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INFLUENCE OF AGE AND GENDER ON JET-LAG SYNDROME : RECOMMENDATIONS

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• ABSTRACT

Jet-lag syndrome in civilian flight personnel is quite well known. In Air Force crews, especially during long-haul flights, jet-lag is associated with sleep deprivation and a specific environment. In this communication, we present some results of a real world experiment (simulation of troops deployment) after a transmeridian flight in which we evaluated notably the influence of age and gender in this kind of jet-lag. In our population, composed of 27 US Air Force reservists, males and females from 19 to 46 years old, we did not find any important differences due to age and/or gender. Only subjective data, recorded from Sleep Log, presented statistical differences. Nevertheless in the global population the jet-lag induced disturbances in 33% of the studied parameters.

Some physiological and/or pharmacological recommendations are done.

• INTRODUCTION

A lot of civilian and also military people, especially pilots during long-haul flights, suffer from jet-lag syndrome. Symptoms are different during military flights, for example during a troops deployment. Before studying effects of this particular type of jet-lag and evaluating the influence of age and/or gender, we would like to start with a brief summary of the jet-lag syndrome. We will continue with an example of jet-lag syndrome in a military situation, and conclude with few recommendations.

• JET-LAG SYNDROME

The signification of jet-lag is : "Jet engine airliner time lag syndrome". The clinical symptoms observed are due to rapid and repeated transmeridian flights (more than 4 hours) (2).

The symptoms could be divided in acute and chronic effects. The first effects are composed of sleep disturbances with nocturnal insomnia and diurnal drowsiness, reduction of physical and cognitive performances, digestive disturbances ; subjects feel a sensation of discomfort, they are sometimes irritable. The flying personnel could present chronic effects of jet-

lag too, such as gastric ulcers, intestinal disorders, chronic fatigue with insomnia and sometimes a nervous breakdown.

The jet-lag etiology is not well known. Three aspects are concerned : the fatigue due to travel (seen also in north-south flights), the slowness and irregularity to adjust endogenous rhythm to new local hour (at least the sleep deprivation) and the capacity to react to this troubles by sleep recovery.

• VARIABILITY PARAMETERS OF JET-LAG SYNDROME

Individual parameters	Environmental parameters
- Age	- Flight direction
- Gender	- Noise and temperature levels
- Big and small sleepers	- Conflict intensity
- Morningness and eveningness type	- Bedding
- Sensitivity to sleep deprivation	- Psychosocial environment

Generally we can distinguish individual parameters and environmental parameters.

It is usual to say that age and sometimes gender have an influence on jet-lag effects. There is also a difference between big and small sleepers (*i.e.* subjects who sleep 5 hours per night and those who sleep 9-10 hours). The morningness and eveningness type, the sensitivity to sleep deprivation seem to be important too (1, 2).

The most famous environmental parameter is the flight direction : generally an eastbound flight is more penalizing than a westbound flight (1). Noise, temperature levels and bedding are important too. At least the intensity of the conflict and the psychosocial environment, especially during a military operation, are some very important parameters.

• "PEGASUS OPERATION" : Experimental protocol

(During the oral presentation, a movie of 15 minutes about the protocol of PEGASUS OPERATION was showed)

To illustrate effects of jet-lag and especially the influence of age and/or gender, we present some results

from a real world experiment called "PEGASUS OPERATION". It is an example of troops deployment which induces jet-lag and limited sleep deprivation. This situation provokes fatigue and a decrease of vigilance and performance.

It was an original collaboration between french Air Force, US Air Force, IMASSA (Institut de Médecine Aérospatiale), Armstrong Laboratory and NESTLE Company.

This unique experiment included 3 military planes (KC 135), 60 people were involved. A jet-lag of 7 hours was due to a transmeridian flight between San Antonio (USA) and Mont de Marsan (France), in an operational setting with a representative population (27 healthy subjects, males and females, reservists from US Air Force).

During this experiment we evaluated the subjective and objective vigilance, the physical and cognitive performances, hormonal proportions, and some physiological parameters, *i.e.* 140 parameters.



Measure of physical static performance with Grip test on an US Air Force reservist (Pegasus Operation)

These parameters were evaluated during two periods of tests, one on mornings (between 0900 and 1200) and another one on afternoons (between 1400 and 1700) and were recorded before the flight (reference period during 2 days) and after the flight (recovery period during 10 days). Each period included : MSLT, VAS, Sleep Log, CFFF, Attention test, STRES battery, Grip test, Jump test and a clinical examination. Other parameters were evaluated at different moments of the day or the night : temperature, actimetry, VAS (during the flight), EEG, salivary samples (cortisol, melatonin, caffeine).

In this protocol, we compared three situations : placebo versus melatonin versus slow release caffeine (a new galenic form of caffeine : STINERGIC®).

In this paper we interest only in placebo group.

• MAIN RESULTS AND DISCUSSION

- Summary of the influence of jet-lag

When we studied the global effect of jet-lag, *i.e.* for males and females of all ages, we observed that 46 parameters on 140, were disturbed or modified *i.e.* 33%. These data demonstrate the global penalizing effects of jet-lag on a very large population (men, women from 19

to 46 years old) by means of a large choice of tests (biological, physiological, electrophysiological,...). Results demonstrate that the tests used were sensitive to jet-lag.

- Influence of gender

In any case, when a difference existed between males and females, in reference period, it was found again in the post-flight period, *i.e.* that jet-lag did not modified differences previously observed.

When any difference existed in reference period between males and females, one appeared in Sleep Log parameters only during the first five days.

Females were the most sensitive to jet-lag.

If we compare our results to litterature data, the lack of influence of gender on jet-lag is found again (6). The only difference concerns one of the subjective data (Sleep Log) ; but few studies evaluate this parameter.

- Influence of age

Some differences were observed in Visual Analogue Scales, in Sleep Log parameters and also in clinical parameters (orthostatic heart frequency for example).

Subjects less than 35 years old reacted better than elders.

No influence of age was found in other parameters.

More differences are found in the litterature (5, 7, 8) : subjects are generally older than in our case ; in middle age and elderly, physical and cognitive performances are disturbed.

• RECOMMENDATIONS

Between 20 and 45 years old, it is advised to take some counter-measures to beat jet-lag but NO SPECIFIC counter-measures are strictly necessary, if you are a female between 35 and 45 years old.

After the middle age, females should take physiologic or pharmacologic measures to counteract jet-lag.

In the case of an operational situation, recommendations are :

- to stay awake after a transmeridian flight is recommended to expose himself to day light, to participate to social activities and to do physical exercise. It is possible also to major the efficiency of these measures or to replace them, by taking a pill of slow release caffeine (STINERGIC®) (3).

- to facilitate sleep recovery, it is not recommended to sleep during the 10 hours preceding time to go to bed (in local time), but taking a pill of zolpidem (STILNOX®, AMBIEN®,...) just before going to a good bed as comfortable as possible is recommended (3).

But in an operational setting, we do not recommend taking melatonin as an hypnotic or a chronobiotic substance, if the right dose and the right time of administration are not well known in your case. Too much coffee (caffeine solution), because of its side effects, is not recommended ; alcohol is prohibited (4).

• CONCLUSION

In military condition the influence of age and gender in jet-lag syndrome seems to be limited. Some easy and safe countermeasures exist to facilitate recovery after an operational transmeridian flight.

• REFERENCES

- 1 - ARENDT. J., ALDHOUS M., ENGLISH J., MARKS V. And ARENDT J-H. Some effects of jet lag and their alleviation by melatonin. *Ergonomia*, 1987, 30, 1379-1393.
- 2 - LAGARDE. D. Décalage horaire - mettre les pendules biologiques à l'heure. *Le concours Médical*, 1995, 3483-3488.
- 3 - LAGARDE D. Place de la pharmacopée dans la prévention du décalage horaire. *Bull. Soc. Path. Ex.*, 1997, 90, 291-292.
- 4 - LAGARDE D., DOIREAU Ph. Le décalage horaire. *Med. Trop.*, 1997, 57, 489-492.
- 5 - MOLINE. M., ZENDELL S. Le jet-lag. syndrome de décalage des transports aériens intercontinentaux - aspects actuels. *Bulletin Veille-sommeil*, 1991, 12-19.
- 6 - O'CONNOR. P., MORGAN. W., KOLTYN K., RAGLIN J., TURBER J. and KALIN N. Air travel across four time zones in college swimmers. *J. Appl. Physiol.*, 1991, 70, 756-763.
- 7 - REILLY. T., ATKINSON G., WATERHOUSE. J. Travel fatigue and jet-lag. *J. of Sports Sciences*, 1997, 15, 365-369.
- 8 - WRIGHT J., VOGEL J., SAMPSON. J., KNAPIK. J., PATTON J., DANIELS. W. Physical performances and transmeridian flights. *Aviation Space Environ. Med.*, 1983, 54, 121, 137132-137146.