

# **EFFECT OF CONTINUOUS ASSISTIVE - PASSIVE EXERCISE ON PHYSIOLOGICAL PARAMETERS AMONG OBESE FEMALES**

by

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## DEDICATION

This dissertation is dedicated to my brother, Hennie Mentz.

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## SYNOPSIS

<b>TITLE</b>	: Effect of Continuous Assistive-Passive Exercise on Physiological Parameters among Obese Females
<b>CANDIDATE</b>	: N.W. Mentz
<b>SUPERVISOR</b>	: Dr H.J. van Heerden
<b>DEGREE</b>	: M.A. (HMS)

Continuous assistive-passive exercise (CAPE) is an exercise modality commonly applied in slimming clinics and has become popular for weight-loss among obese females. A pretest – posttest randomized groups design was adopted for this study to evaluate the efficacy of an eight-week CAPE programme, in conjunction with and without a specific dietary intervention. A total of 43 female subjects with a mean age of  $29.9 \pm 2.6$  yrs, stature  $164.2 \pm 6.5$  cm and mass of  $74.8 \pm 8.1$  kg were assigned to either a group performing CAPE and following a specific diet (PED;  $n = 15$ ), a group performing CAPE only and not following the specific diet (PE;  $n = 14$ ), or a group not performing CAPE but following the specific diet only (D;  $n = 14$ ). For inclusion in the study subjects were required to be physically suitable for a programme of CAPE, obese ( $>30\%$  relative body fat), sedentary, premenopausal and amenable to being assigned to any of the three study groups. Categories of dependant variables measured were body composition, morphology, cardio-respiratory response, pulmonary function, haematology and musculoskeletal function.

All the groups showed slight body composition improvements in body mass, body mass index, lean body mass and absolute body fat but with no significant differences ( $p > 0,05$ ) between groups. The reduction in relative body fat was greatest in group D (5.5%) and differed significantly ( $p < 0,05$ ) from that in group PE (0.2%) but not ( $p > 0,05$ ) from that in group PED (2.9%).

Similarly all groups showed slight morphological improvements in body girths and skinfold measures with no significant differences ( $p>0,05$ ) between groups, with the exception of the relaxed upper-arm girth and biceps skinfold. The reduction in the upper-arm girth was greatest in group D (1.2%) and differed significantly ( $p<0,05$ ) from that in group PE which showed an increase (1.4%) but did not differ significantly ( $p>0,05$ ) from the decrease in group PED (1.1%). The reduction in the biceps skinfold was also the greatest in group D (12.6%) and differed significantly ( $p<0,05$ ) from both an increased skinfold (0.1%) in group PE and a decreased skinfold in group PED (1.7%).

All groups showed some pulmonary function improvements in mean expiratory flow (50%), mean expiratory flow (25%), peak inspiratory flow and peak expiratory flow but with no significant differences ( $p>0,05$ ) between groups, with the exception of forced vital capacity (FVC) and forced expiratory volume in 1 second ( $FEV_1$ ). The increase in FVC was greatest in group PE (16.2%) and differed significantly ( $p<0,05$ ) from that in group D (10.9%) but did not differ significantly ( $p>0,05$ ) from that in group PED (11.4%) The increase in  $FEV_1$  was also the greatest in group PE (38.5%) and differed significantly ( $p<0,05$ ) from that in both group PED (5.6%) and group D (4.4%)

All groups showed slight cardio-respiratory response improvements in absolute and relative physical work capacity ( $PWC^{170}$ ) and indirect absolute maximal oxygen uptake ( $VO_2 \max$ ) measures but with no significant differences ( $p>0,05$ ) between groups, with the exception of indirect relative  $VO_2 \max$ . The increase in relative  $VO_2 \max$  was greatest in group PED (8.2%) and differed significantly ( $p<0,05$ ) from that in group PE (0.4%) but did not differ significantly ( $p>0,05$ ) from that group D (5.4%).

All groups showed slight haematological improvements in total cholesterol and blood glucose concentrations but with no significant differences ( $p>0,05$ ) between groups. Only group PED showed a beneficial decrease (3.7%) in low-density lipoprotein (LDL) which differed significantly ( $p<0,05$ ) from the detrimental increases observed in both group D (1.1%) and group PE (0.3%). Correspondingly only group PED showed a beneficial increase (5.5%) in high-density lipoprotein (HDL) as opposed to detrimental decreases

observed in both group PE (8.5%) and group D (6.2%), but these differences between groups were not significant ( $p>0,05$ ). Triglyceride values were only reduced in group D (6.0%) whilst they increased in group PE (2.6%) and remained unchanged in group PED, but these differences between groups were not significant ( $p>0,05$ ).

All groups showed slight musculoskeletal function improvements in trunk flexibility and hip flexion but with no significant differences ( $p>0,05$ ) between groups. Abdominal muscle endurance improved the most in group PE (7.8%) as opposed to group PED (0.2%) and an anomalous decrease in group D (12.3%), but these differences between groups were not significant ( $p>0,05$ ).

Based on the results of the study, passive exercise independent of dietary control proved ineffective as a weight-loss modality.

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**KEY WORDS:** CONTINUOUS ASSISTIVE-PASSIVE EXERCISE; EXERCISE; WEIGHT-LOSS; PHYSIOLOGICAL VARIABLES; OBESE; FEMALES.

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## SINOPSIS

<b>TITEL</b>	: Effek van Voortdurend Ondersteunde-Passiewe Oefening op Fisiologiese Parameters by Obese Dames
<b>KANDIDAAT</b>	: N.W. Mentz
<b>STUDIELEIER</b>	: Dr H.J. van Heerden
<b>GRAAD</b>	: M.A. (MBK)

Voortdurend ondersteunde-passiewe oefening (VPO) is 'n oefenmodaliteit algemeen aangewend in verslankingsklinieke en is gewild vir gewigsverlies by obese dames. 'n Voortoets - natoets gekontroleerde eksperimentele groepsontwerp is aangewend vir die studie om die effektiwiteit van 'n agtweek VPO program te evalueer, in kombinasie met en sonder 'n spesifieke dieetintervensie. 'n Totaal van 43 vroulike proefpersone met 'n gemiddelde ouderdom van  $29.9 \pm 2.6$  jaar, lengte  $164.2 \pm 6.5$  cm en massa van  $74.8 \pm 8.1$  kg onderskeidelik is toegewys na 'n groep vir deelname aan VPO met 'n spesifieke dieet (PED;  $n = 15$ ), 'n groep vir deelname aan VPO sonder 'n spesifieke dieet (PE;  $n = 14$ ), en 'n groep sonder deelname aan VPO maar met die spesifieke dieet (D;  $n = 14$ ). Vir toelating tot die studie is vereis dat proefpersone fisies geskik vir 'n VPO program, obees ( $>30\%$  relatiewe liggaamsvet), sedentêr, premenoposaal en bereid was om ingedeel te word by enige van die drie studiegroepe. Kategorieë van afhanklike veranderlikes gemeet was liggaamsamestelling, morfologie, kardio-respiratoriese respons, pulmonêre funksie, hematologie en muskuloskeletale funksie.

Al die groepe het geringe liggaamsamestelling verbeteringe getoon in liggaamsmassa, liggaamsmassa-indeks, vetvrye-liggaamsmassa en absolute liggaamsvet maar sonder beduidende verskille ( $p > 0,05$ ) tussen groepe. Die afname in relatiewe liggaamsvet was die grootste in groep D (5.5%) en het beduidend verskil ( $p < 0,05$ ) van die in groep PE (0.2%) maar nie beduidend ( $p > 0,05$ ) van die groep PED (2.9%) nie.

Soortgelyk het alle groepe klein morfologiese verbeteringe in liggaamsomtrekke en velvoumetinge getoon met geen beduidende verskille ( $p>0,05$ ) tussen groepe nie, met die uitsondering van die ontspanne bo-arm omtrek en die bisepeelvou. Die afname in die bo-arm omtrek was die grootste in groep D (1.2%) en het beduidend verskil ( $p<0,05$ ) van 'n toename in groep PE (1.4%), maar nie beduidend verskil ( $p>0,05$ ) van die afname in groep PED (1.1%) nie. Die afname in die bisepeelvou was weereens die grootste in groep D (12.6%) en het beduidend verskil ( $p<0,05$ ) van beide 'n toename (0.1%) in groep PE en 'n afname in groep PED (1.7%).

Alle groepe het sekere pulmonêre funksie verbetering in gemiddelde ekspiratoriese vloei (50%), gemiddelde ekspiratoriese vloei (25%), piek inspiratoriese vloei en piek ekspiratoriese vloei vertoon, maar met geen beduidende verskille ( $p>0,05$ ) tussen groepe, met die uitsondering van geforseerde vitale kapasiteit (GVK) en geforseerde ekspiratoriese volume in 1 sekonde ( $GEV_1$ ). Die verhoging in GVK was die grootste in groep PE (16.2%) en het beduidend verskil ( $p<0,05$ ) van die in groep D (10.9%) maar nie beduidend ( $p>0,05$ ) van die in groep PED (11.4%) nie. Die verhoging in  $GEV_1$  was ook die grootste in groep PE (38.5%) en het beduidend verskil ( $p<0,05$ ) van die in beide groepe PED (5.6%) en D (4.4%).

Alle groepe het effense kardio-respiratoriese verbeteringe in absolute en relatiewe fisieke werkskapasiteit ( $FWK^{170}$ ) en indirekte absolute maksimale suurstof opname ( $VO_2$  maks) vertoon, maar met geen beduidende verskil ( $p>0,05$ ) tussen groepe, met die uitsondering van indirekte relatiewe  $VO_2$  maks. Die verbetering in relatiewe  $VO_2$  maks was die grootste in groep PED (8.2%) en het beduidend verskil ( $p<0,05$ ) van die in groep PE (0.4%) maar nie beduidend ( $p>0,05$ ) van die in groep D (5.4%) nie.

Alle groepe het klein hematologiese verbeteringe in totale cholesterol en bloedglukose konsentrasie vertoon, maar met geen beduidende verskille ( $p>0,05$ ) tussen groepe nie. Slegs groep PED het 'n voordelige afname (3.7%) in lae-digtheid lipoproteïene (LDL) getoon, wat beduidend verskil het ( $p<0,05$ ) van die nadelige verhoging waargeneem in beide groep D (1.1%) en groep PE (0.3%). Ooreenstemmend het alleenlik groep PED



enige voordelige verhoging (5.5%) vertoon in hoë-digtheid lipoproteïne (HDL) in vergelyking met die nadelige verhoging gesien in beide groep PE (8.5%) en groep D (6.2%), maar hierdie verskille tussen groepe was nie beduidend ( $p>0,05$ ) nie. Triglisieriede waardes het slegs verlaag in groep D (6.0%) terwyl waardes verhoog het in groep PE (2.6%) en onveranderd gebly het in groep PED, maar hierdie veranderinge tussen groepe was nie statisties beduidend ( $p>0,05$ ) nie.

Alle groepe het geringe muskuloskeletale funksie verbeteringe getoon in rompfleksiteit en heupfleksie, maar met geen beduidende verskille ( $p>0,05$ ) tussen groepe nie. Abdominale spieruithou vermoë het die meeste verbeter in groep PE (7.8%) as vergelyk word met groep PED (0.2%) en 'n afwykende verlaging in groep D (12.3%), maar hierdie verskille tussen groepe was nie beduidend ( $p>0,05$ ) nie.

Gegrand op die resultate van hierdie studie, is passiewe oefening onafhanklik van 'n dieet nie effektief bewys as 'n gewigsverlies modaliteit nie.

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**SLEUTELWOORDE:** VOORTDUREND ONDERSTEUNDE-PASSIEWE OEFENING; OEFENING; GEWIGSVERLIES; FISIOLOGIESE VERANDERLIKES; OBESITEIT; DAMES.

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