

NECK PAIN PREVALENCE ON FRENCH FIGHTER AIRCRAFT CREW : Observational study among 311 flying crew members

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Introduction

Modern fighter aircrafts with electrical flight controls and weight-for-height ratio greater than one imposed physical constraints (hemodynamical and musculoskeletal) because of the aeronautical environment. A rigorous selection of the fighter crew members, a tight medical following and a fitted physical training are needed. Neck pain seems to increase with the improvement of the aircraft and their resistance to acceleration.

In France, the current neck pain prevalence is barely known, therefore this issue is growing in interest in the military international society. A work group, in which France participates, led by the North Atlantic Treaty Organization (NATO), will make recommendations in 2017 about neck pain prevention.

We propose a neck pain survey on French fighter crew members to determine its prevalence, its potential contributing factors and to evaluate impact on their professional lives in order to suggest recommendations about prevention of the fighter aircraft neck pain.

Methods

An anonymous questionnaire was distributed to the French fighter crew members (pilots and navigators) in the military aeromedical centers and in the fighter squadrons from the 1st May to the 31st July of 2016. The questionnaire consisted of eleven parts dealing with the usual anthropometrics data, the aeronautical course, the physical profile and finally the neck pain assessed in terms of onset, frequency, intensity, resounding and medical care. The statistical analysis were carried out using the software Sphinx IQ®.

Results

311 fighter aircraft members, mean age 36±7 years, completed the survey. 82,3% of respondents were pilots. **60.4% of fighter aircraft members reported having experienced neck pain**, for 61,7% of them neck pain occurred during the last 12 months. 63% of the FAF pilots vs 40.5% of the navy pilots. The navy pilots were younger, with less aeronautical experience, more practice of the postural preventive measures and were visiting their doctor more often. **71.7% of the fighter aircraft personnel suffering neck pain had experienced it in flight** and 4,8% (n=9) during each flight. The major factors triggering neck pain in flight were G-load exposure (59,6%), air combat maneuvers (53,7%), rotation (39,3%), checking six (32,4%) and wearing night vision goggles (31,9%). The history of neck trauma was identified as neck pain provider (p<0,01), as well as being a navigator. Having experienced neck pain in flight was more frequent for navigators. No relation was found between neck pain and age or total flight hours of the crew members or aircraft's type.

	Flight members with neck pain	Without neck pain	p
Total	188 (60,5%)	123 (40,5%)	
Main features			
<u>Sex</u>			
Male	184 (98%)	122 (99%)	NS
Female	4 (2%)	1 (%)	
Age (years)	36 ± 6,27 [18-56]	36,23 ± 7,76 [24-59]	NS
Physical activity (hour/week)	2,87 ± 2,42 [0-24]	2,69 ± 1,61 [0-9]	NS
Smoker	25 (13,3%)	15 (12,2%)	NS
Sleep (hour)	7,2 ± 0,68 [5-10]	7,22 ± 0,66 [6-9]	NS
Aeronautical features			
<u>Army</u>			
Air Force	173 (92%)	101 (82%)	p<0,01
Navy	15 (8%)	22 (21,4%)	p<0,01
<u>Pilots</u>			
Pilots	153 (81,4%)	103 (84%)	NS
Navigators	35 (18,6%)	20 (16%)	NS
<u>Military total flight hours (hour)</u>			
Military total flight hours (hour)	2169,34 ± 1082,05 [230-6100]	1975,04 ± 1048,79 [150-4800]	NS
<u>Civilian total flight hours (hour)</u>			
Civilian total flight hours (hour)	246,8 ± 458,15 [23-000]	225,83 ± 395,5 [32-000]	NS
<u>Length of missions</u>			
1 year (in days)			
1 year (in days)	56,59 ± 72,25 [0-365]	46,60 ± 64,31 [0-365]	NS
2 years (in days)			
2 years (in days)	98,15 ± 116,78 [0-730]	85,72 ± 109,38 [0-650]	NS
Neck trauma	42 (22,6%)	6 (3,2%)	p<0,01

Table 1. Mean features of the flight members with or without neck pain (NS: non significant)

65,6% of the fighter aircraft members declared not having a sufficient knowledge of the postural preventive measures.

The practice of these measures didn't change statistically the occurrence of neck pain, but the pilots declaring neck pain were paradoxically more aware of the postural preventive measures. In terms of cervical muscle strengthening, pilots reported having neck pain practiced these exercises "alone" more frequently than pilots without pain.

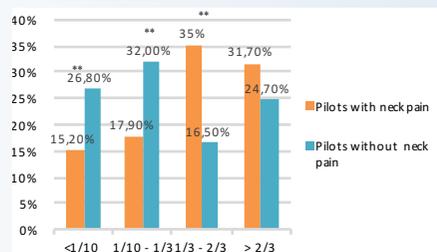


Fig. 1 Frequency of flight with more than 5 Gz (** p<0,01)

Less than one-third of fighter crew members with neck pain reported that it had an impact on the mission. 22,9% of fighter crew members who had pain felt that they had had an influence on their ability to fly, half of them reported that they had canceled their flight because of neck pain. 10,6% of fighter crew members reporting pain would have had a temporary medical inability to fly with an average duration of 9.3 days. A majority of fighter crew members (70%) reported that they had talked about their pain to a health professional. The most consulted practitioner were the osteopaths.

Discussion

The history of cervical trauma is a significant risk factor for neck pain. Being a navigator appears to be a major risk too, suggesting close following of these two populations. The impact of neck pain over personal and professional lives as well as flight safety seems to remain moderate. 40,8% of fighter crew members report that they do not perform specific cervical muscle strengthening. An awareness of the neck pain prevention techniques for fighter pilots, dispensed by the aeronautical physicians, must be enhanced from the air force schools and continued in squadrons inciting in particular the practice of the specific cervical muscle reinforcement and promoting the consultation of the aeronautical physician for optimum patient management. Manual therapy professionals have already been introduced in some medical centers and sent on overseas missions with results that seem very satisfying. A generalization of these practices could be encouraged.

	Number (n) of flight members with neck pain answering the question	% of flight members with neck pain (on 188)
Equipment n=103		
NVG		31,9% (n=60)
Dry suit		4,8% (n=9)
Combat jacket		21,3% (n=40)
Mae-West		15,5% (n=29)
Mission n=131		
<u>Air combat</u>		
Lower flight level		53,7% (n=101)
Long range flight		6,4% (n=12)
Pod laser		25,5% (n=48)
Air to air refueling		18,6% (n=35)
Night flight		2,2% (n=4)
Catapult launch arrestment		16,5% (n=31)
Deck landing		1,1% (n=2)
Deck landing		0% (n=0)
G-load exposure n=126		
<u>Position</u> n=115		
Checking six		32,4% (n=61)
Extension		5,3% (n=10)
Flexion		6,9% (n=13)
Rotation		39,3% (n=74)
Other : CAS mission		8% (n=15)

Table 2. Triggering factors of neck pain in flight

Postural prevention measures	Flight members with neck pain	Flight members without neck pain	p
Total	153	103	
Warming up before flight	32% (49)	16,5% (17)	p<0,01
G-warm up in flight	86,3% (132)	76,7% (79)	NS
Muscle recovery	4,6% (7)	2,9% (3)	NS
Stretching after flight	18,6% (30)	13,6% (14)	NS
Other	3,3% (5)	1,9% (2)	NS

Table 3. Comparison of the postural prevention measures practice between flight members with and without neck pain (p<0,01 et NS: non significant)

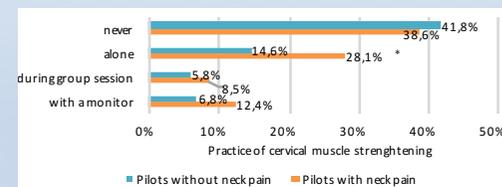


Fig. 2 : Comparison of muscle strengthening practices of cervical spine muscles by pilots with and without cervical pain (*p<0,02)