

# Aerobic Exercise:

## Randomized Controlled Trial Data Suggest Qualified Benefits for Erectile Dysfunction

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### Abstract

Erectile dysfunction (ED) refers to the difficulty in achieving and maintaining a degree of penile erection that suffices for satisfactory sexual activity. ED is multifactorial in origin; its prevalence therefore varies with the population studied. In the general population, ED is present in 18–52% of men in younger to older age groups and in 43–76% of men with different medical conditions. Phosphodiesterase-5 inhibitor drugs are gold standard treatments for ED. However, because many lifestyle disorders predispose to ED and because aerobic exercise is beneficial for these lifestyle disorders, aerobic exercise may be a possible intervention for ED. In this context, a recent systematic review and

meta-analysis identified 11 randomized controlled trials (RCTs; pooled N=1,147) of aerobic exercise vs nonexercising control conditions for the treatment of ED. These RCTs had been conducted in men with different medical and surgical conditions, commonly obesity, metabolic syndrome, diabetes mellitus, and cardiovascular disease. The exercise interventions were varied but mostly involved 30–60 minutes sessions of activity, 3–5 times a week, for a median duration of 6 months. Advice for diet and weight loss was also commonly provided. The meta-analysis found that aerobic exercise was significantly superior to nonexercising control conditions, with greater improvement in erectile functioning observed in subjects with

greater baseline impairment. Limitations of the findings were that subjects could not be blinded to the nature of the intervention and that the magnitude of benefit with exercise, although statistically significant, fell below thresholds suggested for clinical significance. Aerobic exercise might therefore be more useful for the primary prevention of ED, for which preliminary evidence already exists. Exercise can also be recommended, along with other lifestyle guidance, to improve sexual functioning in both men and women and to improve health across a range of domains.

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Erectile dysfunction (ED) refers to the difficulty in achieving and maintaining a degree of penile erection that suffices for satisfactory sexual activity. ED is not all or none; the degree of erection achieved and maintained, the experience of what is sufficient and satisfactory, and even the nature and context of the sexual activity associated with ED qualify how ED is perceived by the individual and partner. ED is therefore commonly quantified rather than categorized in research, such as by using the 15-item International Index of Erectile Function (IIEF) scale, or the 5- or 6-item IIEF erectile function domain (IIEF-EF-5 or IIEF-EF-6).<sup>1,2</sup>

ED is multifactorial, with risk factors including older age, obesity, stress, anxiety, substance use disorders, major mental illness, medical and especially endocrine

and cardiovascular disorders, use of certain medications, prostate surgery, and others. Accordingly, the prevalence of ED is nuanced, varying widely not only with how ED is defined but also with the population and subpopulation studied. As examples, in a nationally representative sample of 1822 US men aged 18–87 years, the overall prevalence of ED was 24.2%. The prevalence was 17.9% in men aged 18–24 years and 52.2% in those aged >75 years.<sup>3</sup> In meta-analyses of epidemiological studies of subpopulations, ED was present in 43% of men who survived cancer,<sup>4</sup> 44% of men with schizophrenia,<sup>5</sup> 53% of men with diabetes,<sup>6</sup> 74% of men with diabetes and depressive symptoms,<sup>7</sup> and 76% of men with chronic kidney disease.<sup>8</sup>

ED negatively impacts psychosocial well-being,<sup>9</sup> is associated with poorer quality of life,<sup>10</sup> and predictably

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Table 1.

**Important Findings From the Meta-Analysis by Khera et al<sup>16</sup>**

1. In all 11 RCTs, aerobic exercise was numerically better than nonexercising control conditions for improving IIEF-EF scores; statistical significance, however, was attained in only 5 RCTs
2. Aerobic exercise was significantly better than nonexercising control conditions for improving IIEF-EF scores (MD, 2.8; 95% CI, 1.7–3.9; 11 RCTs; N = 1,147). Heterogeneity was moderate ( $I^2 = 53\%$ ). In sensitivity analyses that removed 1 study at a time, the MD values ranged from 2.2 to 3.0, and all values remained statistically significant
3. In metaregression analysis, lower baseline IIEF-EF scores were associated with greater improvement with exercise. The MD values for exercise vs control conditions were 2.3, 3.3, and 4.9 for mild, moderate, and severe erectile dysfunction, respectively
4. In metaregression analysis, age, percentage of men with ED, supervision of exercise, duration of exercise intervention, and use of phosphodiesterase-5 inhibitors did not significantly moderate the benefits of exercise
5. There was no evidence for small study effects or of publication bias

Abbreviations: IIEF-EF = International Index of Erectile Function scale, erectile function domain, MD = mean difference.

decreases marital satisfaction.<sup>11</sup> Among many treatments available for ED, phosphodiesterase-5 inhibitor drugs, especially sildenafil, provide strong evidence for immediate and consistent, though transient, benefit.<sup>12,13</sup> Given that many lifestyle diseases are risk factors for ED and that physical exercise reduces the risk of or results in improvements in lifestyle diseases,<sup>14,15</sup> it is reasonable to examine whether physical exercise benefits ED. A recent meta-analysis on the subject is examined in the rest of this article.

**Aerobic Exercise and Erectile Function**

Khera et al<sup>16</sup> described a systematic review and meta-analysis of randomized controlled trials (RCTs) that examined the effect of aerobic exercise on erectile function. The authors identified 11 relevant RCTs (pooled N = 1,147 men) through electronic searches, manual searches, and searches of reference lists. RCTs that qualified for inclusion compared aerobic exercise interventions (pooled N = 636) with nonexercising control conditions (pooled N = 511).

These 11 RCTs had been conducted in North America (2 studies), South America (2 studies), Africa (1 study), and Europe (6 studies) and were published between 2004 and 2021. All RCTs had been conducted in subjects with medical and/or surgical conditions that included overweight, obesity, diabetes mellitus, hypertension, metabolic syndrome, androgen deficiency, cardiovascular surgery, and prostate surgery. Sample sizes ranged from a low of 20 to a high of 372 (median, 60). The mean age of the men in the studies ranged from 39 to 69 years (median, 59 years).

In these RCTs, the exercise intervention was supervised or unsupervised, was individually tailored or conducted in groups, and involved walking, treadmill use, cycling, and other activities, across 2–24 months (median, 6 months). Exercise sessions were commonly 30–60 min in duration at a frequency of 3–5 sessions/wk. Exercise intervention was commonly combined with advice for dieting and weight loss. Control conditions included waitlist, lifestyle advice, usual activity, and usual care.

Important findings from the meta-analysis<sup>16</sup> are presented in Table 1. In summary, aerobic exercise was significantly superior to nonexercising control conditions, with greater improvement in erectile functioning observed in subjects with greater baseline impairment in erectile functioning.

**Comments and Observations**

There are 2 downsides of the findings of this meta-analysis.<sup>16</sup> One is that it is impossible to blind subjects to the nature of the active intervention; besides exercise, this limitation applies to meditation, yoga, psychedelic therapies, many somatic therapies, and psychotherapies, as well. So, placebo effects may at least partly drive the measured benefits of the active intervention. On the positive side, such findings may more accurately reflect what might be observed in real-world practice where treatment is unblinded. The findings will therefore have merit only if the benefits are shown to be sustained.

The other and more important downside is that the magnitude of benefit was modest and of limited clinical significance. The smallest improvement in the IIEF-EF that could be considered clinically important is 2, 5, and 7 points for mild, moderate, and severe ED.<sup>17</sup> In the meta-analysis by Khera et al,<sup>16</sup> the required threshold for improvement with aerobic exercise was met only for subjects with mild ED (Table 1).

The meta-analysis<sup>16</sup> suggests the thought that aerobic exercise as a sustained lifestyle change, rather than as a short-term intervention, may result in sustained improvements in men with ED; this is a possibility worth examining in follow-up studies.

**Parting Notes**

ED associated with aging, obesity, diabetes mellitus, cardiovascular disorders, and many other states evolves across time, and aerobic exercise as a lifestyle behavior may reduce the evolution of ED to the extent that it reduces stress, anxiety, depression, weight gain, hemoglobin A<sub>1c</sub> levels, atherosclerotic changes, and other predispositions to ED. Such a protective effect of

moderate to high levels of physical activity (against ED) has long been known and was demonstrated in a meta-analysis published almost 2 decades ago.<sup>18</sup>

Physical exercise improves sexual functioning in women, as well.<sup>19,20</sup> The manifold health benefits of exercise<sup>14,15</sup> therefore recommend regular exercise as a lifestyle behavior for the primary and secondary prevention of a wide range of physical and mental health conditions in both men and women, and not only for the improvement of sexual functioning.

It goes without saying that lifestyle guidance to prevent or treat ED, and other physical and mental health disorders should not be limited to exercise alone. Ample research is available to support roles for healthy diet, maintenance of ideal body weight, adherence to recommended medical treatments, avoidance of smoking, drinking, and illicit substance use, and others.

## Article Information

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