

Health problems in passengers undertaking long-haul flights – **JET LAG**

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ABSTRACT

Millions of people choose to travel by plane what may result in jet lag disorder associated with circadian rhythm misalignment. The severity of jet lag symptoms is emphasized in the second and next days after arrival, however there is a possibility of the occurrence of jet lag in the first hours after landing which is the subject of this paper

KEYWORDS: jet lag, symptoms of jet lag, predictors of jet lag

1. Introduction

Every year millions of people choose to travel by plane, what can be associated with long distance flights over one or more continents. The reports of the International Organization of Tourism from 2006 show that the long distance flights were chosen by 45% out of almost 850 millions of travelers, and it is estimated that by the year 2020 this number could double. These multiply time zone flights may lead to a constellation of symptoms known as jet lag disorder [1,2,12,13]. These symptoms include general malaise, reduced alertness, nighttime insomnia, depressed mood, poor psychomotor coordination, reduced cognitive skills and gastrointestinal disorders, which all are due to circadian rhythm misalignment [7,8,11]. Although jet lag is most of time benign, sometimes unfortunate and serious consequences can result from jet lag (untoward business, diplomatic or military decisions) [10]. The research among staff cabin crew showed that frequent and repeatable changes of time zone could be associated with menstrual cycle disturbance and may also exacerbate any existing affective disorder, which weren't noticed among healthy people changing time zones less frequently [6].

Furthermore, it was shown that chronic jet lag increases the danger of having hormone dependent and hormone independent cancer among men and women alike [3-5].

In essence jet lag syndrome is a consequence of circadian misalignment that occurs after crossing three or more time zones too rapidly for the circadian system to keep pace. Literature emphasizes the severity of jet lag symptoms in the second and next days after arrival, however there is a possibility of the occurrence of jet lag even in the first hours after landing.

It is said that the adaptation process to the new time zone should last as many days as many time zones have been crossed – 2-3 days minimum when it comes to the journey in eastern direction, but if the flight was in the western direction – this process should last half the number of the crossed time zones [1, 2].

2. Goals

The main aim of this paper was to define the early symptoms of jet lag in travelers crossing seven time zones in the western and eastern direction, and also to examine the differences in the occurrence of the symptoms in the

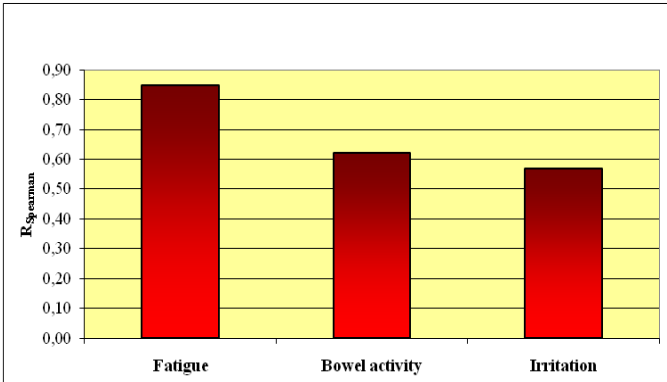


Fig. 1. Components of jet lag
Source: [own work]

people travelling on the same routs, but in the opposite direction, the impact of some variables and conditions on the early jet lag and last but not least, the knowledge of travelers about jet lag.

3. Material and methods

The research method used in this study was a self-generated questionnaire, which was divided into two parts. The first part enabled a general characteristic of the respondents (age, gender, nationality), and the second one involved questions concerning the problem of the research. The questionnaire was prepared in Polish and English regarding the multinationality of the respondents.

In order to verify the hypothesis, there were 175 subjects, divided into three subgroups, who could evaluate subjective severity of jet lag using visual analogue scale. 36 questionnaires were given to travelers flying from Chicago to Cracow, waiting in the luggage reclaim area (option A). The next group of 83 respondents were people traveling from Chicago to Warsaw (option B) and 57 from Warsaw

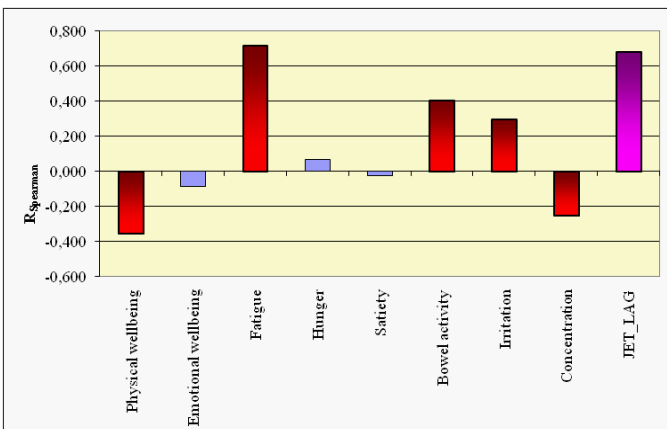


Fig. 1. Correlation between jet lag and its symptoms
Source: [own work]

to Chicago (option C), who were given the questionnaires during the last 30 minutes of the flight.

Standard statistical methods were used to investigate and describe the results.

4. Results

Based on the results a stepwise regression analysis was used to investigate the predictors and the early symptoms of jet lag.

The data showed, that the significant components of jet lag are fatigue, gastrointestinal disturbance and irritation (fig. 1).

Those symptoms, together with physical well-being and the ability to concentrate, also have a strict correlation with the evaluation of the severity of jet lag disorder (fig. 2).

After verifying the impact of such variables as the option of the questionnaires, sex, age, awareness of jet lag, we discovered that only the option A of the questionnaires has a significant, adverse influence on early symptoms of jet lag (fig. 3). The average sensation of jet lag disorder in this case was 4,306 and it was almost two times higher than other variables. So it turned out, that the place and the conditions in which the questionnaires were conducted had a significant influence on the results and they varied for different options of questionnaire.

5. Discussion

Along with the rising interest in transcontinental journeys, the risk of the occurrence of jet lag syndrome also becomes bigger. In order to minimize the jet lag disorder it is indispensable to inform the travelers about the pathophysiology of jet lag. This research showed, however, that the awareness of travelers about jet lag is insufficient

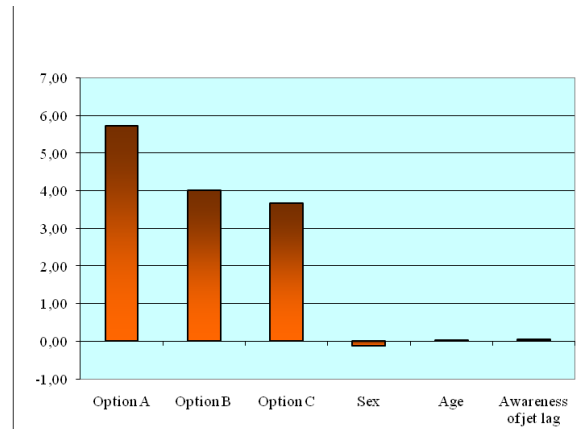


Fig. 3. Variables influencing jet lag
Source: [own work]

– more than 44% of travelers is unaware of the existence of jet lag phenomenon.

The rising interest in travelling contributed to conducting research dealing with jet lag, nevertheless they focus on the symptoms occurring in the second and next days after reaching one's destination. However, the knowledge of the early occurrence of jet lag is insufficient, therefore this paper deals with this particular topic.

The conducted research showed that the place and conditions in which the questionnaire was filled in had a significant influence on the results which vary for different variants of questionnaire. It was shown that only variant A of the questionnaire (flight Chicago – Cracow) had a significant influence on the early sensation of jet lag. This is the only variant which was conducted straight after the arrival, in the baggage reclaim area, where the travelers had for the first time contact with the external factors which could cause desynchronization of the internal body clock. Moreover, waiting for the luggage had a stressful influence on the respondents, what could be observed in their reluctance and irritation, and even in aggressive attitude towards the pollsters.

The variant C (flight Chicago – Warsaw) and variant B (flight Warsaw – Chicago) of the questionnaire turned out to be statistically irrelevant. The questionnaires were distributed among the travelers on the plane during the last 30 minutes of the flight (no contact with the external factors) and it showed that the difference in the degree of the sensation of the early jet lag symptoms in people travelling on the same route, but in the opposite direction is statistically irrelevant.

Summing up, it can be observed that the first symptoms of jet lag can occur as soon as in the first hour after landing, what was also pointed out by Waterhouse in his publications. The research also proved that fatigue, gastrointestinal disorders and moodiness are relevant in estimating early jet lag.

The research done by Marks showed that subjective tiredness could be felt in the fifth hour of the flight [9]. Our own research showed however, that the degree of the severity of tiredness during the flight is an early jet lag symptom of little significance, what corresponds with Waterhouse report, who recognized tiredness as a characteristic factor of later sensation of jet lag [12, 13].

Gastrointestinal problems are the next factor correlating with jet lag, what remains in opposition to other publications, which don't seem to see much relation between abdominal disorders and jet lag and they consider it as an irrelevant jet lag variable [12, 13]. Taking into account conversations conducted with the passengers at the airport in Cracow – Balice, it is evident that the high significance of this variable could be connected with the occurrence of constipations which could result from lack of movement

for a long period of time, and diarrhea resulting from stress connected with flight. Moreover, travelers could suffer from nausea and vomiting caused by air sickness.

In the literature the relation between the stage of irritation varies from irrelevant to significant [12, 13]. Self-done research showed a significant impact of early jet lag on irritation. It may be associated with the place and conditions, in which the questionnaires were conducted. According to Spearman's rank there is a strict correlation with self-assessment of all the above-mentioned variables and also additionally with physical well-being and concentration, what corresponds with other research, which proved that the ability to concentrate is the second factor (along with fatigue) strongly connected with jet lag syndrome.

6. Conclusions

In conclusion, the current study showed that the significant predictors of early jet lag are fatigue, bowel movement and moodiness. There is a correlation between subjective effects of jet lag and physical well-being, fatigue, gastrointestinal disturbance, concentration and irritation. The study also revealed that more than 40% of the respondents have never heard of jet lag syndrome. A proper education of passengers concerning jet lag seems to be an important issue in the reduction of its symptoms.

Bibliography:

- [1] BROWN G.M, et al.: Melatonin and its relevance to jet lag. *Travel Med Infect Dis* 2009; 7: 69-81
- [2] COSTE O, LAGARDE D.: Clinical management of jet lag: What can be proposed when performance is critical? *Travel Med Infect Dis* 2009; 7: 82-87
- [3] DAVIDSON A, et al.: Chronic jet-lag increases mortality in aged mice. *Curr Biol* 16; 21
- [4] FILIPSKI E, et al.: Effects of Chronic Jet-Lag on Tumor Progression in Mice. *Cancer Res* Nov 2004; 64: 7879-7885
- [5] FILIPSKI E, XIAOI MEI LI, LEVI F.: Disruption of circadian coordination and malignant growth. *Cancer Causes Control* 2006; 17: 509-514
- [6] LAHTI T, et al.: Field trial of timed bright light exposure for jet lag among airlines cabin crew. *Int J Circumpolar Health* 2007; 66; 4: 365-369
- [7] LELOUP J, GOLDBETER A.: Modeling the circadian clock: from molecular mechanism to physiological disorders. *BioEssays* 30: 590-600
- [8] LU B, ZEE P. Circadian rhythm sleep disorders. *Chest* 2006; 130: 1915-1923

- [9] MARKS E, ZUŻEWICZ W, CHRZANOWSKI J. Praca wielozmianowa i w warunkach przekraczania strefy czasu. Badania ankietowe. *Med. Pr* 1982; 33: 1-3
- [10] REILLY T, WATERHOUSE J, EDWARDS B. Some chronobiological and physiological problems associated with long-distance journeys. *Travel Med Infect Dis* 2009; 7: 88-101
- [11] SACK R.L. The pathophysiology of jet lag. *Travel Med Infect Dis* 2009; 7: 102-110
- [12] Waterhouse J, et. all.: Further assessments of the relationship between jet lag and some of its symptoms. *Chronobiol Int* 2005; 22(1): 121-136
- [13] Waterhouse J, et. all.: Jet lag: trends and coping strategies. *Lancet* 2007; 369: 1117-1129