Individual, work and flight-related factors that might lead to an outcome of neck and low back pain in military student pilots

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OVERVIEW

1. Introduction
2. Methods
3. Results
4. Conclusions
5. Key Message

KEY MESSAGE

Start prevention for spinal pain as early as possible during Military Pilot Trg.

INTRODUCTION

Spinal pain is a major MSK issue in military pilots

INTRODUCTION

NORTH ATLANTIC TREATY ORGANIZATION

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STO TECHNICAL REPORT

PUB REF NBR (E.G. STO-TR-IST-999)

Aircrew Neck Pain Prevention and Management

Task Group HFM-252 Final Report

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Chapter 2 – Aircrew Neck Pain Epidemiology, Definition, and Operational Impact

John Crowley, William W. Dodson, Nathalie Duvigneaud, Philip S. E. Farrell, Helmut Fleischer, Sanna Feberg, Christopher P. Goff, Justin G. Hollands, Roope Sovelius, Ellen Slungaard, Erin Smith, Marieke van den Oord, Thomas Weme

2.1 EPIDEMIOLOGY

INTRODUCTION

Literature is sparse about spinal pain among Student Pilots (SP)

- +Gz-related neck pain: a follow-up study (Hamäläinen et al 1994)
- MSK pain in High-G aircraft Trg Programs: a survey of SP & IP. (Valkenburg & Thompson 2016)

INTRODUCTION

Survey 2006: 90 F16 pilots BAF & RNLAF

- 1y prevalence **NP** : 42%

2x

Survey 2015 : 71 F16 pilots BAF

- 1y prevalence NP : 80%
- 1y prevalence LBP: 79%

INTRODUCTION

1-y prevalence NP and LBP *

n=61

NP: 86%
LBP: 85%

n=41

NP: 58%
LBP: 81%

n=41

NP: 49%
LBP: 62%

Live Poll on Pilot Meet 11Feb2017

* At least one episode

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INTRODUCTION

.be

INTRODUCTION

Objectives

- Year prevalence of NP and LBP among military SP
- Indentify associated factors with NP or LBP
- Identify possible predicting factors of NP and LBP

METHODS

Subjects

- Data of 87 BAF SP (2009-2016)
- Before start specific flight Trg
- During yearly medical check-up

METHODS

Data (2009-2016)?

METHODS

Measurements

- Cervical mobility
- Cervical proprioception
- Maximal isometric neck strength
- Questionnaire

METHODS

Cervical mobility

- 3-D motion analyser Zebris CMS20
- Max ROM: Flex – Ext – Rot – Lateral Flex
- Mean of 3 Rep

METHODS

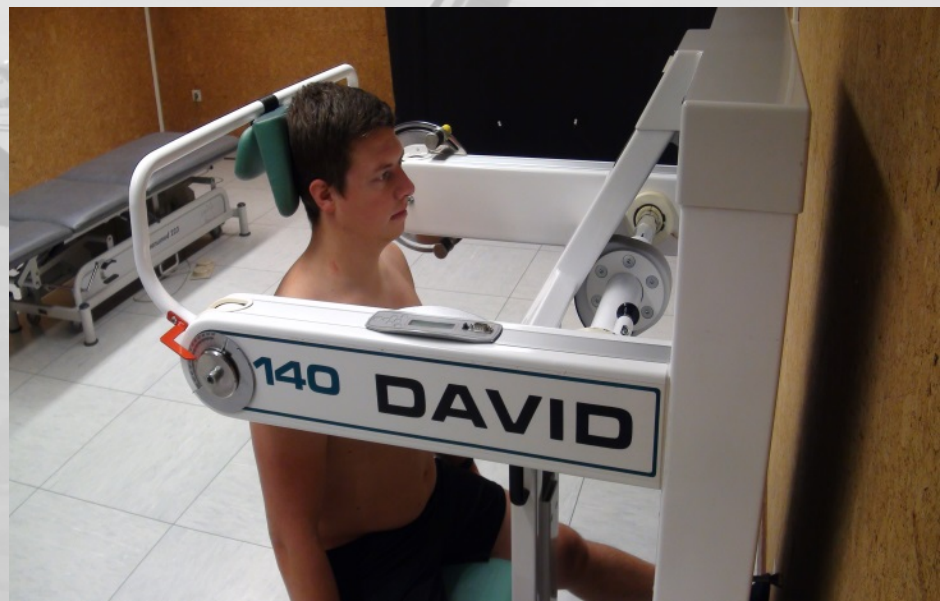
Cervical proprioception

- 3-D motion analyser Zebris CMS20
- Neutral position
  - ✓ after submax Flex-Ext (10x)
  - ✓ after submax Right & L Rot (10x)
- 30° Rotation position (5x right & 5x left)

METHODS

Maximal isometric neck strength

- David F-140 device
- 4 directions: Flex – Ext – Lat Flex Right – Lat Flex Left
- 3 repetitions – 30s rest
- Progressive
- Highest peak value



METHODS

Questionnaire

- 3 parts:
  - General (demographics, health, leisure)
  - Work related (mental & physical)
  - Pilot specific
- Standardized Dutch Musculoskeletal Questionnaire

Hildebrandt et al, 2001

ANALYSES

- At least 1 episode of NP or LBP during past 12 months → NPG or LBPG → categorical dependent variable
- Independent variables: mobility, proprioception, strength, individual/flight/work-related factors

- Independent sample T-test & Chi-Square test
  - Association with NP/LBP?
- Binary logistic regression
  - Prediction of NP/LBP?

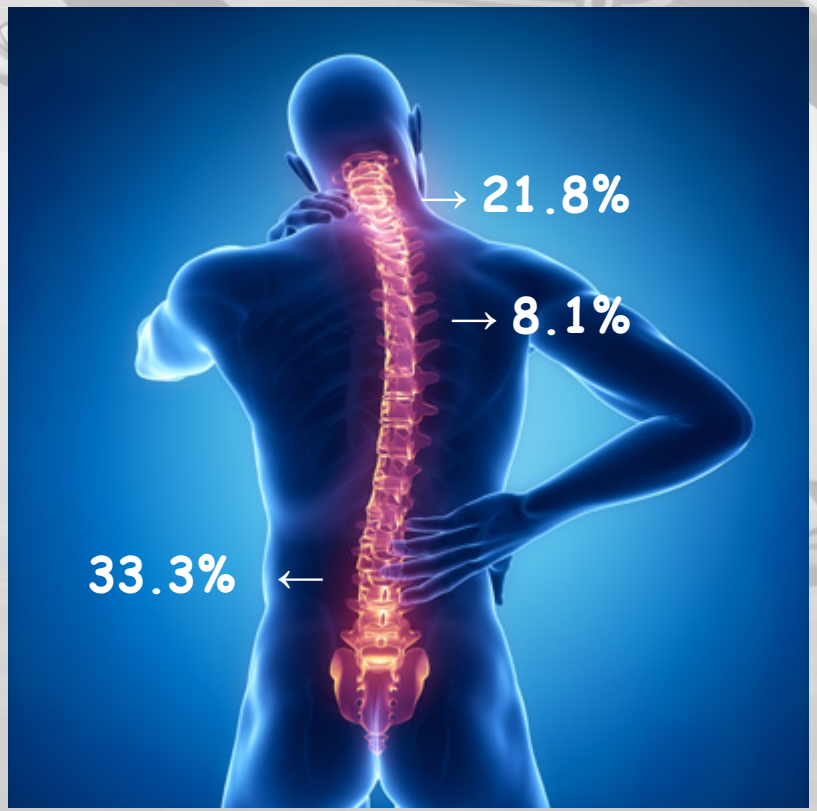
RESULTS

Demographic, work and flight- related characteristics

	Mean ± SD	Min	Max
BMI (kg/m2)	22.62 ± 1.67	19.38	27.40
Sleep hrs/night	7.58 ± 0.81	6.00	10.00
Hrs sport/week	4.26 ± 2.48	1.00	15.00
Length in service (yrs)	1.91 ± 1.81	0.00	6.00
Working hrs/week	34.01 ± 15.96	0.00	60.00
Hrs on computer/day	1.62 ± 1.27	0.00	6.00
Hrs in vehicles/week	10.19 ± 5.51	1.00	30.00
Mean flight hrs/year	110.68 ± 38.05	8.00	200.00
Mean flight duration (min)	65.6 ± 8.46	50.00	90.00

RESULTS

Prevalence of spinal pain in the past 12 months*



*At least 1 episode of pain

RESULTS

Qualitative factors associated with NP

Being annoyed by others*	Suffering from LBP in past yr *

*chi² P-value <0.05

Quantitative factors associated with NP

	NPG	No NPG	P
Mean duration of flights (min)	66.42 ± 8.79	62.33 ± 6.23	0.047**
Neck strength lateral flexion R (Nm)	29.67 ± 11.83	41.80 ± 13.51	0.041**
Neck strength lateral flexion L (Nm)	31.83 ± 8.08	41.43 ± 14.88	0.035**
** P- value <0.05			

RESULTS

Qualitative factors associated with LBP

Lack of endurance work*	Suffering from NP in past yr *
Often uncomfortable postures*	
Not enough variation*	

*chi² P-value <0.05

Quantitative factors associated with LBP

	LBPG	No LBPG	P
Mean duration of flights (min)	66.76 ± 8.91	62.33 ± 6.23	0.030**
Hrs on computer/day	1.43 ± 1.08	2.00 ± 1.53	0.048**

** P- value <0.05

RESULTS

OR for predictors of NP among military SP				
Independent variables	Wald	Exp (B)	95% CI	p-value
Low back pain*	7.440	7.938	1.791 - 35.171	**0.006**
Annoyed by others	2.957	4.268	0.816 - 22.307	0.085
Discomfort at work	3.528	4.186	0.940 - 18.651	0.060
Weight*	4.068	0.902	0.817 - 0.997	**0.044**
Mean duration of flights	2.242	0.907	0.798 - 1031	0.134
Chi^2 square (df = 5)	23.230* (p< 0.001)			

* P- value <0.05

RESULTS

OR for predictors of LBP among military SP

Independent variables	Wald	Exp (B)	95% CI	p-value
Neck pain	2.749	4.019	0.776 - 20.811	0.097
Lack of work requiring endurance*	5.625	0.129	0.024 - 0.700	**0.018**
Mental fatigue	2.882	4.766	0.786 - 28.911	0.090
Often uncomfortable postures*	4.440	5.173	1.122 - 23.862	**0.035**
Enough variation	0.022	0.837	0.079 - 8.852	0.882
Taking work problems home	0.213	0.657	0.111 - 3.902	0.644
Number of working hrs/week*	4.897	0.948	0.904 - 0.994	**0.027**
Hrs on computer/workday	0.836	1.283	0.752 - 2.189	0.361
Mean duration of flights	1.497	0.934	0.837 - 1.042	0.221
Chi^2 square (df = 9)	33.843* (p< 0.001)			

* P- value <0.05

CONCLUSIONS

- NP & LBP already an issue in military SP.
- Year prevalence of LBP is higher than NP in this population.

  → **not only focus on the prevention of NP, but also LBP**

  → **improve education & sensitization**

CONCLUSIONS

- Except the average time of flights, no flight related factors were associated with NP or LBP.

  → **small population SP, younger than 30y, same pilot Trg**

- Several individual and work-related factors were associated with NP or LBP in this population.

  → **causes of NP & LBP are multifactorial, including psychosocial well-being**

KEY MESSAGE

Start prevention as early as possible during Military Pilot Trg.

- Not only focus on NP but also LBP
- Aircrew education
- Multidisciplinary approach

Follow the pilots during their whole career as pilot.


Questions?
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