Flight time, number of sectors and risk of low back pain among short and medium haul commercial female flight attendants in Indonesia

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Abstrak

Latar belakang: *Nyeri pinggang bawah (NPB) sering dialami pramugari dan dapat membatasi tugas serta tanggung jawab pramugari. Tujuan penelitian ialah untuk mengetahui hubungan antara jam terbang dan faktor lainnya dengan NPB pramugari sipil penerbangan jarak dekat dan menengah di Indonesia.*

Metode: *Studi potong lintang dengan sampling purposif dilakukan pada pramugari sipil penerbangan jarak dekat dan menengah yang melaksanakan pengujian kesehatan di Balai Kesehatan Penerbangan tanggal 5-26 Mei 2014. Data demografi, pekerjaan dan NPB dikumpulkan dengan pengisian kuesioner dan pemeriksaan fisik. Definisi NPB ialah nyeri anamnesis yang pernah atau masih dirasakan pada pinggang bawah 1 bulan terakhir, non-neural, dan tidak terkait cedera akut yang tidak berhubungan pekerjaan. Analisis regresi Cox digunakan untuk mengidentifikasi faktor risiko yang berhubungan NPB.*

Hasil: *Di antara 333 pramugari yang melaksanakan pengujian kesehatan, 287 orang bersedia berpartisipasi, dan 240 di antaranya memenuhi kriteria inklusi. Sebanyak 37,9% pramugari menderita NPB. Faktor dominan yang mempertinggi risiko NPB ialah jam terbang dan jumlah sektor 24 jam terakhir. Pramugari dengan jam terbang 9 jam atau lebih dibandingkan dengan yang kurang dari 9 jam berisiko 82% lebih tinggi mengalami NPB [risiko relatif suaian (RRa) = 1,82; p = 0,000]. Ditinjau dari jumlah sektor 24 jam terakhir, pramugari dengan 4 sektor atau lebih dibandingkan yang kurang dari 4 sektor berisiko 53% lebih tinggi mengalami NPB (RRa = 1,53; p = 0,034).*

Kesimpulan: *Jam terbang 24 jam terakhir selama 9 jam atau lebih dan jumlah sektor sebanyak 24 jam terakhir 4 sektor atau lebih meningkatkan risiko NPB.* ***(Health Science Journal of Indonesia 2016;7:64-8)***

Kata kunci: *nyeri pinggang bawah, pramugari, jam terbang, jumlah sektor*

Abstract

Background: Low back pain (LBP) often experienced by flight attendants could limit their duties and responsibilities. Aim of this study was to determine the correlation between flight time and other factors with LBP among short and medium haul commercial female flight attendants in Indonesia.

Methods: Cross-sectional study with purposive sampling among short and medium haul commercial female flight attendants who conducting medical examination on May 5-26th 2014 at Civil Aviation Medical Center. Demographic, job and LBP data collected using questionnaire and physical examination. Definition of LBP was historically pain that ever or still felt in lower back in the last month, non-neural, and no non-working related acute injury. Cox regression analysis used to identify risk factor associated LBP.

Results: Among 333 female flight attendants who were conducting medical examination, 287 attendants willing to participate, and 240 meet inclusion criteria. There are 37.9% flight attendants experienced LBP. The dominant factors increasing LBP risk were flight time and number of sectors in the last 24 consecutive hours. Female flight attendant with 9 hours or more flight time compared with less have 82% higher LBP risk [adjusted relative risk (RRa) = 1.82; p = 0.000]. Review from number of sectors in the last 24 consecutive hours, female flight attendant with 4 sectors or more compared with less have 53% higher LBP risk (RRa = 1.53; p = 0.034).

Conclusion: Nine hours or more flight time and 4 sectors or more in the last 24 consecutive hours have higher risk of LBP. ***(Health Science Journal of Indonesia 2016;7:64-8)***

Key words: low back pain, female flight attendant, flight time, number of sectors, short and medium haul flight

Low back pain is the leading cause of activity limitation, work absence, and an enormous economic burden on individuals, families, communities, industry and governments.[1] The lifetime prevalence of low back pain is reported to be as high as 84%, with 11-12% of the population being disabled by it.[2] Of special importance for flight safety is the sudden, and many times unpredictable, occurrence of acute attacks of pain,[3] which may result cabin crew may not be able to provide appropriate cabin services, but also their awareness of abnormal situations and response ability will be weakened, and this may render potential lethal risks to flight safety.

In United States (U.S.) flight attendants, the lower-back was shown to be the body region most commonly affected by musculoskeletal disorders, as high as 85,9%.[4] Up to 52% of total direct workers' compensation claim among Canadian flight attendants related to low back problem.[5] Result of study in U.S. long haul female flight attendants was no statistically significant differences were found between flight attendants with or without low-back pain on years of service as a flight attendant, flight hours, number of sectors, and body mass index.[6]

Flight time and number of sectors for cabin crew have not been regulated in the Civil Aviation Safety Regulations part 121. Prevalence of low back pain on the flight attendants in Indonesia is unknown. Indonesia is an archipelagic Island country, causing short and medium flight dominates. The aim of this study was to examine correlation of flight time, other risk factors and low back pain among short and medium haul commercial female flight attendants in Indonesia.

METHODS

This study used cross-sectional design with purposive sampling among short and medium haul commercial female flight attendants who conducting medical examination on May 5-26th 2014 at Civil Aviation Medical Center. The data was collected by subject answering structured questionnaire and measurement of body weight and height by researcher.

Subjects in this study were (1) commercial female flight attendants who are still on active flight duty on the airline in Indonesia; (2) age 19-45 years old; (3) short-haul flight operation (with flight times of less than 2 hours) or medium-haul flight operation (flight times between 2 and 6 hours).[7]

Low back pain were defines as historically pain that ever or still felt in lower back in the last month. This was determined by a modified single question with a yes/no response and a body map derived from Nordic Musculoskeletal Questionnaire,[8] which was done by the study before.[6] The positif low back pain cases in this study were answering "Yes" from that single question, but no non-work related acute injury (e.g., motor vehicle accident, sports, home accident) and non-neural origin.

Flight time in the last 24 consecutive hours were the total elapsed time from the moment the aircraft first moves under its own power for the purpose of take off, until the time it comes to rest at the end of the flight with limit for 24 consecutive hours on the last flight duty before the subjects filling out the questionnaire (1-8 hours, 9-14 hours). While number of sectors were total number of flight which has a take-off and landing at different airports which are not less than 50 nautical miles apart 24 consecutive hours on the last flight duty before the subjects filling out the questionnaire (1-3 sectors, 4-8 sectors).

A number of confounders categorized into: age (19-29 years, 30-39 years, 40-44 years); educational level (bachelor, diploma, high-school); marital status (single, married, separated); height (158 cm-164 cm, 165-174 cm); body mass index (normal 18,5-24,9 kg/m^2, underweight < 18,5 kg/m^2, overweight 25-29,9 kg/m^2); leisure time physical activity (nothing, light, moderate, high); smoking status (never, stopped, current); years of service (1-5 years, 6-9 years, 10-24 years); frequency of luggage lifting per flight (2-5 times, 6-10 times, 11-12 times).

The research protokol was approved by Research Ethical Commission of Faculty of Medicine Universitas Indonesia and undertaken upon approval by the Chief of the Civil Aviation Medical Centre.

Research analysis using Cox regression with a constant time to calculate the relative risk (RR) for low back pain. Calculations using STATA version 9. Results were considered statistically significant at a 5% ($P < 0.05$) significance level.

RESULTS

In making interpretations of this study need to be considered: purposive sampling in a short time, and subjectivity because no special physical examination for the diagnosis of low back pain. In this study, low back pain caused by musculoskeletal system and the study was performed on short and medium haul commercial female flight attendants only.

During the 16 days of the study there were 333 female flight attendants who perform periodic health examination in Civil Aviation Medical Center. A total of 287 female flight attendants are willing to participate in this study and of whom 47 people were excluded for analysis. From 240 short and medium haul commercial female flight attendants that fit the inclusion criteria there were 91 attendants having low back pain.

Table 1 shows that both the female flight attendants with and without low back pain similarly distributed by age, education level, marital status, height, body mass index and leisure time physical activity. Female flight attendants who are still smoking compared with never smoking appears to have a higher risk of having low back pain.

Table 2 shows that both the female flight attendants with and without low back pain similarly distributed on years of service and frequency of luggage lifting per flight.

Table 3 shows that the two dominant factors (flight time and the number of sectors in the last 24 consecutive hours) correlate with the risk of low back pain. Female flight attendant with 9 hours or more flight time in the 24 consecutive hours had a 82% higher probability of experiencing low back pain compared with less than 9 hours. While 4 sectors or more in the last 24 consecutive hours had a 53% higher probability of experiencing low back pain compared with less than 4 sectors.

Table 1. Several socio demographic, health behavior characteristics and risk of low back pain

	Low back pain				Crude relative risk	95% Confidence interval	P
	No (n = 149)		Yes (n = 91)				
	n	%	n	%			
Age							
19-29 years	124	63.6	71	36.4	1.00	Reference	
30-39 years	23	56.1	18	43.9	1.21	0.72-2.02	0.478
40-44 years	2	50.0	2	50.0	1.37	0.33-5.60	0.668
Education level							
Bachelor	14	58.3	10	41.7	1.00	Reference	
Diploma	17	48.6	18	51.4	1.23	0.57-2.67	0.594
High-school	118	65.2	63	34.8	0.84	0.43-1.63	0.597
Marital status							
Single	124	63.9	70	36.1	1.00	Reference	
Married	19	51.4	18	48.6	1.35	0.80-2.26	0.258
Separated	6	66.7	3	33.3	0.92	0.29-2.93	0.893
Body weight							
43-53 kg	66	64.7	36	35.3	1.00	Reference	
54-68 kg	83	60.1	55	39.9	1.13	0.74-1.72	0.571
Body height							
158-164 cm	86	65.2	46	34.8	1.00	Reference	
165-174 cm	63	58.3	45	41.7	1.20	0.79-1.80	0.394
Body mass index							
Normal	132	63.8	75	36.2	1.00	Reference	
Underweight	16	53.3	14	46.7	1.29	0.76-2.38	0.385
Overweight	1	33.3	2	66.7	1.84	0.46-7.57	0.395
Leisure time physical activity							
Heavy	8	61.5	5	38.5	1.00	Reference	
Moderate	45	70.3	19	29.7	0.77	0.29-2.07	0.606
Light	48	53.9	41	46.1	1.19	0.47-3.03	0.703
Nothing	48	64.9	26	35.1	0.91	0.35-2.38	0.853
Smoking status							
Never	112	65.9	58	34.1	1.00	Reference	
Stopped	16	55.2	13	44.8	1.31	0.72-2.40	0.374
Current	21	51.2	20	48.8	1.43	0.86-2.38	0.168

Table 2. Several work related factors and risk of low back pain

	Low back pain				Crude relative risk	95% Confidence interval	P
	No (n = 149)		Yes (n = 91)				
	n	%	n	%			
Years of service							
1-5 years	107	62.2	65	37.8	1.00	Reference	
6-9 years	21	60.0	14	40.0	1.06	0.59-1.89	0.847
10-24 years	21	63.6	12	36.4	0.96	0.529-1.78	0.902
Frequency of luggage lifting per flight							
2-5 times	101	63.9	57	36.1	1.00	Reference	
6-10 times	29	56.9	22	43.1	1.19	0.73-1.95	0.476
11-12 times	19	61.3	12	38.7	1.07	0.58-2.00	0.824

Table 3. Relationship between flight time in the last 24 consecutive hours, number of sectors in the last 24 consecutive hours and risk of low back pain

	Low back pain				Adjusted relative risk*	95% Confidence interval	P
	No (n = 149)		Yes (n = 91)				
	n	%	n	%			
Flight time in the last 24 consecutive hours							
1-8 hours	131	68.9	59	31.1	1.00	Reference	
9-14 hours	18	36.0	32	64.0	1.82	1.34-2.46	0.000
Number of sectors in the last 24 consecutive hours							
1-3	74	74.0	26	26.0	1.00	Reference	
4-8	75	53.6	65	46.4	1.53	1.03-2.26	0.034

*Adjusted each other between variables listed on this table

DISCUSSION

This study found 91 (37.9%) short and medium haul commercial female flight attendant experiencing low back pain. This is lower than U.S. long-haul female flight attendant where 85.9% of those experiencing low back pain.[4] The difference is caused by the difference in determined the kriteria for diagnosis. In that study, the diagnosis was low back pain in the last 12 months regardless of the cause so that the estimated prevalence is higher. Long-haul flight attendant is known to have risk of low back pain greater that short-haul flight attendant.[9]

Our research shows that 9 hours or more flight time in the last 24 consecutive hours had higher low back pain risk when compared with less than 9 hours flight time in short and medium haul commercial female flight attendantS. Similar result were not obtained in study conducted on U.S. long-haul female flight attendants, which no statistically significant differences were found between flight attendants with or without low-back pain on flight time.[6] On long-haul flights, the flight is only done 1 time a day with more than 6 hours flying per segment and was followed by a break at least 24 hours.

The longer flight hours on short and medium haul flight attendant, more and more physical loading is done. In Galipault study, 27.6% of flight attendants thought seven-nine hours the duty length induced tiredness. This study also found that short duration flights with beverage or snack service produce large increases in end-of-duty fatigue.[10] Ono's study on Japanese flight attendant found that the flying hours 9 hours or more shown to correlate with stress and fatigue symptoms include low back pain.[11]

Low back pain on the flight attendant can be related to physical burden associated with their work tasks, including manual material handling (for example, long standing and frequent bending).[5] In Morley and Griffiths's study, high workload demands were reported by 83% of flight attendants.[12] In another workload-related study with 118 female flight attendants, the total average number of steps taken per flight attendant during flights of an approximate duration of 10.6 hours was 10,742.8, or 14.0 steps/min.[13]

Other risk factors were significantly related to lower back pain in this study is the number of sectors in the last 24 consecutive hours. In this study, female flight attendant with 4 sectors or more in the last 24 consecutive hours had higher risk of low back pain compared to less than 4 sectors. Similar result were not obtained in the study conducted on U.S. long-haul female flight attendant, which no statistically significant differences were found between flight attendants with or without low-back pain on flight.[6]

Short and medium haul flight crew work with more often take off and landing. On each flight there are working cycle begin of the entry of passengers to the aircraft, passenger seat, baggage storage, passenger briefing, distribution of food and beverages, cleaning up, preparation for landing, and clearing the passengers off the plane, to be completed on each sector down the route. In long-haul flight operation, there is only one full cycle to be completed each rostered duty period. Therefore it takes recommendations to the airline and Civil Aviation Medical Center regarding flight time and sector number in the last 24 consecutive hours regulation for the cabin crew.

Overweight appears to increase the risk of low back pain compared with normal body mass index flight attendants but not significantly correlated. This may occur because slightly number of overweight flight attendants.

It is also seen on the risk factors of smoking, where smoking appears to increase the risk of low back pain compared with non-smoking flight attendants but it is not significantly correlated. Little female flight attendants who are still smoking.

Lifting luggage did not correlate significantly with risk of low back pain. This happen because the weight of passengers luggage only about 7 kg and if necessary, the flight attendants will lift the luggage with the other.

In conclusion, 9 hours or more flight time and 4 sectors or more in last 24 consecutive hours increased the risk of low back pain.

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REFERENCE

1. Krismer M, Tulder M. Low back pain (non-spesific). Best Pract Res Clin Rheumatol. 2007;21:77–91.
2. Hoy D, Brooks P, Blyth F, Buchbinder R. The Epidemiology of low back pain. Best Pract Res Clin Rheumatol. 2010;24:769–81.
3. Doc 8984. Manual of Civil Aviation Medicine. Third edition. International Civil Aviation Organization (ICAO); 2012.
4. Lee H, Wilbur J, Conrad KM, Mokadam D. Work-related musculoskeletal symptoms reported by female flight attendants on long-haul flights. Aviat Space Environ Med. 2006;77:1283–7.
5. Logie A, VanDerDoe L, Ryan A. Musculoskeletal injury prevention project: Report on the flight attendant group. 1998. Available on: http://www.worksafebc.com/about_us/library_services/reports_and_guides/wcb_research/assets/pdf/97FS-35.pdf
6. Lee H, Wilbur J, Kim MJ, Miller AM. Psychosocial risk factors for work-related musculoskeletal disorders of the lower-back among long-haul international female flight attendants. J Adv Nurs. 2008;61:492–502.
7. Yen J-R, Hsu C-C, Yang H, Ho H. An investigation of fatigue issues on different flight operations. J Air Transp Manag. 2009;15:236–40.
8. Kuorinka I, Jonsson B, Kilbom a, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987;18:233–7.
9. Haugli L, Skogstad A, Hellesøy OH. Health, sleep, and mood perceptions reported by airline crews flying short and long hauls. Aviat Space Environ Med. 1994;65:27–34.
10. Galipault JB. A study of airline flight attendant sleepiness, fatigue and stress (Rep. No. 80-2). Worthington, OH: The Aviation Safety Institute. 1980.
11. Ono Y, Watanabe S, Kaneko S, Matsumoto K, Miyao M. Working hours and fatigue of Japanese flight attendants. J Human Ergol. 1991;20:155-64.
12. Morley-Kirk J, Griffith A. Cabin crew work stres. International Research 2003. Available at www.workstress.net/downloads/CCWS%202003%20summary.pdf
13. Hagihara A, Tarumi K, Nobutomo K. The number of steps taken by flight attendants during international long-haul flights. Aviat Space Environ Med. 2001;72:937-39.