In addition to mechanical loading, pregnancy-related hormonal changes play a critical role. Elevated levels of relaxin, estrogen, and progesterone affect collagen fiber alignment, cross-linking, and extracellular matrix metabolism, thereby reducing connective tissue stiffness and tensile strength and increasing the compliance of the linea alba and myofascial system. The combination of sustained mechanical loading and tissue laxity makes the linea alba more susceptible to irreversible elongation (Du et al., 2025). Furthermore, factors such as obesity, chronic cough, constipation, heavy physical labor, and inappropriate high-intensity exercise can lead to chronically elevated intra-abdominal pressure, further increasing abdominal wall stress and exacerbating DRA.

Importantly, DRA is not merely a geometric widening but also involves impaired force transmission and reorganization of the core functional system. The transversus abdominis, diaphragm, and pelvic floor muscles work synergistically to regulate intra-abdominal pressure and maintain lumbopelvic stability. When pregnancy and childbirth alter their activation patterns and coordination, delayed muscle recruitment, reduced force transmission, and compensatory strategies may occur, creating a cycle of "structural laxity–functional dysfunction." Clinically, this may manifest as midline bulging, reduced trunk stability, postural fatigue, lumbopelvic pain, and pelvic floor symptoms, although the exact causal relationships remain to be fully elucidated.

2.3 Risk factors

The development and persistence of DRA are influenced by multiple maternal, pregnancy-related, and delivery-related factors, among which multiparity is considered one of the most significant. Repeated pregnancies subject the linea alba to cycles of stretching, repair, and reloading, potentially leading to cumulative damage to elastic fibers and collagen structure and reducing the capacity for recovery. Cross-sectional and cohort studies consistently show that higher parity is associated with greater IRD and increased risk of clinically significant DRA, both in the early postpartum period and in long-term follow-up (Sartori et al., 2024). Multiple gestations, fetal macrosomia, and diabetes may further increase mechanical and metabolic stress, thereby elevating the risk of DRA (Lin et al., 2024).

Advanced maternal age and higher pre-pregnancy or postpartum body mass index (BMI) are also important risk factors. With increasing age, the regenerative capacity of connective tissue declines and collagen metabolism becomes less efficient, making the linea alba more prone to irreversible stretching under pregnancy-related stress. Elevated BMI not only increases sustained abdominal wall loading but may also alter intra-abdominal pressure distribution and force transmission. Studies have demonstrated a significant association between higher BMI and more severe DRA, with severe cases also linked to higher rates of abdominal hernia, urinary incontinence, pelvic organ prolapse, and pain (Lin et al., 2024; Sartori et al., 2024). Research in Chinese populations further indicates that high-risk postpartum women often report poorer patient-reported outcomes, suggesting that risk factors influence not only structural changes but also functional status and quality of life (Zhu et al., 2024).

The role of delivery mode and perinatal behaviors in DRA remains complex and inconclusive. Some studies suggest that cesarean section, prior abdominal surgery, and higher birth weight are associated with increased DRA risk, while others report that vaginal delivery may be negatively associated with certain types of DRA in multivariate analyses, indicating that the relationship between delivery mode and DRA is not straightforward (Li et al., 2024; Guo et al., 2025). Additionally, chronic heavy physical labor, inappropriate high-intensity abdominal exercise, chronic constipation, chronic cough, connective tissue disorders, and generalized joint laxity may contribute to the development and persistence of DRA by increasing intra-abdominal pressure or reducing connective tissue stability.

3 Assessment Methods for Diastasis Recti Abdominis

3.1 Clinical assessment methods

Clinical assessment forms the basis for screening, preliminary diagnosis, and follow-up management of diastasis recti abdominis (DRA), particularly in settings with limited access to imaging, such as maternal and child healthcare services, community rehabilitation, and physiotherapy. The most commonly used bedside method is finger-width palpation. This is typically performed with the patient in a supine hook-lying position, where she is