

## The effect of total flight hours and others dominant factors on the risk of distress in civilian pilots in Indonesia

Yuliana,<sup>1,2</sup> Srimpi Indah,<sup>3</sup> Widura Imam Mustopo,<sup>3</sup> Bastaman Basuki<sup>1</sup>

<sup>1</sup> Aviation Medicine Program, Department of Community Medicine, Faculty of Medicine Universitas Indonesia

<sup>2</sup> Aviation Medical Center, Ministry of Transportation

<sup>3</sup> Saryanto Institute for Medical and Health Aviation and Aerospace (Lakespra Saryanto)

Corresponding address: Dr. Yuliana, Sp.KP

Email [yuliana.takia@gmail.com](mailto:yuliana.takia@gmail.com)

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### Abstrak

*Latar belakang:* Distres pada pilot dapat mengurangi tingkat kewaspadaan dan mengganggu proses pengambilan keputusan. Tujuan penelitian ini mengidentifikasi pengaruh jam terbang total dan faktor dominan lainnya terhadap risiko distres di antara pilot sipil di Indonesia.

*Metode:* Studi potong lintang dengan sampling purposif pada tanggal 1-14 Mei 2013 terhadap pilot yang sedang melakukan pemeriksaan medik (medEx) di Balai Kesehatan Penerbangan, Jakarta. Pilot mengisi langsung dan tanpa nama data demografi dan pekerjaan, kuesioner strategi koping dan stresor di rumah. Pengukuran distres menggunakan Self Reporting Questionnaire-20 (SRQ-20) dengan titik potong 5/6, self rating dan anonymous. Risiko distres dianalisis menggunakan risiko relatif (RR) dengan regresi Cox dengan waktu konstan.

*Hasil:* Dari 209 pilot didapatkan 13,4% berisiko distres. Pilot dengan jam terbang total 6000-12999 jam dibandingkan dengan 59-5999 jam berisiko distres hampir 5,8 kali lipat [risiko relatif suaian (RRa) = 5,83; P = 0,000], sedangkan jam terbang total 13000-29000 berisiko meningkatkan distres lebih dari 8 kali lipat (RRa = 8,42; P = 0,000). Selanjutnya, pertengkaran di keluarga 2,5 kali lipat mempertinggi risiko distres (RRa = 2,47; P = 0,006), sedangkan penggunaan koping beragama mengurangi distres sebanyak 51% (RRa = 0,49; CI = 0,97-1,06; P = 0,051).

*Kesimpulan:* Jam terbang total 6000 jam atau lebih dan pertengkaran di keluarga mempertinggi risiko distres, sedangkan penggunaan koping agama menurunkan distres pada pilot sipil di Indonesia. (*Health Science Journal of Indonesia 2015;1:17-22*)

*Kata kunci:* pilot sipil, distres, jam terbang total, koping agama

### Abstract

**Background:** Distress can reduce awareness and interfere with decision making. The aim of this study is to identify the effect of total flight hours on the risk of distress among civilian pilots in Indonesia.

**Method:** This cross sectional study with purposive sampling was conducted on May 1-14, 2013 among civilian pilots undergoing medical check up at the Aviation Medical Center, Ministry of Transportation, Jakarta. SRQ-20 with cut-off point 5/6 was used to measure distress, along with self-rating and anonymous, coping strategy and home stressor check list questionnaire. Data were analyzed with Cox regression with constant time.

**Results:** Of 209 pilots 13.4% pilots had distress. Those with total flight hours of 6000-12999 hours compared to 59-5999 hours had 5.8-fold increased risk to be distress [adjusted relative risk (RRa) = 5.83; P = 0.000]. Meanwhile, those with total flight hours of 13000-29000 hours had 8-fold increased risk to be distressed. Those who had family tension had 2.5-fold increased distress risk (RRa = 2.47; P = 0.006). Meanwhile coping using religion could 51% decreased distress risk (RRa = 0.49; 95% CI = 0.97-1.06; P = 0.051).

**Conclusion:** Total flight hours of 6000 hours or more and tension in family increased distress risk, on the other hand, coping using religion decreased risk distress in civilian pilots. (*Health Science Journal of Indonesia 2015;1:17-22*)

**Key words:** civilian pilots, distress, total flight hours, religious coping mechanism

Distress can affect performance, health, and work productivity. The profession of civilian pilots has been classified as “veryhigh risk”withthe highest distress level.<sup>1</sup>

The risk factors that can affect distress include length of employment, license class, age, tension in family, flight hours etc.<sup>2-4</sup> Flight hours has been correlated with flying experienced and skill of the pilots.<sup>2</sup>

A prior study showed that total flight of 10,000 hours or more was a strong risk factor for job stress and emotional stress among airlines pilots and copilots in Indonesia.<sup>4</sup> Another risk factor of distress is length of employment. One study concluded that the longer the employment, the heavier the workload which could cause boredom and increased job stress.<sup>3</sup>

To minimize distress some action is required, called prevention of distress or coping strategy. There are two coping strategies: problem focused coping and emotion focused coping. One of the example of emotion focused coping is coping by seeking God’s help.<sup>5</sup>

The aim of this study was to identify the effect of total flight hours and other dominant factors on the risk of distress among civilian pilots in Indonesia.

## METHODS

This was a cross sectional study with purposive sampling conducted on May 1-14, 2013 on civilian pilots undergoing medical check up at the Aviation Medical Center, Ministry of Transportation, Jakarta.

The pilots filled the demographic and job data and answered the questionnaire about coping strategies, types of stressors at home, and Self Reporting Questionnaire-20 (SRQ-20). The questionnaire was self-rating and anonymous.

Distress was measured by Self Reporting Questionnaire-20 (SRQ-20) which consisted of 20 questions about the conditions for the last one month. The pilots answered yes or no for each of the question in SRQ-20, and the score was 1 for ‘yes’ and 0 for ‘no’. Therefore, the range of SRQ-20 score was 0 to 20.

This study used 5/6 as cut off point for eustress and distress. The pilots were categorized as distress if their ‘yes’ answers had 6 or more points on SRQ-20. On the contrary, if their ‘yes’ were less than 6 points, classified as eustress.<sup>6</sup>

Total flight hours were calculated from the first flying until the date of data collecting. The pilots who joined in this study had Private Pilot License (PPL), Commercial Pilot License (CPL) and Air Transport Pilot License (ATPL). The lowest total flight hours was 59 hours and the highest was 29000 hours. Total flight hours were categorized into 3 subgroups (0=59-5999 hours; 1=6000-12999 hours; and 2=13000-29000 hours).

The total length of employment was calculated from the first day of work at the airlines until the date of data collection. Total length of employment was categorized into 4 subgroups (0 = 1-10 years; 1 = 11-20 years; 2= 21-30 years; 3 = 31-42 years).

The age of the pilots in this study was calculated from the year of birth until the date of data collection. The youngest was 19 years old and the oldest was 62 years old. The age was categorized into 4 subgroups (0 = 19-34 years; 1 = 35-44 years; 2 = 45-54 years; 3 = 55-62 years).

The pilots filled the coping strategy questionnaire which consisted of 24 statements. The questionnaires were self rating and anonymous. The coping strategy was divided into 4 coping dimensions (active coping and planning consisted of 9 statements; denial coping and uncontrolled behaviour consisted of 6 statements; social support coping consisted of 6 statements, and turning to religion coping consisted of 3 statements). The pilots were given a score for each statement which ranged from 0 to 10. The lowest score was 0 and the highest score was 10.

The focus of this study was coping by turning to religion. The average was 8, so the cut-off point was 8. If the pilots used that coping frequently, then the score was between 9-10 but if rarely, the score was between 0-8.

The home stressor questionnaire consisted of 4 questions, such as the role in family described in 8 roles (the main source of family income, as father, husband, financial support to other family members, payer of various bills, gardener, home decorator, and as household repairmen); physical factors of house and environment (narrow, unsecure, flood and crowded); tension in family (low= a bit of dispute which can be openly discussed, moderate= some tension but can be tolerable, severe= high tension and hardly resolved). The pilots gave the answer by giving a tick (√).

Relative risk (RR) was used to calculate RR distress among civilian pilots with 95% confidence interval

(CI) based on the result of Cox regression analysis with the constant time.<sup>7</sup>

Ethical approval was obtained from the Research Ethical Commission of Faculty of Medicine University of Indonesia. The study was conducted upon approval by the Chief of the Aviation Medical Center.

## RESULTS

There were 612 pilots undergoing medical check-up within the 10 days. Only 217 pilots were willing to participate in this study. Six of them were excluded (2 students) and 4 female pilots. In addition, there were 2 incomplete questionnaires. Therefore, the total subjects available for this study were 209 pilots.

Table 1 showed that pilots with eustress and distress were similarly distributed in terms of race, marital status, license, and the training stress management. When compared to the respective references, pilots whose age on diagnosis was more than 34 years old, length of employment was more than 10 years, and CPL was more likely to have high distress.

Furthermore, Table 1 showed that pilots with length of employment of 21-30 years had 11-fold increase

to have distress, and among 31-42 years had 9-fold increase to have distress.

Table 2 showed that pilots with eustress and distress were similarly distributed with respect to the pilots' role in the family, the influence of physical factors of house and environment, the frequency of relaxation and praying coping. When compared to reference, pilots who rarely relax seemed to be more likely to distress. In addition, the pilots coping by seeking God's help were likely less likely to have distress ( $P=0.112$ )

Table 3 showed 3 dominant factors related to distress. Total flight hours and tension in family increased distress, while coping through religion decreased the risk of distress. Based on total flight hours, pilots with 6000-12999 hours of total flight had almost 6-fold increased risk of distress when compared to 59-5999 hours of total flight [adjusted relative risk (RRa)=5.83;  $P=0.000$ ], and among those with 13000-29000 hours of total flight had 8-fold increased risk for distress (RRa= 8.42;  $P=0.000$ ). Besides that, tension in family had 2-fold increased distress risk (RRa=2.46;  $P=0.006$ ). Meanwhile, coping using religion decreased the risk of distress by 51% (RRa=0.49; CI = 0.23-1.00;  $P=0.051$ ).

Table 1. Several demographic and occupation characteristics and the risk of distress

	Stress				Crude relative risk	95% confidence interval	P
	Eustress (n=181)		Distress (n=28)				
	n	%	n	%			
Age (years)							
19-34	100	95.2	5	4.8	1.00	Reference	
35-44	47	84.0	9	16.0	3.38	1.13-10.07	0.029
45-54	21	67.7	10	32.2	6.70	2.31-19.81	0.000
55-62	13	76.5	4	23.5	4.94	1.33-18.40	0.017
Race							
Asian	161	87.3	24	12.8	1.00	Reference	
Caucasian	20	83.3	4	16.7	1.28	0.45-3.72	0.643
Marital status							
Single	79	89.8	9	10.2	1.00	Reference	
Married	99	84.5	18	15.3	1.42	0.67-3.34	0.317
Divorce	3	75.0	1	25.0	2.44	0.31-19.29	0.396
Length employment							
1-10 (years)	120	96.7	4	3.2	1.00	Reference	
11-20 (years)	37	75.5	12	24.5	7.59	2.44-23.53	0.000
21-30 (years)	12	63.2	7	36.8	11.42	3.34-39.01	0.000
31-42 (years)	12	70.6	5	29.4	9.11	2.44-33.23	0.001
License*							
PPL	2	66.7	1	33.3	1.00	Reference	
CPL	94	96.0	4	4.1	1.20	0.01-1.09	0.060
ATPL	85	78.7	23	21.3	0.63	1.26-1.06	0.661
Stress training							
Ever	159	85.5	26	14.5	1.00	Reference	
Never	22	95.7	1	4.3	1.27	0.69-2.33	0.432

\*PPL= Private pilot license; CPL= Commercial pilot license; ATPL= Air transport pilot license

Table 2. Several stressors at home and religious coping strategy and the risk of distress

	Stress				Crude relative risk	95% confidence interval	P
	Eustress (n= 181)		Distress (n=28)				
	n	%	n	%			
Role in family							
Low	110	88.7	14	11.3	1.00	Reference	
Moderate	63	82.8	13	17.1	1.51	0.71-3.22	0.281
High	8	88.9	1	11.1	0.98	0.13-7.50	0.988
Physical factors at home							
Low	139	87.9	19	12.1	1.00	Reference	
Moderate	35	83.3	7	16.7	1.38	0.58-3.29	0.460
High	7	77.8	2	22.2	1.84	0.43-7.93	0.409
Relax time frequency							
Everyday	69	90.8	7	9.2	1.00	Reference	
Rarely	38	84.4	7	15.6	1.68	0.59-4.81	0.327
Almost never	74	84.1	14	15.9	1.72	0.69-4.27	0.238
Praying frequency							
Rarely	71	87.8	11	12.2	1.00	Reference	
Frequently	110	86.0	17	14.0	0.99	0.47-2.13	0.996
Coping by seeking God's help							
Rarely	72	82.2	16	17.8	1.00	Reference	
Frequent	109	90.1	12	9.9	0.55	0.27-1.15	0.112

Table 3. The relationship between risk factors and the risk of distress

	Stress				Adjusted relative risk	95% confidence interval	P
	Eustress (n=181)		Distress (n=28)				
	n	%	n	%			
Total flight hours							
59-5999	115	95.8	5	4.2	1.00	Reference	
6000-12999	46	79.3	12	20.7	5.83	2.17-15.62	0.000
13000-29000	20	64.5	11	35.5	8.42	3.24-21.85	0.000
Tension in family							
Low level	134	90.5	14	9.5	1.00	Reference	
Moderate level	45	77.6	13	22.4	2.46	1.29-4.68	0.006
Severe level	2	66.7	1	33.3	7.10	6.67-146.91	0.104
Religion coping							
Rarely	84	82.7	18	17.3	1.00	Reference	
Frequent	97	90.7	10	9.3	0.49	0.23-100	0.051

\*Adjusted relative risk each other between risk factors listed on this table

## DISCUSSION

The limitation of the study is related to the differences in perception of the questions in the questionnaire by the respondents. However, this was anticipated by giving clear explanations of the questions in the study to the pilots.

In this study, the questionnaire used was self-rating and anonymous to insure privacy and confidentiality for the pilots.

In this study, the percentage of Indonesian civilian pilots aged with an average age of 34 years with the total flight average of 5912 hours experiencing distress was about 13.4%. The figure was smaller than pilots in Iran. In the Iranian military, 95.5% pilots with an average age of 35 years and a total flight of 1441 hours showed job distress, 33.7% had mild distress, 48.3% exhibited moderate distress, and 13.5% was indicated with high distress.<sup>8</sup> The difference in percentage compared to the Iranian pilots may be due

to physical and environmental stressors experienced by military pilots were more complicated than civilian pilots. Other differences were the number of samples, which was only 87 in Iranian study, and the different distress questionnaire used.

A study of 55 Indian civilian pilots, 78% was found to be distressed with total flight hours of 450-12000.<sup>9</sup> There were less in this study of Indonesia pilots which was less in number. This might be due to the difference in the numbers of samples, the distress questionnaire used as instrument, and the openness of the pilots filling the questionnaires.

In this study, the peak age group with increased risk for distress was 45-54 years. This was partly due to physiological factors that decreased visual, thinking, memory and hearing abilities.<sup>10</sup> This age group also had increased burden of living as well as family and job responsibilities, which were also stressors.

This study revealed that pilots with a total flight of 6000-12999 and 13000-29000 hours had 6-fold and 8-fold, respectively, increase in the risk of distress compared to pilots with total flight of 59-5999 hours. This may be due to total flight hours and related to the pilot's experiences in flying the plane, their proficiencies, and aircraft incidents. Pilots who experience distress will lack concentration and vigilance in their work, which can have an impact on flight safety.

A study among airlines pilots and co-pilots in Indonesia revealed that pilots with a total flight of 10000 hours or more had increased emotional stress. This may be due to the need for high vigilance when on duty, and this accumulated vigilance could increase the risk of distress.<sup>4</sup> The more mature a pilot, the more flight hours he has accumulated during his work. According to Rheinhardt, 38 years are a safe years phase for pilots. At this stage, pilots have witnessed the flight incidents and deaths of co-workers which are psychological stressors for them.<sup>11,12</sup> In this study, the average age of the pilot is 34 years.

A previous study among military pilots in Iran found that higher of total flight hours lower stress level, especially in life stress, organizational stress, and task based stress. But it was different with physical stress in aviation environment, a higher of total flight hours correspond to a higher stress level in physical stress.<sup>5</sup>

Length employment should be positively correlated with flight hours and flying experienced, but this is certainly in contrary to the results of this study. The results of this study revealed that the length

of employment significantly increased the risk of distress (RR= 2.34-5.76; P=0.000) but it was not one of the dominant factors affecting the risk of distress, while flight hours was a dominant factor that affected the risk of distress. Based on these results, it can be concluded that pilots with long working periods were more exposed to stressors associated with organization and responsibility, while flight hours was more associated with physical aviation environment stress, such as hypoxia, take-off landings, humidity, etc.<sup>2</sup>

This study also showed that tension in family had 2-fold increased to the risk of distress (RRa=2.47; P=0.006). This was consistent with previous study on airlines pilots and co-pilots in Indonesia which showed that tension in family had a significant relationship with job stress and emotional stress.<sup>4</sup>

Quarrels in family can be caused by many things, such as financial problems and lack of communication with spouse. The accumulated quarrels not solved by the using of coping strategies, can cause distress. Another study showed that increasing stress at home which was unresolved could interfere with performance and job productivity.<sup>13</sup>

The average age of the pilot in this study was 34 years old. According to Erikson, people between 40-60 years were considered in middle adulthood, and they will prioritize and maintain good relationship with their family and spouse.<sup>14</sup> So, if at this stage there is lack of communication leading to failed relationship caused by quarrels with spouse or brother/sister, it can interfere with performance and increase the risk of increased distress. This study confirmed that moderate level of tension in the family can increase the risk of distress.

This study also showed that using religion as coping strategy will decrease the risk of distress. This may be caused by the feeling of restfulness and calm after praying.<sup>5</sup>

In conclusion, total flight of 6000 hours or more and tension in the family increased the risk of distress, on the other hand, using religion as coping strategy decreased the risk of distress in civilian pilots in Indonesia.

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