Low Back Pain in Tactical Athletes: Improving Outcomes and Reducing Disability

Joseph R. Kardouni, PT, DPT, PhD, OCS, SCS

The views, opinions and/or findings contained in this presentation are those of the author and should not be construed as an official Department of the Army, Department of Defense, or U.S. Government position or policy.

Tactical Athletes
Law enforcement, military, and rescue professionals (Scofield and Kardouni 2015)

Factors Common to Athletes
Technical and tactical skills requisite for activity

General physical preparedness
- Cardiorespiratory endurance
- Anaerobic endurance
- Muscle strength
- Power
- Flexibility
- Mobility

Treatment Considerations
Occupational exposures
- Load carriage – relatively unique to tactical athletes
- Driving
- Lifting and carrying
- Repetitive tasks
- Training activities

What happens when we carry loads?
Wear of a backpack when walking increases trunk flexion angle.

Variable influence on lower extremity angles (Liew, Morris, and Netto 2016)
  o increased or unchanged
    - hip flexion angle
    - Knee flexion angle
    - ankle dorsiflex angle

Effect of load carriage on lumbar spine kinematics (Rodriguez-Soto et al. 2013)
Loaded versus unloaded
  o Forward flexion of the trunk
  o Reduced lumbar lordosis
  o Superior and inferior segments showed different kinematics

Response to backpack carriage on postural angle in young adults
Convenience sample – 30 university students, mean age 21.4 years
(Abaraogu et al. 2017)
- Greater forward head posture
- Greater forward lean

Body Army and additional equipment
Axial load
Effects on performance and kinematics
(Loverro et al. 2015)
- Body armor decreases performance
- Increased protection level did not decrease mobility
- Adding fighting load detrimental to mobility

Body armor and perceived increase in back pain
Police
- Increased hazard of first onset LBP (Burton et al. 1996)
Military
- One of the most consistent predictors of LBP (Roy, Lopez, and Piva 2013; Kelley et al. 2017)

Factors related to LBP during deployment
Deployed Brigade Combat Team from 101st Airborne (Roy, Lopez, and Piva 2013)
- 1194 soldiers, no LBP, pre- and post-deployment surveys
- 389 lost to follow-up (n=805)
- 77% reported LBP during deployment

Increased risk of LBP
- History of LBP
- Wearing body armor (hours/day)
- Increasing age
- Lower fitness scores

Occupational driving increases risk for LBP
Increased risk for LBP
- Military drivers (Knox et al. 2013)
- Police (Burton et al. 1996; Gruevski et al. 2013)
Could be further exacerbated by in-vehicle terminals (Gruevski et al. 2013)

Treatment Considerations
Comorbid medical conditions related to LBP
- Smoking (Behrend et al. 2012; Shiri et al. 2010b)
- Alcohol use/abuse (Ferreira et al. 2013; Gorman et al. 1987)
- Obesity (Shiri et al. 2010a)
- Sleep disturbance (Auvinen et al. 2010; Alsaadi et al. 2014; Alsaadi et al. 2011)
- Mental health issues (Linton 2000; Angstman et al. 2013)

Generalizability (Rothman, Greenland, and Lash 2008)
The laws of nature are the same everywhere
In research we sometimes assume the opposite. Findings only apply to populations resembling those studied. Generalization involves assumptions about study applicability. Generalizability dependent on how population/group membership modifies the effect.

- Does the biological effect differ between populations?
- Is there a confounder based on population?

Risk factors for LBP and surgery in Soldiers

383,586 Soldiers with LBP in a 10 year period (Kardouni, Shing, and Rhon 2016)

27% of cases became chronic/recurrent

Comorbid variables showed an increase in chronic/recurrent 18-52%

- Sleep disorders - 52%
- Psychological issues – 39%
- Tobacco use – 37%
- Obesity – 34%
- Alcohol use – 18%

Increasing number of comorbidities distinctly increased risk of chronicity/recurrence

- 31% to over 124%

Risk factors for LBP and surgery in Soldiers

7,446 surgical cases (Kardouni, Shing, and Rhon 2016)

- Considering surgical intervention as failure of conservative care
- Tobacco use increased risk for surgery 33%
- More than one comorbidity increased risk for surgery 27%

Each comorbidity except alcohol use lead to earlier surgical intervention

- Tobacco use 42% quicker
- Sleep disorders 32% quicker
- Obesity 12%
- Psychological issues 10%
- Multiple comorbidities 51%

Comorbidities and LBP in tactical athletes

Paucity of evidence on comorbidities and LBP in first responders

- Consider some generalizability between general population and Soldiers
- Fatigue and stress often part of the job

Firefighters and sleep disturbance (Lusa et al. 2015)

- Persistent LBP
- Radiating LBP

Firefighters and obesity (Mayer et al. 2012)

- Reduced back and core muscle endurance

LBP as a risk factor for LBP
Systematic review of 41 studies (Taylor et al. 2014)
Tactical athletes – Brigade Combat Team (Roy and Lopez 2013)

Why?
- Failure to properly rehab
- Return to occupational stresses
- Unaddressed underlying risk

Physical therapists are becoming more involved with human performance optimization
- Traditional athletes
- Tactical athletes

History of LBP on pelvis and trunk coordination during functional movement (Seay et al. 2013)

Box lifting task
- 11 Soldiers (26±6 years) no history of LBP
- 9 Soldiers (24±5 years) no LBP for ≥6 months

Hx of LBP = more in phase
- Differences in transverse plane coordination
- More “guarding”

Considerations for Rehabilitation Programs
Personnel strength is typically set
- A specific number of people to complete the job
- An absent team member means more work for others
- Pressure to return to work (self and peers)

Employ established tests or return to duty criteria

Clinical discharge ≠ fitness for duty

Considerations for Rehabilitation Programs
Understand occupational demands
- Load carriage
- Short bursts of intense activity
- Static positions for prolonged periods in vehicles
- Parachuting/repelling/fast roping
- Marksmanship training is very repetitive
- Force exerted from water pressure in hose
- Lifting or dragging another adult human being

Considerations for Rehabilitation Programs
There is often a culture within tactical organizations that must be understood
- Internal trust is often paramount
- Medical care sometimes seen negatively
- Shame in inability to participate fully
- Dismissing elements of culture hurt provider’s credibility

Secondary gain
- Most likely the exception and not the rule

Considerations for Rehabilitation Programs
Encourage “finishing” rehab

Incorporate functional or simulated work tasks during rehabilitation

Communicate limitations with patient and supervisors/seniors (as needed)
- Employing agency wants to prevent additional lost duty time
- Understand training or mission cycle
- Like athletic season (or in season always)

Reintegration
Coordinate reintegration with strength and conditioning professionals or supervisors
- Initial duty limitations
- Full return to duty guidelines
- Precautions upon return to duty

Strength and conditioning professions may also be able to help with modified workouts during rehabilitation

Buy-in from patient and supervisors/co-workers will drive compliance

Reintegration
Address relevant comorbidities that could impact recurrence/recovery
- Weight
- Lifestyle (smoking, off-duty activities, etc.)
- Rest/Sleep
- Stress management

Many tactical organizations have resources in place to help with these; encourage use

Facilitate Relationships with Strength and Conditioning Professionals
In most cases, PT is not a strength and conditioning specialist
PT primary strength is rehabilitation of injured or ill people
PTs may also have skill in:
- Pain modulation interventions
- Edema control
- Ergonomic assessments
- Functional assessments
References


Lusa, S., H. Miranda, R. Luukkonen, and A. Punakallio. 2015. 'Sleep disturbances predict long-
term changes in low back pain among Finnish firefighters: 13-year follow-up study', *Int
Arch Occup Environ Health*, 88: 369-79.
'The impact of obesity on back and core muscular endurance in firefighters', *J Obes*,
2012: 729283.
R. Kelly, and S. R. Ward. 2013. 'Effect of load carriage on lumbar spine kinematics',
(Wolters Kluwer Health/Lippincott Williams & Wilkins: Philadelphia).
Roy, T. C., and H. P. Lopez. 2013. 'A comparison of deployed occupational tasks performed by
different types of military battalions and resulting low back pain', *Mil Med*, 178: e937-43.
Seay, J. F., S. G. Sauer, P. N. Frykman, and T. C. Roy. 2013. 'A history of low back pain affects
pelvis and trunk mechanics during a sustained lift/lower task', *Ergonomics*, 56: 944-53.
Shiri, R., J. Karppinen, P. Leino-Arjas, S. Solovieva, and E. Viikari-Juntura. 2010a. 'The
association between obesity and low back pain: a meta-analysis', *Am J Epidemiol*, 171:
135-54.
———. 2010b. 'The association between smoking and low back pain: a meta-analysis', *Am J
Med*, 123: 87 e7-35.
Taylor, J. B., A. P. Goode, S. Z. George, and C. E. Cook. 2014. 'Incidence and risk factors for
first-time incident low back pain: a systematic review and meta-analysis', *Spine J*, 14:
2299-319.