Intra-abdominal Pressure, New Insights for Pelvic Floor Physiotherapy

Leitner M[1], Hitchcock R[2]

1. Bern University of Applied Sciences, Department of Health Professions, Physiotherapy, Switzerland
2. Department of Bioengineering, University of Utah, Salt Lake City, UT, USA

Contact: monika.leitner@bfh.ch,
+41 31 848 35 13
Murtenstrasse 10, CH-3008 Bern, Switzerland

Background:

When Intra-abdominal pressure (IAP) is elevated it places a load on the pelvic floor. Pelvic floor dysfunctions (PFDs), such as stress urinary incontinence or diminished pelvic organ support are associated with increased IAP [1-3]. Many activities increase IAP and for women managing stress incontinence or recovering from pelvic surgery, postoperative activity restrictions minimizing elevated IAP are given. However, the perspective that elevated IAP is detrimental might not be the appropriate conclusion.

Purpose:

The role of IAP in pelvic floor health and dysfunction is not fully understood yet. This review aims at contributing a new perspective about IAP, biomechanics and the pelvic floor. Also, the review encourages a critical evaluation of restrictions.

Methods:

For this narrative review, a comprehensive search of databases for English literature between 1980 and 2019 was performed identifying quantitative studies that addressed relevant IAP-issues about clinical conditions, rehabilitation, exercise and ergonomics. The reference lists and bibliographies were hand- searched to identify other relevant studies.

Results:

IAP is generated in activities of daily living and is both beneficial and detrimental. The generation of IAP positively supports clearance of airways [4] or defecation [5] and plays a role in spinal stability [6-8]. However, increased IAP can lead to SUI and PFDs [9]. IAP waveforms vary depending on the type of activity. These differing time-pressure profiles need to be considered and analyzed in their entirety and not just as static measurements [9]. In addition, recent research has discovered that relative IAP may be an important consideration in determining healthy versus unhealthy IAP [14]. Many of the current postoperative restrictions aimed at reducing IAP are based on empiric experience rather than evidence. Some of the restricted activities (abdominal crunches, stair climbing, walking, Pilates) did not raise the IAP more than simply getting out of a chair [10, 11]. For most activities a wide intersubject variability has been observed, so an activity that may be ‘safe’ in one woman may not be in another [12, 13]. In fact, a study of ‘safe’ exercises revealed no difference between the recommended and discouraged exercise versions in five of the ten exercise types [14]. Few recommendations include instructions about breathing, a significant factor in the generation of IAP. In exercises (and especially in lifting tasks) the inhalation-hold pattern (glottis closed) produces higher IAP than other forms of breath control [7]. At present, there is no IAP cut point that is known to result in pelvic floor disorder [14]. Instead of using absolute IAP values, relative IAP and overall exposure are recommended as an individual approach [15].

Conclusion(s):

A broader understanding of IAP benefits and detriments can lead to improved evidence-based physical therapy intervention. IAP is linked to motor control and breathing, this should be considered in (postoperative) recommendations and training.

Implications:

A holistic rehabilitation approach considers IAP as a physiologic phenomenon, that should be targeted for pelvic health. The role of breath control and breathing patterns referring to IAP generation should receive more attention. Effects of respiration should be controlled in studies investigating IAP.

Keywords:
Pelvic floor
Pressure
Biomechanics

Funding acknowledgements:
The project described was supported in-part by Grant Number 1P01HD080629 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Institutes of Health.

1. Eliasson, K., A. Edner, and E. Mattsson, *Urinary incontinence in very young and mostly nulliparous women with a history of regular organised high-impact trampoline training: occurrence and risk factors.* Int Urogynecol J Pelvic Floor Dysfunct, 2008. **19**(5): p. 687-96.
2. Nygaard, I.E., et al., *Lifetime physical activity and pelvic organ prolapse in middle-aged women.* American journal of obstetrics and gynecology, 2014. **210**(5): p. 477. e1-477. e12.
3. Haylen, B.T., et al., *An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction.* International urogynecology journal, 2010. **21**(1): p. 5-26.
4. Addington, W.R., et al., *Intra-abdominal pressures during voluntary and reflex cough.* Cough, 2008. **4**(1): p. 1-9.
5. Mouritsen, L., et al., *Vaginal pressure during daily activities before and after vaginal repair.* International urogynecology journal, 2007. **18**(8): p. 943-948.
6. Stokes, I.A., M.G. Gardner-Morse, and S.M. Henry, *Abdominal muscle activation increases lumbar spinal stability: analysis of contributions of different muscle groups.* Clinical Biomechanics, 2011. **26**(8): p. 797-803.
7. Hagins, M., et al., *The effects of breath control on intra-abdominal pressure during lifting tasks.* Spine, 2004. **29**(4): p. 464-469.
8. Hodges, P.W., et al., *Intra-abdominal pressure increases stiffness of the lumbar spine.* Journal of biomechanics, 2005. **38**(9): p. 1873-1880.
9. Bo, K., *Urinary incontinence, pelvic floor dysfunction, exercise and sport.* Sports Med, 2004. **34**(7): p. 451-64.
10. Weir, L.F., et al., *Postoperative activity restrictions: any evidence?* Obstetrics & Gynecology, 2006. **107**(2, Part 1): p. 305-309.
11. Coleman, T.J., et al., *Effects of walking speeds and carrying techniques on intra-abdominal pressure in women.* International urogynecology journal, 2015. **26**(7): p. 967-974.
12. Murphy, M., et al., *Postoperative management and restrictions for female pelvic surgery: a systematic review.* International urogynecology journal, 2013. **24**(2): p. 185-193.
13. Guttormson, R., et al., *Are postoperative activity restrictions evidence-based?* The American Journal of Surgery, 2008. **195**(3): p. 401-404.
14. Tian, T., et al., *Assessing exercises recommended for women at risk of pelvic floor disorders using multivariate statistical techniques.* International urogynecology journal, 2018. **29**(10): p. 1447-1454.
15. Dietze-Hermosa, M., et al., *Intra-abdominal Pressure and Pelvic Floor Health: Should We Be Thinking About This Relationship Differently?* Female pelvic medicine & reconstructive surgery, 2020. **26**(7): p. 409-414.