A cross-sectional study on fear-avoidance beliefs and chronic low back pain in fighter pilots

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ABSTRACT

Background: Chronic low back pain (CLBP) is considered a serious complaint among fighter pilots because the vertebrae of these pilots are exposed to high compression forces from prolonged sitting on a hard ejection seat and frequent sudden fighter aircraft maneuvers. It is yet unknown whether a correlation exists between CLBP and psychosocial/behavioral performance of fighter pilots.

Methods: This was a cross-sectional study of 66 fighter pilots with nonspecific CLBP voluntarily participated in this study. Self-efficacy was measured based on the degree of physical activity and work performance using the fear-avoidance beliefs questionnaire (FABQ).

Results: A significant inverse correlation was found between the work subscale of the FABQ (FABQw) (mean score: 27.4 ± 8.4) and both age (mean: 35 ± 4.9 years) and flying experience (mean: 13.2 ± 4.4 years) among fighter pilots with nonspecific CLBP. In contrast, there was no significant correlation between physical activity subscale of the FABQ (mean score: 12.3 ± 6.4) and both age and flying experience.

Conclusions: An inverse correlation was observed between FABQw and both age and flying experience among fighter pilots with nonspecific CLBP. It is important for rehabilitation specialists to understand the role of cognitive/affective components of a pain from tissue injury and nociception to prevent occupational disability and enhance occupational performance.

Key Words: Chronic pain, fear-avoidance belief, low back pain, self-efficacy

INTRODUCTION

Low back pain (LBP) is considered one of the most common complaints in modern societies.[1] Chronic LBP (CLBP) is defined as LBP symptoms lasting >3 months.[2] Acute LBP progresses to CLBP over time in about 2%–7% of patients, and 15%–45% of the population suffer from CLBP.[3] CLBP is a major public health burden, and it negatively affects many aspects of quality of life.[4]

LBP is one of the most common problems in the military population. It constitutes a significant burden to the military health-care system and has significant implications for military readiness.[5] The prevalence rate of musculoskeletal disorders that require medical attention is 33%; 20% of these disorders involve the low back and 6% involve the thoracic and cervical spine pain.[6]

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LBP is common among military pilots, but it is also associated with tasks other than flying.[7] The prevalence of back pain among service members is 4.3%–32%, and the prevalence rate is highest among fighter pilots.[8] Fighter pilots who fly high-performance aircraft frequently complain of pain in the thoracic and lumbar spine.[9]

Psychological factors play a role in the development of chronic pain. People experiencing pain tend to develop fear-avoidance (FA) behavior and avoid the activities that led to the acute episodes of pain to minimize the likelihood of re-experiencing pain or suffering further physical damage.[10] This is an adaptive behavioral strategy for dealing with situations that lead to acute pain, but it can become maladaptive in cases of chronic pain and can result in high levels of inactivity and functional disability.[10]

The relationship between pain-related FA and chronic pain such as CLBP has been studied for over three decades, and it was found that different professionals with long-lasting musculoskeletal pain may have different perceptions of FA belief. FA beliefs were found to be inevitable consequences of LBP, and FA behaviors were found to be more negative in student nurses than in student physiotherapists.[11] It was found that long-lasting musculoskeletal pain may negatively affect work performance and personal life.[12]

A strong association exists between physical activity and pain, as pain may affect components of motor processing and lead to inhibition of muscle activity.[13] Furthermore, intensive physical performance may lead to acute or chronic pain conditions such as sports-induced injuries.[14] There are limited available studies that suggest that poor self-efficacy accompanies CLBP, especially among fighter pilots. Therefore, the objective of this cross-sectional study aimed to observe the effect of CLBP on self-efficacy among fighter pilots assessed by FA beliefs questionnaire (FABQ) components. It is important to identify the role of cognitive/affective components of a pain from tissue injury and nociception to prevent occupational disability.

**METHODS**

A total of 86 fighter pilots, working at the King Abdulaziz Airbase in Saudi Arabia, with nonspecific LBP voluntarily participated in this study. The inclusion criteria were as follows: age of 21–50 years; nonspecific LBP primarily in the lumbar region presenting on a daily basis for the previous ≥3 months and described as being of at least “mild” intensity (≥2 on the 0–10 numeric rating scale) with impact on ≥2 aspects of everyday life; English-speaking ability, literate, ability to understand the study and communicate with the study team; and no candidacy for back surgery at the time. All the participants were healthy and had no systematic diseases. The exclusion criteria were as follows: specific LBP caused by infection, neoplasm, metastasis, rheumatoid arthritis or other inflammatory articular conditions (such as ankylosing spondylitis), spinal stenosis, or fractures and major coexisting medical illness or major surgical or nonsurgical intervention for any disorder within the past 12 months. Among 86 fighter pilots, 66 questionnaires were used for the analysis, whereas 20 questionnaires omitted due to exclusion criteria, and incomplete data yielded 66 valid samples for an effective response rate of 77%. The objectives, nature, and procedure of the study were explained to all the participants, and signed written informed consent was obtained from each participant. The study was approved by the institutional ethical committee (approval number: CAMS-056-37/38).

The FABQ was used to measure self-efficacy based on the degree of physical disability.[15] The FABQ consists of 16 items, and the participants rated their agreement with each statement using a 7-point Likert scale (0 = completely disagree and 6 = completely agree). The FABQ comprises two subscales, namely the work subscale (FABQw) with seven questions (maximum score = 42) and the physical activity subscale (FABQpa) with four questions (maximum score = 24). Higher scores indicate more strongly held FA beliefs. The total FABQ scores had excellent test–retest reliability (intraclass correlation coefficient = 0.97).[16]

**Statistics**

The IBM® SPSS Statistics version 21 (IBM Corp., Armonk, USA) statistical software package was used for the data analysis. The values were reported as mean ± standard deviation [Table 1].

**RESULTS**

A total of nonspecific CLBP 66 fighter pilots with a mean age of 35 ± 4.9 years were analyzed for the study. The mean participant FABQpa and FABQw scores were 12.3 ± 6.4 and 27.4 ± 8.4, respectively. Among fighter pilots with nonspecific CLBP, there was a significant correlation between FABQw and both age (P = 0.020) and flying experience (P = 0.01), but there was no significant

| Table 1: Descriptive study variables mean ± standard deviation |
|-------------------------------------------------------------|
| Descriptive variables                                      | Mean ± SD |
| Age (years)                                                 | 35.0 ± 4.9 |
| Weight (kg)                                                 | 82.8 ± 9.7 |
| Height (cm)                                                 | 175 ± 5.1  |
| Flying experience (years)                                   | 13.2 ± 4.4 |
| Work (FABQw) (score/42)                                     | 27.4 ± 8.4 |
| Physical activity (FABQpa) (score/24)                       | 12.3 ± 6.4 |

SD: Standard deviation, FABQ: Fear-avoidance beliefs questionnaire, FABQw: Work subscale of the FABQ, FABQpa: Physical activity subscale of the FABQ
correlation between FABQpa and both age ($P = 0.90$) and flying experience ($P = 0.90$). Correlations between the variables were assessed using Spearman’s correlation coefficient [Table 2].

**DISCUSSION**

This study aimed to investigate the effect of CLBP on FA beliefs among fighter pilots. The results showed inverse correlations between FABQw and both age and flying experience; however, no correlations were found between FABQpa and both age and flying experience.

The FABQ measures patients’ fear of pain and the consequent avoidance of physical activity. Higher FABQ scores are indicative of stronger FA beliefs. FABQpa and FABQw scores $>14$ and $>29$, respectively, are considered elevated FABQ scores. However, fighter pilots in this study had low mean FABQpa and FABQw scores of $12.3 \pm 6.4$ and $27.4 \pm 8.4$, respectively; these scores were within the acceptable range reported in an earlier study. Patients with strong FA beliefs are more likely not to return to work and to have poor physical therapy rehabilitation. The low scores recorded among fighter pilots with CLBP may be due to their physical fitness and physical activity regimen.

Moreover, chronic pain is multifactorial and has biological, psychological, and social elements, which affect the perception of nociceptive stimuli that ultimately produce the final outcome of pain or lack thereof. People who interpret pain as nonthreatening likely remain actively engaged in normal daily activities (work, sports, and recreational activities), which may promote functional recovery via cognitive mechanisms, such as pain-catastrophizing behavior, and physiological mechanisms mediated by muscular activity and overall body movement. The participants of this study are professional fighter pilots who actively engage in routine high-risk activities.

Furthermore, a significant negative correlation between FABQw and both flying experience and age in this study suggests that the greater the flying experience, the less FA belief the fighter pilot has. This is consistent with the results of an earlier study that suggested that LBP FA beliefs are influenced by age, work location, level of LBP-related disability, and level of education.

Consequently, the FABQw score may be considered a good predictor of self-report of disability. The FABQw score was previously considered a good predictor of self-report of disability in patients participating in physical therapy clinical trials. As fighter pilots age and gain more flying experience, their pain knowledge is enhanced and enriched. It has been reported that enhanced pain knowledge leads to less FA and lower perceived disability due to pain. Moreover, people are active processors of their life experiences, which are always mediated by what they believe and how they interpret the situation. As the age and flying experience of fighter pilots increase over time, chronic pain experience becomes less significant for them than catastrophizing warzone experience. Moreover, their cognitive process may be superimposed by the worst possible outcomes during their high-risk fighter pilot profession.

In the light of Melzack and Wall’s gate control theory, it now appears that sociocultural factors may affect the psychophysiological processes of pain perception. Soldiers do not report pain from their wounds because their pain perception is affected by the benefits they think they will receive from leaving a life-threatening frontline situation. In the light of this strong possibility, a multidisciplinary biocultural approach to pain should prove useful to clinicians. FA beliefs are significantly associated with the experience of chronic pain. FA beliefs are a primary factor determining whether an individual employs an avoidance or confrontation strategy. As the lives of our study participants, when on duty, are at extreme risk, they may unconsciously avoid pain perception when they face other life-threatening situations.

Researchers have also reported that FA beliefs may play a crucial role in cognitive development complications in patients with CLBP. The contribution of FA beliefs to the development of long-term disability has been gaining popularity. The relationship between FA belief and pain is essential for the performance evaluation of patients receiving interventions for LBP aimed at preventing future disability. The results of this study may inform the clinical decision-making of therapists based on the pain-related cognition and behavior of patients, especially fighter pilots.

Regular physical training is part of the lifestyle regimen of our participants since they work in defense services.

**Table 2: Statistical correlations on the study variables**

| Descriptive variables | Work (FABQw) | Physical activity (FABQpa) |
|-----------------------|--------------|--------------------------|
|                       | Spearman’s correlation | Significant (two-tailed) | Spearman’s correlation | Significant (two-tailed) |
| Age                   | $-0.4$       | $0.020$                  | $0.10$                | $0.90$                  |
| Weight                | $-0.15$      | $0.430$                  | $-0.10$               | $0.85$                  |
| Height                | $0.17$       | $0.460$                  | $-0.11$               | $0.50$                  |
| Flying experience     | $-0.70$      | $0.01$                   | $0.05$                | $0.90$                  |

FABQ: Fear-avoidance beliefs questionnaire, FABQw: Work subscale of the FABQ, FABQpa: Physical activity subscale of the FABQ
As seen in athletes, regular intensive exercise enhances pain tolerance. In addition, exercising seems to prevent the development of chronic pain conditions. This may also explain why they were not exhibiting FA behavior. A "U-shaped relation" is also reported between physical activity and the descending pain inhibitory system, and it posits that chronic intensive exercise leads to a depression of the descending pain inhibitory system.

CONCLUSIONS

FABQ results show how a fighter pilot’s FABQw and FABQpa contribute to his LBP. In our results, we observed an inverse correlation of FABQw with both age and flying experience among fighter pilots with nonspecific CLBP. It is important that physical rehabilitation specialists have enough information on occupational performance to enable them to adopt an appropriate strategy for the management of CLBP among fighter pilots.

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Conflicts of interest

There are no conflicts of interest.

Research quality and ethics statement

This study was approved by the Institutional Review Board (approval number: CAMS-056-37/38). The authors followed applicable EQUATOR Network (http://www.equator-network.org/) guidelines during the conduct of this research project.

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