

“exercise+breathing control+pelvic floor coordination” demonstrate higher effect rankings and more stable clinical outcomes (Bigdeli et al., 2025; Wu et al., 2025; Zhu et al., 2025). De Oliveira et al. (2025) further reported that combining abdominal exercise with adjunctive interventions resulted in an additional IRD reduction of approximately -3.6 mm compared with exercise alone, suggesting an additive effect of comprehensive strategies.

Mechanistically, the superiority of comprehensive rehabilitation lies in its broader focus beyond structural width alone, targeting neuromuscular control, postural behavior, and functional load management. Through approaches such as biofeedback, electrical stimulation, and patient education, individuals develop improved awareness of proper muscle recruitment and intra-abdominal pressure regulation, leading to better adherence and movement quality. Current evidence therefore supports comprehensive rehabilitation models as aligning with an integrated “structure-function-behavior” framework, particularly for individuals with moderate to severe DRA, higher symptom burden, or limited response to isolated exercise (Deka, 2025).

### **5.2 Effects of different rehabilitation methods on IRD, muscle strength, and functional recovery**

Different rehabilitation strategies demonstrate distinct pathways in improving DRA-related outcomes. Regarding IRD, most studies support active exercise as the fundamental intervention, while multi-component programs further enhance structural improvement. Large meta-analyses indicate that abdominal exercise significantly reduces IRD compared with no intervention, particularly below the umbilicus, and that combining exercise with adjunctive modalities, such as NMES, taping, breathing training, or pelvic floor muscle training, can result in an additional reduction of approximately 3-4 mm (De Oliveira et al., 2025; Wu et al., 2025). Network meta-analyses further suggest that suspension training, Pilates, and “abdominal support+core stabilization” rank highly in improving IRD at different anatomical levels (Zhu et al., 2025). In contrast, passive approaches such as abdominal binders or taping alone may provide short-term support but generally have limited or moderate effects on structural IRD reduction (Abdullah et al., 2025; Bigdeli et al., 2025).

In terms of muscle strength recovery, active exercise remains the most critical intervention. Curl-up training, core stabilization, and progressive abdominal strengthening can improve rectus abdominis thickness, trunk flexion strength, and muscular endurance, even when IRD changes are not always significant (Gluppe et al., 2023; Du et al., 2025). Comparative studies show that core stabilization, abdominal support, and their combination all improve strength, endurance, and balance, with combined interventions producing superior outcomes in both structural and functional measures (Kaya and Menek, 2023). Furthermore, combining EMG biofeedback-assisted pelvic floor training with NMES enhances neural activation and motor control, leading to improvements in both IRD and health-related quality of life. This suggests a potential synergistic relationship between muscle strengthening, neuromuscular control, and structural recovery.

From a functional perspective, the overall value of rehabilitation strategies becomes particularly evident. Increasing evidence indicates that IRD alone is a structural marker and does not fully reflect symptom burden or functional status. Combined interventions, such as abdominal support with targeted exercise, can improve body image, trunk strength, and subjective function, even when structural changes are modest (Du et al., 2025). Therefore, comparisons between rehabilitation methods should not be limited to IRD reduction alone but should also include outcomes such as strength, endurance, pain, postural control, and quality of life.

### **5.3 Short-term and long-term outcomes**

Current evidence generally suggests that most conservative rehabilitation interventions yield positive short-term effects, with intervention durations typically ranging from 6 to 16 weeks and primary outcomes including IRD, muscle activation, strength, and selected functional indicators. Short-term findings indicate that interventions such as abdominal exercise, exercise combined with NMES, acupuncture or electroacupuncture combined with exercise, and abdominal support combined with core stabilization result in greater reductions in IRD compared with control groups, along with improvements in muscle strength and quality of life (Bigdeli et al., 2025; Wu et al., 2025; Zhu et al., 2025). For example, some studies report that core stabilization combined with NMES can significantly improve IRD, waist circumference, and quality of life within a few weeks, while “exercise+NMES”