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A COMPARISON BETWEEN THE EFFECTS OF LAND AND WATER BASED EXERCISES IN PATIENTS WITH RHEUMATOID ARTHRITIS

by

Kim Nolte

Submitted in fulfillment of the requirements for the degree

Magister Artium (HMS)

in the

Faculty of Humanities
Department of Biokinetics, Sport and Leisure Sciences

University of Pretoria

Pretoria, February, 2002

DEDICATION

THIS DISSERTATION IS DEDICATED TO ALL RHEUMATOID ARTHRITIS SUFFERERS

ACKNOWLEDGEMENTS

I WOULD LIKE TO EXPRESS MY SINCERE THANKS AND GRATITUDE TO THE FOLLOWING PERSONS AND INSTITUTIONS FOR THEIR GUIDANCE, WITHOUT WHO'S ASSISTANCE, THIS STUDY WOULD NOT HAVE BEEN POSSIBLE.

PROFESSOR P E KRUGER, (DEPARTMENT OF BIOKINETICS, SPORT & LEISURE SCIENCES, UNIVERSITY OF PRETORIA), WHO ACTED AS MY PROMOTER. FOR HIS TIME, SUPPORT AND GUIDANCE.

DR C JANSE VAN RENSBURG, (DEPARTMENT OF SPORTS MEDICINE, UNIVERSITY OF PRETORIA), WHO ACTED AS MY CO-PROMOTER. FOR HER ENTHUISIASM, SUPPORT, GUIDANCE AND ASSISTANCE WITH EVALUATIONS.

A M VAN DER MERWE, (INSTITUTE OF PATHOLOGY, UNIVERSITY OF PRETORIA), FOR THE ANALYSIS OF BLOOD SAMPLES.

HEINRICH NOLTE, (MY HUSBAND). FOR HIS LOVE, PATIENCE, SUPPORT AND GENERAL ASSISTANCE.

YVONNE DE'ATH, (MY MOTHER). FOR HER SUPPORT, UNCONDITIONAL LOVE AND GENERAL ASSISTANCE.

SUBJECTS WHOM PARTICIPATED IN THE STUDY: FOR THEIR TIME, SUPPORT AND WILLINGNESS IN ASSISTING ME.

NATIONAL RESEARCH FOUNDATION: THEIR FINANCIAL ASSISTANCE TOWARDS THIS RESEARCH IS HEREBY ACKNOWLEDGED. OPINIONS EXPRESSED AND CONCLUSIONS ARRIVED AT, ARE THOSE OF THE AUTHOR AND ARE NOT NECESSARILY TO BE ATTRIBUTED TO THE NATIONAL RESEARCH FOUNDATION.

INSTITUTE FOR SPORTS RESEARCH, UNIVERSITY OF PRETORIA: THE USE OF THEIR EQUIPMENT IN THE EVALUATIONS OF THE SUBJECTS AND EXERCISE PROGRAMMES.

CHRISTINE SMITH: ASSISTANCE WITH THE ANALYSIS OF STATISTICAL DATA.

JACOB MAKAFULA: FOR THE TRANSPORT OF BLOOD SAMPLES.

Synopsis

Title	**A comparison between the effects of land and water based exercises in patients with Rheumatoid Arthritis**
Candidate	**Kim Nolte**
Promoter	**Prof. PE Krüger**
Co-Promoter	**Dr C Janse van Rensburg**
Degree	**MA (HMS)**

Rheumatoid Arthritis (RA) is the most common type of chronic inflammatory arthritis (Thompson, 1998). When appropriately prescribed, therapeutic exercise is useful in the care of patients with RA (Semble et al., 1990).

A pre-test - post-test randomized groups design was adopted for the study to compare the effects of a land- and water-based exercise programme in RA patients. A total of ten subjects, diagnosed with RA functional class I or II according to Steinbrocker, were assigned to either a group performing water-based exercises (W, n=4), a group performing land-based exercises (L, n=4), or a control group, who were requested to continue with their present sedentary lifestyle (C, n=2). For inclusion in the study, subjects were required to be on stable medication. Categories of dependent variables measured, were disease activity, haematology, functional and psychological status as well as physical status.

There was a reduction in total swollen and tender joint counts in both experimental groups, but not the control group. The reduction was greater in group W than group L. Total tender joint count (TJC) decreased by 53% ($p<0.10$) and the total swollen joint count (SJC) decreased by 31% ($p>0.05$) in group W. In group L, the total TJC decreased by 4,7% ($p>0.05$) and the total SJC decreased by 8,5% ($p>0.05$).

The haematological values remained globally unchanged in all three groups concerning the hemolglobin (Hb) values.

There were changes in the erythrocyte sedimentation rate (ESR) in the groups, however changes were not significant ($p>0.05$). The ESR decreased by 29% in group W and by 33% in group C. There was a slight increase in group L's ESR (11,9%) but values remained within the normal range.

There was an improvement in the patients self-assessed disability and psychological status in the experimental groups while there was a deterioration in the control group's. Health Assessment Questionnaire (HAQ) scores improved by 15% in group W ($p>0.05$), 18% in group L ($p>0.05$) and deteriorated by 13% in group C ($p>0.05$). There was no change in the total Profile of Mood States (POMS) score of the control group, however, significant ($p<0.05$) improvements were observed in the experimental groups. There was a 163% improvement in group L's and a 99% improvement in group W's affective states.

As far as physical condition is concerned, in general, there was an improvement in group W and group L's physical condition, while there was no improvements noted in group C.

Group W showed the following changes in physical condition :

Body mass decreased by 9,2% ($p>0.05$). Mean blood pressure values remained unchanged. 50-ft walk time improved by 18% ($p<0.05$). Right and left grip strength increased by 18% and 35% respectively, ($p<0.05$). Absolute VO_2max increased by 28% and relative VO_2max increased by 30% ($p<0.05$). Right knee flexor strength increased by 43% ($p<0.05$) and left knee flexor strength by 24% ($p>0.05$). Increases in right and left knee extensor strength were 32% ($p>0.05$) and 34% ($p>0.05$) respectively. Improvement in joint mobility was also noted. There was a significant ($p<0.05$) improvement in both right and left wrist extension range of motion(ROM). Right wrist extension ROM improved by 49% and left wrist extension ROM improved by 31%. Improvements were also noted in wrist flexion ROM however changes were not significant ($p>0.05$). There was an 12% and 19% increase in right and left wrist flexion ROM respectively. In

addition, there was a 12% ($p<0.05$) increase in right knee flexion ROM and a 14% increase in left knee flexion ROM ($p<0.05$).

Group L showed the following changes in physical condition :

Mean body mass and blood pressure remained unchanged. 50-ft walk test time improved by 15% ($p<0.05$). Right and left grip strength increased by 4,8% and 16.1% respectively ($p>0.05$). Relative VO_2max increased by 16.6% and absolute VO_2max by 31% ($p<0.05$). Right knee flexor strength increased by 22.1% and left knee flexor strength by 23.8% ($p>0.05$). Increase in right and left knee extensor strength was 9% and 2,4% respectively ($p>0.05$). Right wrist extension ROM increased by 20.7% and left wrist extension ROM increased by 15,7% ($p>0.05$). There was a significant ($p<0.05$) increase in left wrist flexion (7,6%), but right wrist flexion ROM decreased by 2.6% ($P>0.05$). Improvements in right and left knee flexion ROM were also significant ($p<0.05$), 9,2% and 7,4%, respectively.

Group C showed the following changes in physical condition :

Mean body mass increased by 2% ($p>0.05$), while blood pressure and 50-ft walk time remained globally unchanged. Left grip strength decreased by 16% ($p>0.05$) and right grip strength remained the same. Although not significant ($p>0.05$), there was a 11% decrease in relative VO_2max and a 6,7% decrease in absolute VO_2max. Muscle strength also showed deterioration in group C. Right and left knee flexor strength decreased by 1,8% and 12%, respectively ($p>0.05$). Left knee extensor strength remained unchanged while right knee extensor strength decreased by 9,7% ($p>0.05$). Right wrist extension ROM decreased by 4.7% and left wrist extension ROM increased by 6.7%, although the increase was not significant ($p>0.05$). While right wrist flexion ROM decreased by 1,3% and left wrist flexion ROM decreased by 21% ($p>0.05$). There were no significant ($p>0.05$) changes in group C's right and left knee flexion ROM. Right knee flexion ROM decreased by 1,2% and left knee flexion ROM increased by 1,2%.

Based on the above results of the study, both exercise interventions are beneficial in the treatment of RA. Appropriate land-based exercises do not appear to enhance disease

activity, however, the water-based exercise programme was superior in controlling the disease activity. Further research is required, using larger samples and evaluating the long-term effects of various exercise interventions.

Key Words: Rheumatoid Arthritis, Exercise Therapy, Rehabilitation, Water-based Exercises, Land-based Exercises

Sinopsis

Titel	**'n Vergelyking tussen die effek van land en water gebaseerde oefeninge in patiente met Rheumatoide Arthritis**
Kandidaat	**Kim Nolte**
Promotor	**Prof. PE Krüger**
Mede-Promotor	**Dr C Janse van Rensburg**
Graad	**MA (MBK)**

Rheumatoide Artritis (RA) is die mees algemeenste tipe kroniese inflammatoriese artritis (Thompson, 1998). Indien dit korrek voorgeskryf word, kan terapeutiese oefeninge waardevol wees in die behandeling van pasiente met RA (Semble, et al.,1990).

'n Voortoets – natoets lukraak toegewysde groepsontwerp is aangewend tydens die studie, met die doel om 'n vergelyking te tref tussen die gevolge van 'n land- en water-gebaseerde oefenprogram vir RA pasiente. 'n Totaal van tien probante, gediagnoseer met RA funksionele klas I of II (volgens die Steinbrocker klassifikasie stelsel) is toegewys na onderskeidelik 'n groep wat water-gebaseerde oefeninge doen (W, n = 4), 'n groep wat land-gebaseerde oefeninge doen (L, n = 4), en 'n kontrole groep wie gevra is om voort te gaan met hul huidige sedentêre lewensstyl. Vir toelating tot die studie is vereis dat proefpersone op stabiele medikasie was. Kategorieë van afhanklike veranderlikes wat gemeet is, sluit in siekte-aktiwiteit, hematologie, funsionele en psigologiese status so wel as fisieke status.

Daar was 'n afname in die totale geswelde,-en teer-gewrig tellings in beide eksperimentele groepe, maar geen verskil in die kontrole groep nie. Die afname was egter groter in groep W as in groep L . In groep W het die totale-teer-gewrigs telling (TJC) met 53% ($p<0.10\%$) en die totale geswelde-gewrigs-telling (SJC) met 31% ($p>0.05$) onderskeidelik afgeneem. In groep L het die totale TJC afgeneem met 4,7% ($p>0.05$), en die totale SJC met 8,5% ($p>0.05$).

Die hematologie waardes het geen veranderings getoon vir enige van die drie groepe nie met die betrekking tot die hemoglobien. Daar was wel veranderinge in die groepe se eretrosiet sedimentasie tempo (ESR), maar hierdie veranderinge was onbeduidend ($p>0.05$). Die ESR het afgeneem met 29% in groep W en met 33% in groep C. Daar was a klein toename in groep L se ESR (11,9%), maar die waardes het binne die normale reikwydtes gebly.

Daar was 'n verbetering in die pasiente se self-geassesseerde gestremdheid en psigologiese status in die eksperimentele groepe, terwyl daar 'n afname was in die kontrolegroep. Die Gesondheids Evaluerings Vraelys (HAQ) het 'n verbetering van 15% vir groep W getoon ($p>0.05$), 18% vir groep L ($p>0.05$) en 'n negatiewe verandering van 13% vir groep C ($p>0.05$). Daar was geen veranderinge in die totale gemoedstoestand profile (POMS) vir groep C nie, maar wel beduidende ($p<0.05$) verbeteringe vir die eksperimentele groepe met onderskeidelik 163% en 99% vir groepe L en W onderskeidelik.

Beide groepe L en W het in die algemeen verbeterings in hul fisieke kondisionering getoon, terwyl daar geen verbetering in groep C voorgekom het nie.

Groep W het die volgende veranderinge in hul fisieke kondisionering getoon :

Liggaamsmassa het met 9,2% ($p>0.05$) afgeneem, terwyl gemiddelde bloeddruk onverandered gebly. Die 50-voet looptoets se tyd het met 18% ($p<0.05$) verbeter. Beide regs en linker greepkrag het met ondeskeidelik 18% en 35% ($p<0.05$) verbeter. Absolute VO_2max het met 28%, en relatiewe VO_2max het met 30% toegeneem ($p<0.05$). Regter knie fleksorkrag het met 43% verbeter ($p>0.05$) en die linker knie fleksorkrag met 24% ($p>0.05$). Toenames in regter- en linker knie ekstensorkrag was 32% ($p>0.05$) en 34% ($p>0.05$) onderskeidelik. Verder was daar ook verbeteringe in gewrigsomvang. Daar was beduidende verbeterings ($p<0.05$) in beide regter en linker gewrigsekstensie bewegingsomvang. Die regter en linker gewrig het verbeterings van onderskeidelik 49% en 31% vertoon. Die verbeteringe van onderskeidelik 12% en 19% vir die regter en linker gewrigs-fleksie was egter nie beduidend nie ($p>0.05$). Verder was daar beduidende

($p<0.05$) verskille van 12% en 14% onderskeidelik vir toenames in regter en linker knie fleksie bewegingsomvang.

Groep L het die volgende veranderinge in hul kondisionering getoon:

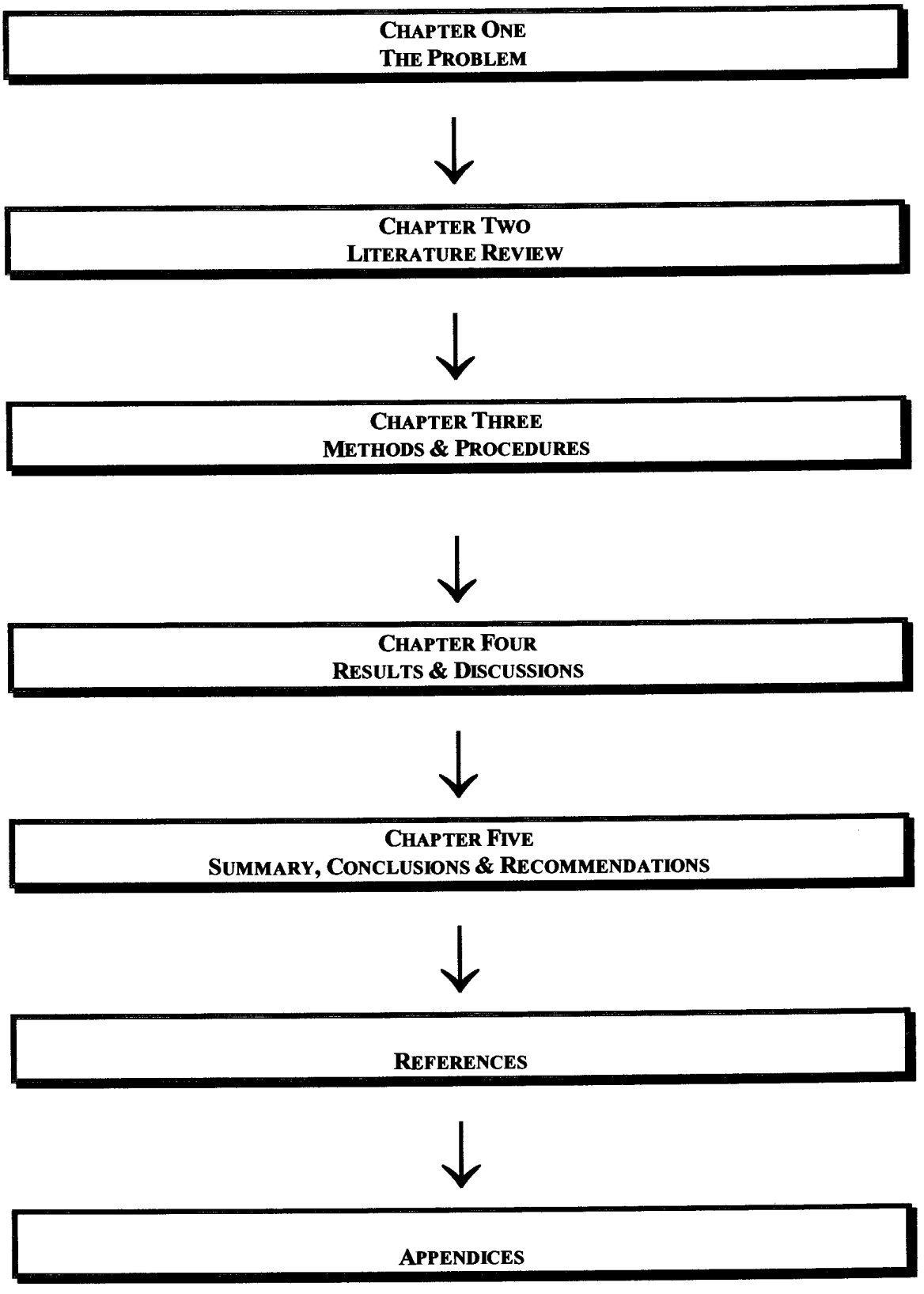
Gemiddelde liggaamsmassa en bloeddruk het onverandered gebly. Die 50-voet looptoets se tyd het met 15% ($p<0.05$) verbeter. Die regter en linker greepkrag het met onderskeidelik 4,8% en 16.1% ($p>0.05$) verbeter. Relatiewe VO_2max het met 16.6% toegeneem, terwyl die absolute VO_2max 'n toename van 31% getoon het ($p<0.05$). Regte knie fleksorkrag het met 22.1% en linker knie fleksorkrag met 24% ($p>0.05$) toegeneem. Toenames in regter en linker knie ekstensorkrag was onderskeidelik 9% en 2,4% ($p>0.05$). Die toenames in regter- en linker gewrigs ekstensie bewegingsomvang was 20.7% en 15,7% ($p>0.05$) onderskeidelik. Daar was 'n beduidende toename in linker gewrigs-fleksie van 7,6% ($p<0.05$), maar regs was daar 'n afname van 2.6% ($p>0.05$) in die bewegingsomvang. Verbeterings in beide die regter en linker knie-fleksie bewegingsomvang was beduidend ($p>0.05$) met 9,2% en 7,4% onderskeidelik.

Groep C se veranderinge in kondisionering was as volgs:

Gemiddelde liggaamsmassa het toegeneem met 2% ($p>0.05$). Beide die bloeddruk en tyd van die 50-voetlooptoets het onveranderd gebly. Die linker greepkrag het met 16% ($p>0.05$) afgeneem, terwyl die regter greepkrag onverandered gebly het. Alhoewel nie beduidend nie ($p>.0.05$), was daar 'n 11% afname in relatiewe VO_2max en 'n 6.7% afname in absolute VO_2max. Spierkrag het ook afnames getoon in groep C. Regter- en linker- knie fleksorkrag het met onderskeidelik 1,8% en 12% afgeneem ($p>0.05$). Linker knie ekstensorkrag het onverandered gebly, terwyl die regterbeen se waardes afgeneem het met 9,7% ($p>0.05$). Regtegewrigsektensie omvang het met 4.7% afgeneem en linkegewrigsekstensie omvang het met 6.7% toegeneem ($p>0.05$). Regtegewrigsfleksie omvang het met 1,3% afgeneem, terwyl linkegewrigsfleksie met 21% afgeneem het ($p>0.05$). Daar was geen beduidende ($p>0.05$) veranderinge in groep C se regter en linker knieg fleksie omvang nie, regter knie fleksie omvang het met 1,2% afgeneem en linker knie fleksie omvang het met 1.2% verbeter.

Na aanleiding van die studie se resultate is beide intervensies (water- en land-gebasseerde oefeninge) voordelig in die behandeling van RA. Korrekte land-gebasseerde oefeninge blyk nie die toestand van RA te vererger nie, maar die waterterapie (hidroterapie) was meer doeldtreffend in die beheer van die siektetoestand. Verdere navorsing met groter populasies is egter nodig om die langtermyn gevolge van verskeie oefeningsintervensies te evalueer.

Sleutelwoorde: Rheumatoide Artritis, Oefeningsterapie, Rehabilitasie, Water-gebasseerde oefeninge; land-gebasseerde oefeninge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