Research Report Poster Presentation
Number: RR-PO-05-04-Mon
Monday 4 May 2015 13:00
Exhibit halls 401–403

USING A PREDICTIVE MODEL OF SUBMAXIMAL EXERCISE TESTING TO TRACK AEROBIC CAPACITY: A 4 MONTH RANDOMISED CONTROLLED TRIAL

G. Lavelle, J. Fortune, J. Gormley

Trinity College Dublin, Discipline of Physiotherapy, Dublin, Ireland

Background: Maximal exercise testing provides valuable information and is widely considered a gold standard measure of aerobic capacity (VO_{2max}). However, maximal exercise testing can be very labour intensive and can pose potentially hazardous in certain populations; such as the elderly, those previously sedentary or individuals with a history of chronic lung or heart conditions. Consequently, sub maximal exercise testing is used in a variety of clinical and research settings. Submaximal exercise testing can be divided into two broad categories: predictive or performance based. Much of the literature to date involving submaximal exercise testing employs prediction equations to estimate oxygen consumption at a given sub maximal workload. Maximal oxygen uptake is then estimated based upon these original predictions. There is a paucity of research using indirect calorimetry to measure oxygen uptake while undertaking submaximal exercise testing.

Purpose: This randomised controlled trial examined the change in predicted VO_{2max} in response to a 16 week aerobic exercise intervention. Indirect calorimetry was used to measure oxygen consumption throughout the submaximal test.

Methods: Previously sedentary, healthy, individuals were randomised to either a control group or to an exercise group. The intervention group undertook bi-weekly supervised aerobic sessions. Submaximal exercise testing, following a modified Bruce protocol, was conducted by a blinded assessor at baseline, 8 weeks and 16 weeks. A predictive model, know as a multi- stage model for estimating VO_{2max}, was used.

Results: Baseline measurements were obtained for 25 healthy, sedentary males ($n = 10$) and females ($n = 15$) (mean ± SD: age 37.93 ± 13.428 yr; body mass index 25.964 ± 3.57 kg/m^2). Of those who commenced the programme, 87% ($n = 20$) completed the 4 month programme (control $n = 11$, intervention $n = 9$). Data analysis was conducted using mixed method ANOVA on individuals with fitness readings at each of the 3 specified timepoints. The exercise group demonstrated marked increases in mean fitness half-way through the intervention (33.3 ± 7.7 ml kg^{-1} min^{-1} to 37.8 ± 13.46 ml kg^{-1} min^{-1}). However, this group demonstrated a plateau at 16 weeks (37.5 ± 11.52 ml/kg/min). A continuous decrease in mean fitness over time was detected in the control group.

Conclusion(s): A mean increase in cardiorespiratory fitness was detected following an 8 week aerobic exercise intervention, using this method of submaximal exercise testing. There was no mean increase in fitness from 8 weeks to programme completion for the intervention group which may be indicative of a ceiling effect of this predictive method or a plateau in fitness from 8 weeks to 16 weeks.

Implications: Cardio-respiratory fitness is associated with lower risk of all-cause mortality and cardiovascular disease. The practice, application and correct interpretation of cardio-respiratory measurement is paramount. This piece of research adds to ever-growing knowledge base on the accuracy of submaximal testing in predicting maximal oxygen uptake.

Keywords: Exercise testing; Submaximal; Aerobic intervention

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Ethics approval: Ethical approval was sought and granted by St James's and Tallaght Hospital Research Ethics Committee.

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Research Report Platform Presentation
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Room 303–304

THE EFFECTS OF A 16 WEEK AEROBIC EXERCISE PROGRAMME ON CIRCULATING LYMPHOCYTE SUBPOPULATIONS: A RANDOMISED CONTROLLED TRIAL

G. Lavelle [1], J. Gormley [1], D. Doherty [2]

[1] *Trinity College Dublin, Discipline of Physiotherapy, Dublin, Ireland*; [2] *Trinity College Dublin, Department of Immunology, Dublin, Ireland*

Background: The role of aerobic exercise in disease prevention is well established and has been highly validated. The effect of both acute and chronic exercise on the immune system has also been widely studied over the last few decades. It has been determined that an acute bout of exercise can have a transient immunosuppressive effect, leading to an increased susceptibility to infection known as the "open window theory". On the contrary chronic exercise may have a long-term protective effect. The intensity and duration of exercise has also come into question, however most studies to date have focused their attention on elite athletes and the effects of overtraining.

Purpose: The innate immune system plays a very important role as the first line of defense against foreign invaders

(antigens) and tumour cells. The adaptive immune system employs a more advanced level of specificity and also plays a major role in combating infection and viral illness.

The aim of this study was to examine the effect of the American College for Sports Medicine's aerobic activity recommendations on the innate (NK cells) and adaptive (B-cells, T-cells) immune systems, over a 4 month intervention period.

Methods: Following randomisation the intervention group undertook bi-weekly supervised aerobic sessions, following a standard progression of intensity and duration. A home exercise programme complimented the classes to achieve the recommended guidelines. Fasting venous blood samples were obtained at baseline, 8 weeks and 16 weeks. The frequencies of $CD4^+$ and $CD8^+$ T-cells, B-cells and natural killer cells were determined by multicolour flow cytometry.

Results: Baseline measurements were obtained from 25 healthy, sedentary males ($n = 10$) and females ($n = 15$) (mean ± SD: age 37.93 ± 13.428 yr; body mass index 25.964 ± 3.6 kg/m^2). Of those who commenced the programme, 87% ($n = 20$) completed the 4 month programme (control $n = 11$, intervention $n = 9$).

A similar trend for both cytotoxic T-cells (CD8) and helper T-cells (CD4) was observed in both the control and exercise groups. While % CD8 cells rose to peak values at week 8 for both groups, % CD4 cells fell below baseline levels at this timepoint, irrespective of group allocation. While the % NK cells fell from 12.99 ± 7.38% to 11.29 ± 7.39 over the 4 month period for control participants there was a steady rise for those exercising (10.36 ± 6.22%, 10.48 ± 6.54% and 12.2 ± 5.29%, respectively). No significant difference in b-cells was noted.

Conclusion(s): The trending peaks and falls of mean T-cells were similar for both groups and so cannot be isolated to the effect of exercise alone. However, the steady rise of NK cells compared to a decline for control participants may indicate the potential long-term immune-protective effects of regular aerobic exercise.

Implications: This work adds to the wealth of promising evidence supporting the benefits of participating in regular aerobic activity. Most promising is the finding that a 4 month intervention, lead to a steady rise of tumour combating natural killer cells.

Keywords: Exercise intervention; Immune system; Aerobic

Funding acknowledgements: This work was funded by Trinity College Dublin.

Ethics approval: Ethical approval was sought and approved by St James's and Tallaght hospital Research Ethics Board.

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Research Report Platform Presentation
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Room 328–329

EFFECTIVENESS OF AUGMENTING THERAPY TIME IN CIRCUIT CLASS THERAPY ON MOBILITY OF UPPER/LOWER EXTREMITY POST STROKE: A RANDOMIZED PILOT STUDY

I.U. Lawal [1], I. Lawal [2,3]

[1] *Bayero University, Department of Physiotherapy, Kano, Nigeria*; [2] *Bayero University, Physiotherapy, Kano, Nigeria*; [3] *University of the Western Cape, Physiotherapy, Cape Town, South Africa*

Background: Stroke is a debilitating medical and neurological condition. It is the leading cause of adult disability worldwide. About half of stroke survivors suffer impaired mobility and close to a third remain dependent on caregivers to for outdoor mobility needs six-month post stroke and sometimes beyond. Rehabilitation remains the hallmark of managing mobility deficits accompanying stroke. Presently, a key advocacy in neuroscientific studies for stroke rehabilitation is that therapy should be directed towards task specificity. Task Specific Training in form of Circuit Class Therapy and the intensity of multiple repetition of the task has been identified as physiological mechanisms behind sustained motor learning following stroke. In stroke survivors accomplishing multiple repetitions is affected by the poor reaction time. Seemingly, stroke survivors will require longer time to achieve increased intensity of repetitions especially in Circuit Class Therapy where multiple task specific activities are to be performed within a single therapy session if the rehabilitation goal is to be achieved.

Purpose: To evaluate the relative effectiveness of varied durations of Circuit Class Therapy in the rehabilitation of upper and lower extremity mobility after stroke.

Methods: Fifteen hemiparetic stroke survivors (first ever stroke < 12months), were recruited to participate in this pilot study. Participants were randomly allocated to three equal groups based on the duration of circuit class therapy including 60-minutes ($n = 5$), 90-minutes ($n = 5$), and 120-minutes ($n = 5$) (denoted A, B and C respectively). Participants in each group performed intensive circuit class therapy (CCT), involving 10-workstations, and three sessions per week, with each session lasting according to group. Participants were assessed for mobility of the upper and lower extremity using 10-minute walk test (10MWT) used for gait speed, Six minute walk test (6MWT) used for functional capacity, Action research arm test (ARAT) used for upper extremity function, Motor Activity Log and the upper limb and mobility domains of the stroke specific quality of life questionnaire. Comparison was made between the three groups to determine