# Physical Activity and PDE5 Inhibitors in the Treatment of Erectile Dysfunction: Results of a Randomized Controlled Study

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**ABSTRACT**

***Introduction.*** Physical activity (PhA) has proven to be a protective factor for normal erectile function in numerous epidemiological studies.

***Aim.*** The aim of this study was to establish if PhA could have a therapeutic role in the treatment of erectile dysfunction (ED).

***Methods.*** This was a randomized, open-label study. A total of 60 patients complaining of ED were studied. Patients were assessed at baseline and after 3 months of study treatment. At baseline, patients were randomized to receive phosphodiesterase type 5 inhibitor (PDE5i) alone (group A) or PDE5i plus regular (≥3 hours/week), aerobic, non-agonistic PhA (group B).

***Main Outcome Measures.*** All subjects completed the International Index of Erectile Function (IIEF-15) questionnaire and performed total testosterone (TT).

***Results.*** Mean PhA was 3.4 hours/week in group B vs. 0.43 in group A; mean energy expenditure in group B was 1,868 kcal/ week or 22.8 metabolic equivalent (MET)/week. IIEF restoration of ED occurred in 77.8% (intervention group) vs. 39.3% (control) ($P < 0.004$). The IIEF-15 score resulted in statistical improvement in intervention group in all the domains but one (orgasm): erectile function 24.7 vs. 26.8 ($P = 0.003$); confidence (Q15) 3.53 vs. 4.07 ($P = 0.006$); sexual desire 6.46 vs. 7.18 ($P = 0.028$); intercourse satisfaction 9.85 vs. 11.25 ($P = 0.001$); total satisfaction 7.17 vs. 8.07 ($P = 0.009$); total score 56.2 vs. 61.07 ($P = 0.007$). TT was statistically similar in the two groups; separate analysis in each group showed statistical increase in group B 4.24 vs. 4.55 ($P = 0.012$). At multivariate logistic regression analysis, PhA was the only independent variable for normal erection ($P = 0.010$) (95% confidence interval [CI] 0.036–0.643), higher sexual satisfaction ($P = 0.022$) (95% CI 0.084–0.821) and normal total IIEF-15 score ($P = 0.023$) (95% CI 0.85–0.837).

***Conclusion.*** In this randomized controlled pilot study, PDE5i plus PhA was more effective than PDE5i alone in the treatment of ED. **Maio G, Saraeb S, and Marchiori A. Physical activity and PDE5 inhibitors in the treatment of erectile dysfunction: Results of a randomized controlled study. J Sex Med 2010;7:2201–2208.**

***Key Words.*** Physical Activity; Sport; Exercise; Fitness; Treatment; Therapy; Erectile Dysfunction; PDE5 Inhibitors; Sildenafil; Tadalafil; Vardenafil

## Introduction

Numerous studies have reported the importance of physical activity (PhA) in the prevention of cardiovascular diseases [1–3]. The National Institutes of Health Consensus Development Panel on Physical Activity and Cardiovascular Health recommends that all Americans should engage in regular PhA [4].

Regular exercise has also proven to be beneficial on erectile function in several epidemiological studies [5–9]. Data from the Massachusetts Male Aging Study, including a sample of 1,156 men aged 40–70 years followed for approximately 8.8 years, showed that the lowest risk for erectile dysfunction (ED) was among men physically active at both baseline and follow-up compared to those who were sedentary (<200 kcal/day of PhA), probability

for ED (95% confidence interval [CI]) was 14% vs. 27% ($P = 0.013$) [5].

Kratzik et al. in a cross-sectional study on 674 men, aged 45–60 years, at their place of work reported a positive correlation between International Index of Erectile Function (IIEF)-5 and PhA from 1,000 to 4,000 kcal/week ($r = 0.164$; $P < 0.001$); the risk of severe ED was decreased by 82.9% with at least 3,000 kcal/week energy expenditure (EE) (odds ratio [OR] = 0.171, $P = 0.018$) [6].

In the Health Professionals Follow-up Study, a cohort study on 22,086 men, PhA was associated with lower risk for ED; the multivariate relative risk was 0.7 (95% CI 0.6–0.7) for >32.6 metabolic equivalent of exercise per week; interestingly all included exercise types, ranging from walking, jogging, running, cycling, tennis and squash demonstrated significant benefits [7].

In a population study on 2,412 men aged 40–70 years, from four different countries, Nicolosi et al. reported that ED was inversely associated with PhA (OR = 0.5) [8].

A meta-analysis by Cheng et al. including seven cross-sectional studies revealed that the presence of ED was negatively associated with PhA; the study reported a dose–response relationship between ED and PhA, with higher PhA conferring lower risks for ED (OR = 1 for low activity, OR = 0.63 for moderate activity, and OR = 0.42 for high activity) [9].

## Aim

The aim of the present study was to establish if PhA could have a therapeutic role in association with phosphodiesterase type 5 inhibitors (PDE5i) in the treatment of ED. As far as we know, no study has been published to date on the association of PhA with the standard PDE5i treatment in subjects with ED.

## Methods

### *Patients*

Males aged 40–60 years affected by ED of any grade, who where PDE5i naïve and did not take any significant PhA (less than 2 hours/week), were recruited for the study and underwent preliminary andrological evaluation (T0) which included detailed medical history, physical examination, fasting glucose, total and high-density lipoprotein (HDL) cholesterol, total testosterone (TT), and

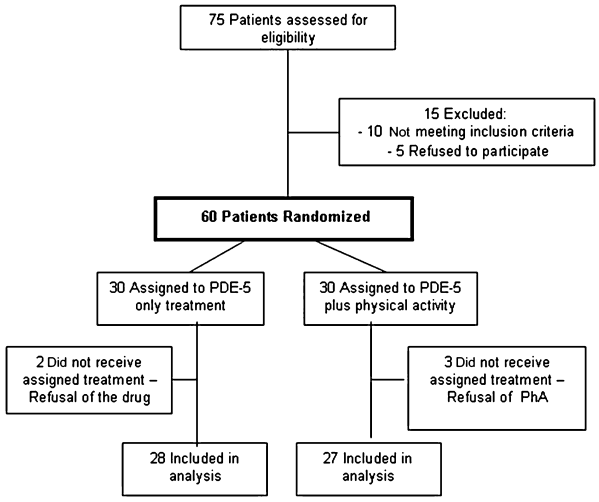


**Figure 1** Consort flow of patients progress through the trial. PDE5 = phosphodiesterase type 5; PhA = physical activity.

PDE5i prescription. Exclusion criteria were: (i) ED secondary to radical pelvic surgery due to actual or potential nerve damage, spinal trauma, or hypogonadism; (ii) contraindications to PhA; (iii) patient refusal to be physically active; (iv) no responders to PDE5i; (v) contraindications to PDE5i. Between June 2007 and September 2008, 75 patients examined at our center were assessed for eligibility. After 6 weeks, in which patients took PDE5i, they were reevaluated (baseline evaluation) in order to select eligible patients. At this evaluation, 15 patients were excluded and 60 were accepted and consequently randomly assigned to either the intervention or control group using a computer-generated random number sequence (Figure 1). This project was approved by an Institutional Review Board; all subjects provided written informed consent for voluntary, unpaid participation.

Participants were randomized to receive PDE5i alone (group A, control) or PDE5i plus regular (≥3 hours/week) aerobic non-agonistic PhA (group B, intervention) for 3 months. Patients in the intervention group were given detailed information on the importance of PhA in improving vascular apparatus and possibly penile vascularization and ED in improving risk factors for ED such as diabetes, hypertension and dyslipidemia; it was also carefully explained that good results depended on maintaining regular PhA (three times or more a week) and exercise for at least 3 hours a week. Each patient in this group received accurate information on the type and intensity of PhA (see below) and on the importance of calculating heart rate as a measure of PhA intensity; thorough