Editorial
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Influence of Sleep Disorders and Fatigue over Aircrew

Costa Filho PSS[1] and Missoni E[2]*

[1]São Carlos School of Engineering, University of São Paulo, Brazil

[2]Faculty of Transport and Traffic Sciences, University of Zagreb, Croatia

Editorial

The performance of aircrew is subject to multiple factors that may interfere with human alertness, cognitive functions, and the ability to make tough decisions. The workload and flight routines of aircrew make them subject to sleep disorders and excessive fatigue that may compromise their dexterity and, consequently, their life quality and the safe and secure aircraft operation. Despite the availability of pharmacological and adaptive solutions, preventing exhaustive workloads in an approach already done by some nations that should be an example to others.

The Circadian System is the human body's natural clock and marks the passage of approximately 24 hours. It aligns our biological time to the 24-hour pattern of light and dark, driving or altering behaviors such as sleep patterns, alertness, mood, physical strength and blood pressure. These changes are more notable on our metabolism during waking up and sleeping periods [1].

The International Classification of Sleep Disorders has one of its classifications used to understand the biology of Circadian Rhythms related to presented symptoms. Currently, there are six distinct specified Circadian Rhythm Sleep-Wake Disorders (CRSWDs) recognized internationally: delayed sleep-wake phase, advanced sleep-wake phase, irregular sleep-wake rhythm, non-24h sleep-wake rhythm, jet lag and shift work disorders [2].

The last two quoted disorders are of greater interest to our studies because aircrew is more subject to them [3]. Shift work disorder is applied to a broad range of non-standard work schedules, from occasional overnight duty, to rotating schedules and to permanent night work or early awakening schedules. The jet lag disorder is the inevitable consequence of crossing time zones too quickly for the circadian rhythm to adapt. The intensity of this disorder is related to the number of time zones crossed, the direction of travel, the ability to sleep while traveling, the availability and intensity of local circadian time cues and individual differences in phase tolerance [4].

Jet lag sleep disorder is the desynchronization of the circadian rhythm due to the rapid crossing of time zones. Resynchronizing the circadian rhythm is more rapidly done when traveling westward than eastward, since the circadian period is just over 24h long and in such case a phase delay adaptation is needed [5].

As other sleep disorders, the basic symptoms of jet lag are irregular sleepiness (less sleepiness during nighttime and more during daytime), reduced alertness and concentration, impaired performance, fatigue and depressed mood. They are explained by the circadian rhythm being still synchronized to the origin's time zone, which can be corrected by gradually changing the sleep times at the destination to re-entrain the circadian system [6].

It is, however, important to note that such adjustment is not always recommended. Should a person stay at the destination for a short time, readjusting the circadian rhythm more than once during a short period might impose chronic internal desynchronization. As it is for most aircrew, a nap strategy or a light pharmacological aid should be useful solutions [5].

The sleep and wake cycles of aircrew is also compromised by their flight duties. Shift work disorders are noticed with early and late flights and with overnight routes, resulting in circadian rhythm desynchronization symptoms already listed. Since, opposing to passengers, the number of aircrew per airplane has been decreasing, the unfavorable work shifts are not evenly distributed in order to avoid high workloads [7].

It has been researched by Marqueze et al. [7] that day shift work tends to start before 6 a.m. and later shifts end after 10 p.m., which accounts for over 60% of the factors that may cause fatigue amongst pilots.

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*Correspondence:
Costa Filho PSS, São Carlos School of Engineering, University of São Paulo, Avenida Trabalhador São-carlense 400, São Paulo, Brazil.
Tel: +385-95-5338-482
E-mail: paulo.sucasas.filho@usp.br

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The effect of short haul flights was also addressed by Bourgeois-Bougrine et al. [8]. The effect of morning flights over afternoon flights was of much high sleepiness when getting up almost at the level of when going to sleep. The high amount of aircraft movements increases work time outside of the airplane and, consequently, workload. Sleepiness and multiple types of fatigue were also evaluated, showing that they are higher in morning flights and would greatly increase after the third afternoon flight.

Regulation of aircrew workload is done by the International Civil Aviation Organization (ICAO) regarding flight time and duty time, with the second criteria including grounding time before and after flights or between flight segments. Some states also take into account Time of Day, Time Zones and Night Flying into account.

As examined by Missoni et al. [9], there are still many ICAO member states that don't address factors that were shown by researches to be of considerable influence to aircrew fatigue and possible causes for the development of sleep disorders. Out of the 10 states analyzed, 8 would consider the whole duty time as a factor and 6 had the number of flight segments, but only 2 would consider the time of day and 3 would consider times zones and night flying.

Aircrew in general are subject to shift work disorders, since multiple flights nowadays have early departure times, late arrival times or are operated overnight. When summed with jet lag resulting from intercontinental flights, aircrew awareness and awakeness are compromised. Close attention must be paid to this, seeking to optimize the work shifts to allow natural correction of these disorders. Proper regulation from the national agencies is advised and must be enforced for measures to take place at the largest range of subjects. Should it be necessary, treatments include hypnotic or stimulant medication are also recommended to help patients achieve their desired sleep cycles.

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