High level of work stressors increase the risk of mental-emotional disturbances among airline pilots

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Abstrak

Pekerjaan sebagai pilot penerbangan sipil dipandang sebagai pekerjaan dengan tingkat stres yang sangat tinggi. Penelitian ini bertujuan untuk mengidentifikasi pengaruh stresor kerja dan faktor lainnya terhadap gangguan mental-emosional pilot penerbangan sipil. Penelitian dilakukan secara cross-sectional melalui wawancara dengan menggunakan kuesioner khusus terhadap pilot-pilot sebuah penerbangan sipil yang sedang melakukan pemeriksaan kesehatan rutin bulan Mei - Juli 1999 di Jakarta. Lima aspek stresor kerja yang dinilai adalah kondisi kerja, aspek fisik lingkungan kerja, pengembangan karir, organisasi dan aspek hubungan interpersonal. Penilaian gangguan mental-emosional menggunakan kuesioner Symptom Checklist 90 (SCL 90). Analisis statistik menggunakan risiko relatif dengan regresi Cox dengan waktu tetap. Sebanyak 109 kuesioner dapat dianalisis dari 128 subyek yang diwawancara. Sebagian besar subjek berstatus menikah (73,4%) dan memiliki ijazah D3 (91,7%). Jumlah subyek yang berpangkat captain dan first officer hampir sama. Prevalensi gangguan mental-emosional 39,4%. Faktor-faktor yang dominan berkaitan dengan gangguan mental-emosional adalah stresor kerja dan ketegangan dalam rumah tangga. Responden dengan stresor kerja yang tinggi dibandingkan dengan yang rendah mempunyai risiko 4,6 kali mengalami gangguan mental-emosional dari pada responden dengan stresor kerja rendah [risiko relatif (RRa) = 4,64; 95% interval kepercayaan (CI) = 1,01-19,65]. Penatalaksanaan yang memadai diperlukan dalam menangani stresor kerja dan ketegangan rumah tangga yang mempengaruhi timbulnya gangguan mental-emosional. ***(Med J Indones 2007; 16:117-21)***

Abstract

Civilian airline pilots have one of the most stressful occupations. The aim of this study was to identify the effect of work stressors and other factors on mental-emotional disturbances among airline pilots. A cross-sectional study was done by interviewing selected pilots of an airline using appropriate questionnaires, during their routine medical examination from May to July 1999 in Jakarta. Five aspects of work stressor were assessed: working conditions, physical conditions of working environment, career development, organization and interpersonal relationship. Mental-emotional disturbances were determined by using the Symptom Checklist 90 (SCL 90) questionnaire. Data analysis was carried out using relative risk by Cox regression with constant time. From 128 subjects interviewed, 109 could be analyzed. Most of the subjects were married (73.4%) and college graduates (91.7%). The number of captains and first officers were almost equal. The prevalence of mental-emotional disturbances was 39.4%. Mental-emotional disturbances were significantly related to work stressors and moderately related to household tension (P = 0.184). Compared to pilots with low levels of work stressors, those with high or very high levels of work stressors had a risk of 4.6 times of mental-emotional disturbances [adjusted relative risk (RRa) = 4.64; 95% confidence interval (CI) = 1.01 – 19.65]. Adequate guides to cope work stressors and household tension which related to mental-emotional disturbance is recommended. ***(Med J Indones 2007; 16:117-21)***

Keywords: *mental-emotional disturbance, work stressors, household tension, airline pilots*

Airline pilots have occupation with potentially high level of work stress[1]. This high level of stress is associated with the type of the work, which was demanding, with the use of high technology and long working hours. High level of work stress can cause errors at work, especially human error, which will further influence the pilot's well-being, both physically and mentally.[2]

Studies among pilots found that proportion of psychiatric problems as the cause of medically unfit condition for flying was high; 41% among those who work in British royal military airlines and 67% among British commercial airlines pilots. However, data from insurance companies were only 13.4%.[3] Significant differences

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between the results could be caused by differences in methodology and diagnosis criteria.

Several factors can be considered as stressors to commercial airline pilots. Firstly, job related factors such as flying schedules that never consider holidays and week-ends, which are sometimes irregular and unexpected, involving time zone changes, lack of career opportunities, poor organizational climate and morale, and lack of autonomy at work. Secondly, domestic stressors such as family health, life events and lack of social support. Both are further influenced by job dissatisfaction, mental health, and pilot performance.[4]

For these reasons, the occupation as a pilot can be classified as highly stressful and have the potential of causing mental-emotional disturbances. This paper reports the results of a study which showed occupational stressors as a risk for mental-emotional disturbance among commercial airline pilots in Indonesia.

METHODS

This was a cross-sectional study conducted by interviews using appropriate questionnaires. Subjects were pilots of a civilian airline still actively working, not on their leave or hospitalized, working as captain or first officer at least for one year, and agree to join the study. Interviews were given to all pilots going for their routine medical examinations in Jakarta from May to July 1999.

Information collected were demographics (age, education, and marriage), baseline work information (duration, flying hours, type of airplane, and rank), occupational stressors (working condition, working environment, carrier development, interpersonal-relationship, and organization) using the Airline Pilots Sources of Stress questionnaire[5], household stressors (role at home, physical environment, tension, and privacy) using the Home Stress Checklist questionnaire[6], and mental-emotional state using the Symptom Checklist 90 (SCL 90) questionnaire which were filled by the subject themselves (self-administered). [7]

For the purpose of analysis, age was grouped into 2 groups, less or equal to 40 years and more than 40 years. Education was grouped into college graduates (such as Airline Transport Pilot License-ATPL) and university graduates. Marriage status was classified as married and un-married.

Working duration was the number of years the subject worked as pilot in the company and classified into less than 5 years, five to twenty years, and more than twenty years. Total flying hours was the sum of hours flying from the first time up until the time of examination and classified into less than 5,000 hours, 5,001 to 20,000 hours, and more than 20,000 hours. Rank was grouped as captain and first officer. The types of airplane operated during the last six months and were classified into Fokker 28, Boeing 737, Airbus 330, DC 10, Boeing 747-200, and Boeing 747 – 400.

Evaluation of stressors

Work stressors were assessed using the Airline Pilot Sources of Stress Questionnaire[5] which was validated before utilized. The questionnaire consists of 55 questions which represent five aspects of work stressors namely working condition, physical aspects of working environment, career development, organization and interpersonal relationship. For each question, the subject must choose a number from 1 to 5 which he felt was appropriate to his situation; one being the lowest exposure and 5 as the highest.

Based on the total score of the questionnaire, subjects were classified into those who were exposed to low (total score of 118 or less), moderate (total score of 119 to 152), high (total score of 153 to 190), or very high (total score of 191 or more) level of work stress. The reliability of the questionnaire was assessed by computing alpha cronbach value to measure the internal consistency of the questions with alpha 0.9399.

Household stressors were assessed using the Home Stress Checklist questionnaire[6] which assessed several aspects of home life potentially considered as sources of stress such as role at home, physical aspects of living environment, household tension and privacy. The subject choose whichever condition was suitable for his situation. In the analysis, role at home, physical environment and household tension were classified as low, moderate or high, while privacy was classified into everyday, several times a week or seldom.

Evaluation of mental-emotional state

Mental-emotional state was evaluated using the Symptom Checklist 90 (SCL 90), a self-rated questionnaire which consisted of 90 questions representing nine dimension scales of symptoms (depression, anxiety, obsessive-compulsive, phobia, somatization, interpersonal sensitivity, hostility, paranoid, psychotic) and one additional scale. Subjects chose from a scale of 0-4

for each question which appropriate with what he felt within the last month; with 0 for never, 1 for rarely, 2 for moderately, 3 for frequently, and 4 for very frequently.

Mental state was measured generally by computing the total score or more specifically by computing the score of each dimension. This questionnaire has already been validated to be used in Indonesia with 82.9% sensitivity and 83% specificity; the positive predictive value was 80% and negative predictive value was 84.9%.[7]

Mental emotional state could vary from minor subjective complaints to recognizable psychiatric symptoms which caused functional disturbance to a person. This questionnaire determined the mental-emotional state of a person through the total score achieved, with a cut-off point of 61. A score of 61 or more indicates mental-emotional disturbance while a score of less than 61 was considered as normal. Moreover the questionnaire also assessed mental-emotional disturbance according to ten dimensions based on score conversion to standard t-score of the questionnaire.

Data analysis

Relative risks (RR) were calculated to identify the risk factors related to mental-emotional disturbance using Cox regression analysis with constant time.[8] A risk factor was considered to be a potential confounder if in the univariate test the *P*-value < 0.25 and would be considered as a candidate for the multivariate model along with all known risk factors for mental-emotional disturbance.[9] Ninety-five percent confidence intervals were based on the standard error of coefficient estimates. Statistical analyses were done using STATA 6.0 software.[10]

Approval for this study was granted by the Board of Examiners of the Department of Community Medicine, Faculty of Medicine University of Indonesia in Jakarta.

RESULTS

Among 128 pilots who filled the questionnaires, data of 109 pilots could be analyzed. Mental-emotional disturbance prevalence in this study was 39.4%.

Table 1 shows that demographic characteristics, work and work stressors were likely not correlated with mental-emotional disturbance except for physical living environment. Physical living environment seemed to have moderate correlation with mental-emotional disturbance. The pilots who reported moderate-high than low physical conditions were more likely to be mental-emotional disturbance.

Table 1. Some demographic characteristics, work, work stressors, household stressors

	Mental emotional disturbance			
	No (N=66)		Yes (N=43)	
	n	%	n	%
Age (years)				
≤ 40	35	64.8	19	35.2
≥ 40	31	56.4	24	43.6
Education				
College	5	55.6	4	44.4
University	61	61.0	39	39.0
Status				
Married	49	61.2	31	38.8
Not married	17	58.6	12	41.4
Rank				
Captain	33	55.9	26	44.1
First officer	33	66.0	17	34.0
Flying hours				
≤ 5,000	23	63.9	13	36.1
5,001-10,000	14	77.8	4	22.2
≥ 10,000	29	52.7	26	47.3
Working duration				
< 5 years	22	62.9	13	37.1
5-20 years	18	60.0	12	40.0
≥ 20 years	26	59.1	18	40.9
Role at home				
Low	26	65.0	14	35.0
Moderate - high	40	58.0	29	42.0
Privacy				
Every day	26	74.3	9	25.7
Several time a week	40	48.4	34	51.6
Physical living environment				
Low	53	66.2	27	33.8
Moderate - high	13	44.8	16	55.2

The final model, as shown on Table 2, noted that those who had high or very high level of work stressor had 4.6 increased risk to be mental-emotional disturbance. While increased household tension was moderately correlated with mental-emotional disturbance.

Table 2. Relationship between household tension, work stressor and mental emotional disturbance

	Mental emotional disturbance		Adjusted relative risk*	95% Confidence intervals	P
	No (N=66)	Yes (N=43)			
	n	n			
Household tension					
Low	58	31	1.00	Reference	
Moderate - high	8	12	1.57	0.81 – 3.07	0.184
Work stressor					
Low	14	2	1.00	Reference	
Moderate	36	16	2.40	0.55 – 10.44	0.243
High - very high	16	25	4.64	1.01 – 19.65	0.037

* Adjusted each others to risk factors listed on this Table

DISCUSSION

This study has some limitations. Firstly, it cannot show cause and effect between risk factors and mental-emotional disturbance. There were also biases in population, subject selection, sample size and information or data obtained. The subjects came from a limited population, which were male pilots and co-pilots of a civilian airline with age ranging from 20 to 60 years.

Instruments used for assessing the household stressor and work stressor were not standardized instruments. However, these instruments have been used in several studies previously with good validity and reliability results.[5] Subsequent validity test done in this study achieved almost the same result.

The psychometric instrument used for assessing the mental-emotional state (SCL 90) was self-rated which depended on the honesty and responsibility of the respondent in answering the questionnaires. Another source of information bias was other risk factors that were not evaluated; such as personality types, individual coping mechanism and important life events.

Out of 109 subjects interviewed, 39.4% subjects categorized as mental-emotionally disturbed. The prevalence was lower compared to a study done on British pilots.[3] This should be considered carefully since population of that study was those already being declared as medically unfit for flying, thus a higher prevalence of mental-emotional disturbance was expected. Studies in other occupations, such as bank supervisors,[11] nurses,[12] and bus drivers[13] which used the same tools showed that the prevalence of mental-emotional disturbance among pilots was the highest. This confirmed that pilot profession was indeed an occupation with high level of potential work stress. However the high prevalence obtained in this study should not be considered as a threat. The use of SCL-90 questionnaire was intended only as a screening tool and not for diagnostic purposes. Therefore the positive results should be reconfirmed with clinical examination by experts, since majority of subjects who had positive result did not show any obvious clinical symptoms.

Dominant factors related to mental-emotional disturbance found in this study were work stressors and household tension. Work stressor correlated significantly with mental-emotional disturbance while household tension and physical living environment stressors were moderately correlated.

The US National Institute of Occupational Safety and Health (NIOSH) agreed that stressful working conditions have a primary role in causing job stress. This stressful working conditions which is also known as job stressors include: (1) the tasks design, such as heavy work load, long working hours, shift works, etc; (2) Management style with lack of workers' participation in decision making, poor communication, or lack of family-friendly policies; (3) Interpersonal relationships; (4) work roles; (5) career concerns; and

(6) environmental conditions, such as unpleasant or dangerous physical conditions.[14]

A previous study[15] on the relation of corporate instability to pilots' stress symptoms confirmed that factors at work such as corporate instability could increase psychological risk in pilots that could manifest in elevation of stress and depression symptoms.[15]

However, according to the NIOSH model of job stress, individual and situational factors could intervene the influence of stressful working condition in causing stress. These individual and situational factors include the balance between work and family or personal life, a support network of friends and co-workers, also a relaxed and positive outlook.[14]

Another study about sources of influence of occupational and domestic stress, together with life events and coping strategies on job dissatisfaction, mental health, and performance among commercial airline pilots, found that overall mental ill-health was associated with lack of autonomy at work, fatigue, and flying patterns, together with an inability to relax and a lack of social support.[4]

The influence of stressors at home on the manifestation of stress has already been acknowledged in several papers. A previous study[16] on the psychological background of US Navy aircraft accidents revealed that problems in marriage were among the factors which correlated significantly with accidents. As lack of social support was proved to be associated with mental ill-health,[4] one study about spousal factors in pilot stress[17] suggested that the spouse can be a major social support system for the aviator and a significant factor in the pilot's ability to deal effectively with psychosocial stress.

In conclusion, this study showed that stressors at work as well as household tension increased risk mental health of pilots. To minimize the risk of mental-emotional disturbance, proper management of these factors should be implemented properly.

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