise habit. However this result was different with study conducted by Hanson et al., which pointed out that subjects aged 55 years old and above would exercise more regularly (adjusted OR 3.04; 95% CI 1.866 – 4.959; P <0.001). This was caused by older people had tendency to suffer from metabolic diseases therefore they were more aware to do physical exercise regularly.[14] In the contrary, older commercial pilots had more work load and job stress which could have effect on healthy habit.[7]

Bivariate analysis presented that marital status had significant effect on exercise habit. This result was consistent with previous study in Europe. That study concluded that married individuals were less likely to exercise regularly (ß = 0.57; SE 0.10; P < 0.01) and the implication was increased BMI in married individuals and their spouses.[15]

In this study, number of sectors was analysed to find out whether it had any effect on exercise habit. The more number of sectors performed, the number of take off and landing phases pilots should perform also increased. This condition would increase work load and exposure of mild hypoxia to the pilots which

could be resulted in mental fatigue.[16] From a study among commercial pilots in Europe, it was known that there was an association between mental fatigue and exercise habit. A number of pilots who reported fatigue performed physical exercise less frequently compared to pilots who did not report fatigue ($P < 0.05$).[7] Recent study concluded that number of sectors did not take effect on pilots' exercise habit. The insignificant result in the current study could be caused by recall bias and job characteristics which was not totally homogenic. For instance, pilots who performed short haul flight were more likely to have less number of sectors in 24 hours compared to pilots with long haul flight, and could result to difference in work load.

Effect of satisfaction of life on exercise habit was also analysed in this study. From a study carried out among Germany workers, one of any factors increasing probability of exercise habit was the level of satisfaction of life (adjusted OR 2.38; 95% CI 1.20 – 4.69; P < 0,05).17 Similar conclusion also resulted from Pekel et al. who investigated the correlation of life satisfaction and exercise habit among teachers in Turkey ($r = 0.496$, $R^2 = 0.246$; P <000).[18] On the other hand, this study did not find out any effect of satisfaction of life on exercise habit. The inconsistence could be resulted from the difference of tools to measure satisfaction of life and exercise habit between the current study and previous studies. Moreover, there were some different characteristics between the studies although they were done among workers community.

Multivariate analysis of this study resulted that the excess BMI seemed to lessen an individual's probability to have exercise habit, even though there was not a strong signficance in statistical analysis. Furthermore, waist circumference was not an affecting factor on exercise habit. This result was consistent with Matheson et al. who stated that obese people were less likely to do regular physical exercise (with frequency of 12 times or more per month) compared to people with normal BMI (OR 0.67; 95% CI 0.47–0.95).[19] The cause of lacking physical activity in obese group was the decreasing of ability to maintain postural stability and the limitation to move freely. Furthermore, in obese individuals, repeated body movement such as in physical exercise could cause muscle and joint fatigue.[20]

Age was a dominant factor which affect physical exercise habit among commercial pilots. Flight hours of unplanned flight, BMI and marital status were likely to have an effect of exercise habit, however the statistical analysis were not significant. Moreover, frequency of unplanned flight, number of sectors, life satisfaction and waist circumference were not proven having an effect on exercise habit among commercial pilots in Indonesia. Further investigation should be conducted regarding to job factors (flight hours, type of flight) which could affect physical exercise and other healthy habits among commercial pilots in Indonesia.

In conclusion, this study found that several factors such as age, overweight and flight hours of unplanned flight were likely to affect physical exercise habit.

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