

Aerobic fitness testing in patients with early Rheumatoid Arthritis

- A comparison of two sub-maximal methods

Haglund EK¹, Bremander AB^{1,3}, Stenström CH², Petersson IF^{1,3}

¹R&D-center, Spenshult Hospital for Rheumatic Diseases, Halmstad, ²Karolinska Institute, Neurotec department, Division of Physical therapy, Huddinge,

³Department of Orthopedics, Clinical Sciences Lund, Lund University, Sweden

Conclusion

Our findings indicate that the bicycle test and the treadmill test cannot be used interchangeably in patients with early rheumatoid arthritis (RA). The treadmill test tended to result in higher aerobic capacity as compared to the bicycle test and the most important factor associated with the difference was body weight.

Objective

Several studies have found that aerobic fitness is reduced among individuals with RA. For evaluation of aerobic fitness, two sub-maximal tests, a bicycle ergometer test and a treadmill test validated for females with arthritis are used interchangeably, both measuring VO_{2max} (peak, oxygen consumption measured in ml O_2 /kg x min).

The objectives was:

- to study if there was a difference between the outcomes of the two sub-maximal aerobic fitness tests.
- to study factors associated with such a difference between the tests.

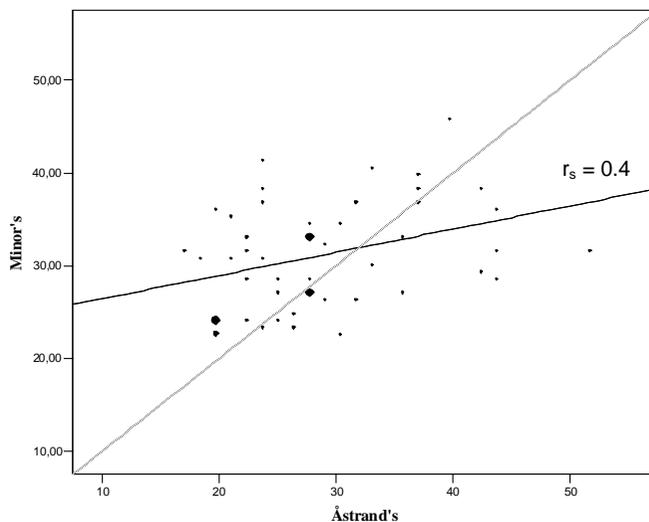


Figure. VO_{2max} in Åstrand's and Minor's sub-maximal test N=52. Scale ●n=3 ●n=2 ●n=1.

Factors included in analysis	Odds Ratio	95% Confidence Interval
Sex (1=men)	0.94	0.01 - 8.99
Weight (kg)	1.18	1.05 - 1.32
Test order (1=treadmill)	0.60	0.13 - 2.81
HAQ score	1.97	0.30 - 12.88
Age (yrs)	0.95	0.88 - 1.02

Table. Logistic regression analyses with included factors and their association to the difference between the two tests.

Result

- There was a significant difference ($p=0.01$) between the outcomes of the two aerobic fitness tests, with a higher VO_{2max} in the treadmill test.
- There was also a significant difference between perceived exertion ($p<0.001$), with higher ratings after the bicycle test.
- Agreement by plotting differences against the mean visualised a low agreement, not clinically acceptable for measuring VO_{2max} (-13.4 to 18.4 ml O_2 /kg x min).
- The only independent variable related to the difference between the two tests was high body weight (OR 1.18 95% CI 1.05 – 1.32, $p= 0.005$) multiple regression analysis.

Method

52 outpatients (62 % women) with early RA (<6 years ACR 1987 criteria) and stable disease, median age 53 (23-66) years, number of tender 4 (0-26) and swollen joints 3 (0-24), and median HAQ disability score 0.5 (0-1.5) performed the two sub-maximal aerobic fitness tests in random order on the same day. The subjects also reported perceived central and peripheral exertion according to the Borg scale after each of the two tests.



Spearman's correlation coefficient (r_s) and Bland and Altman plots were used to calculate agreement. Wilcoxon's signed ranks test were used to calculate differences between the two tests. Logistic regression analysis was used to study the association between age, sex, weight, HAQ score, and test order with respect to the difference between the tests (dependent variable).