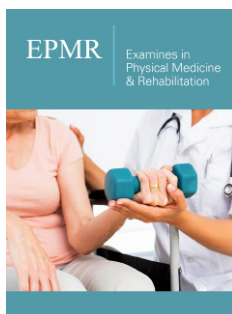


Clinical Commentary: Delving Deeper: Understanding Pelvic Floor Health in Female Athletes

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Abstract

Introduction: Female athletes may face unique challenges regarding pelvic floor health due to the demands of sport participation. While stress urinary incontinence is a well-recognized issue, there is limited data on other Pelvic Floor Disorders (PFDs).

Purpose: This clinical commentary aims to explore the impact of both competitive sport involvement on pelvic floor health in female athletes. Additionally, it offers insights into strategies for preventing and managing PFDs within this population.

Conclusion: Recognizing the impact of sports involvement on pelvic floor health is vital for identifying and managing Pelvic Floor Disorders (PFDs) in female athletes. By employing tailored prevention and management approaches, the risks associated with PFDs can be mitigated to promote overall athletic performance and well-being in female athletes.

Keywords: Pelvic floor health; Female athletes; Urinary incontinence; Physical activity; Pelvic girdle pain; Athletic performance; Gymnastics, Trampolining; Volleyball

Introduction

Over the past several decades, female sports participation has increased significantly with female athletes competing in sports at the high school, collegiate and professional level. The Olympic Games, the pinnacle of athletic achievement reflects this trend with nearly 50% of the athletes being women [1-4]. Female anatomy is multi-faceted and complex, however there is insufficient data on how physical activity affects the pelvic floor in female athletes. While existing literature has begun to address the prevalence of Stress Urinary Incontinence (SUI) among female athletes, indicating an incidence rate of up to 40%, it often overlooks the other conditions of Pelvic Floor Disorders (PFDs). These conditions encompass a range of conditions, including SUI and Anal Incontinence (AI), pelvic organ prolapse, and pelvic girdle pain, all of which significantly affect female athletic performance and quality of life [4-8]. The objective of this clinical commentary aims to explore the current understanding of PFDs and its effect on female athletes.

Prevalence of Pelvic Floor Disorders (PFDs) in Female Athletes

Recent studies have delved deeper into the prevalence and impact of PFDs among female athletes. Emerging evidence suggests a significant association between high-intensity physical activity and PFDs. For example, a cross-sectional study by Pires et al. [7]. discovered the prevalence of SUI was highest among collegiate athletes participating in sports requiring repetitive jumping and landing movements, such as basketball and volleyball [7]. Furthermore, the study identified a significant association between SUI severity and the number of years participating in high-impact sports. The prevalence of SUI has also been noted in the

literature among female athletes engaging in high-impact sports such as running, gymnastics, trampolining, and volleyball [9-13]. The PFDs frequently mentioned in the literature include SUI and AI with prevalence rates varying across different sports disciplines [14-17]. Understanding the prevalence and spectrum of PFDs in female athletes is vital for developing targeted interventions and management strategies.

Biomechanics of the Pelvic Floor in Female Athletes

The Pelvic Floor Muscles (PFM) play a vital role in maintaining continence, supporting pelvic organs, and stabilizing the spine during physical activity. In women participating in high-level sport and elite female athletes, etiologic factors for PFDs may include inadequate abdominal pressure transmission, stress injuries to the fascia, PFMs, or ligaments, and changes in connective tissue or collagen. It is essential to understand the anatomy and biomechanics of the PFM in the female athlete when they are participating in sport and how that may relate to an increased risk of PFD. Studies have indicated that the inability to sustain prolonged PFM contractions during high-impact activities can lead to urine loss. Factors which may attribute to this include increased Intra-Abdominal Pressure (IAP) and repeated stretching of the pudendal nerve [18-21]. Exploring the biomechanical aspects of the pelvic floor in female athletes may provide valuable insights into the mechanisms underlying PFDs and allow for targeted preventive measures. For instance, a study by Paajanen et al. [22] used dynamic MRI imaging to assess pelvic floor muscle function during specific athletic movements [22]. The findings revealed alterations in pelvic floor muscle recruitment patterns among athletes with a history of SUI compared to controls, suggesting potential biomechanical contributors to PFDs in this population.

Impact of Exercise on Pelvic Floor Health

Previously, it was believed that exercise did not adversely affect the pelvic floor. However, recent studies have demonstrated concern regarding frequency and intensity of high-level exercises and its' contribution to PFDs [23]. Emerging evidence suggests that certain types of exercise may exacerbate pelvic floor dysfunction in female athletes. For example, a longitudinal study by Skaug et al. [3,4], followed elite gymnasts over a competitive season and found a significant increase in self-reported UI symptoms following intense training and competition periods [3,4]. This demonstrates the importance of monitoring pelvic floor health throughout the training cycle and implementing preventive strategies to minimize the impact of exercise on pelvic floor function. Further research is needed to clarify the specific exercise-related factors contributing to PFDs and to develop tailored exercise protocols to mitigate these risks.

Awareness and Screening in Female Athletes

It is important that there is awareness around PFDs in female athletes especially as these conditions may be easily concealed by the athlete. Female athletes may feel embarrassed or ashamed to discuss these issues, fearing stigma from coaches and teammates [24]. Proactive screening and identification of high-risk individuals

by rehabilitation providers and trainers are essential to facilitate early intervention and prevention strategies [25]. Promoting screening and educations about pelvic floor health can empower female athletes to seek appropriate care and support. Recent initiatives have aimed to improve awareness and screening for PFDs in female athletes. For instance, a study by Smith et al. evaluated the effectiveness of an educational intervention targeting collegiate athletic trainers to enhance their knowledge and confidence in addressing pelvic floor health concerns among female athletes. The intervention resulted in improved screening practices and referral rates for PFDs, highlighting the importance of education in promoting early detection and management of these conditions.

Consideration should be given to addressing other risk factors contributing to PFDs in female athletes, such as the Relative Energy Deficiency in Sport (RED-S) and its relation to conditions like eating disorders and amenorrhea [26]. Routine screening for both eating disorders and PFDs is crucial to provide comprehensive care to female athletes [27]. Adopting a multidisciplinary approach involving sports medicine physicians, physical therapists, nutritionists, and mental health professionals can optimize outcomes and promote holistic well-being in female athletes. Research has highlighted the interconnectedness of various risk factors for PFDs in female athletes. For instance, a prospective cohort study by Rebullido et al. [6], examined the relationship between RED-S and pelvic floor dysfunction among collegiate distance runners [6,10]. The findings revealed a higher prevalence of UI and pelvic pain symptoms among athletes with disordered eating behaviors and menstrual irregularities, emphasizing the importance of addressing underlying physiological and psychological factors in managing PFDs.

Clinical Management of PFDs: Pelvic Floor Muscle Training (PFMT)

Pelvic Floor Muscle Training (PFMT) remains the gold standard for a variety of pelvic floor conditions, particularly SUI [26]. Numerous studies have demonstrated the effectiveness of PFMT in improving pelvic floor muscle activation and strength, leading to a reduction in UI symptoms [27-30]. Ensuring proper education and training on PFMT techniques is essential to maximize its benefits on those challenged with PFDs. Additionally, exploring innovative approaches, such as biofeedback and neuromuscular electrical stimulation, may further enhance the efficacy of PFMT in this population. Recent advances in PFMT strategies have aimed to optimize outcomes and adherence among female athletes. For example, a randomized controlled trial by Jones et al. compared the effectiveness of traditional PFMT exercises with a combined intervention incorporating mindfulness-based stress reduction techniques. The results demonstrated superior improvements in UI symptoms and quality of life among athletes in the combined intervention group, suggesting the potential benefits of integrating holistic approaches into PFMT programs [7]. PFMT may be an important intervention to consider incorporating in sports training and rehabilitation programs as it can be effective in addressing symptoms of PFD especially SUI. If athletes can be trained on how

to engage their pelvic floor, it can help address PFD symptoms if present and prevent future symptoms from occurring. It is a cost-efficient and effective intervention that can be performed in adjunct with other exercises. However, it is essential that athletes are being taught proper techniques by a trained professional such as a physical therapist to maximize clinical efficacy [31].

Conclusion

The risk of developing Pelvic Floor Disorders (PFD) in female athletes may vary based on the type and intensity of their respective sport. In conclusion, the rising incidence of PFDs among female athletes highlights a critical aspect of sports medicine that necessitates further exploration and intervention. A collaborative approach among healthcare providers, coaches, and athletes are essential to advancing our understanding and management of PFDs in this population. Further high-quality research is warranted to better understand the multifactorial nature of PFDs in this population. A systematic review on the given literature may be beneficial to offer a consolidated and critical analysis of existing research to identify effective management strategies, establish correlations between exercise intensity and PFD risk, and guide future research and clinical practices on this topic. Recognizing the multifaceted nature of these disorders, a holistic approach to screening, education, and targeted rehabilitation is essential to support the health and performance of female athletes. As women's sports continues to evolve and grow so should the strategies to mitigate and manage the unique health challenges faced by this population.

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