PHYSICAL ACTIVITY AS INTERVENTION IN URBAN BLACK FEMALES WITH TYPE 2 DIABETES MELLITUS

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DECLARATION

I, Agatha Johanna van Rooijen, declare that this thesis is my own work. It is being submitted for the degree of Doctor of Philosophy in the University of Pretoria, Pretoria. It has not been submitted before for any other degree or examination at this or any other university.

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..12.....day of.....November....., 2003.

PUBLICATIONS AND PRESENTATIONS ARISING FROM THIS STUDY

PUBLICATIONS

Van Rooijen AJ, Rheeder P, Eales CJ, Becker PJ. Black female patients with Type 2 diabetes mellitus: knowledge, attitudes and physical activity. **SA J Physiother** 2001;57:20-7.

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PAPERS PRESENTED

Van Rooijen AJ, Rheeder P, Eales CJ, Becker PJ. Urban Black female patients' Perception and Knowledge of Non-insulin Dependent Diabetes Mellitus: A pilot study. The 37th SEMDSA Congress. (SEMDSA = Society for Endocrinology Metabolism and Diabetes of South Africa), Johannesburg, South Africa: 2001.

Van Rooijen AJ, Rheeder P, Eales CJ, Becker PJ. Type 2 Diabetes Mellitus: Knowledge, Attitude, Physical Activity and Exercise. The National Congress of the South African Society of Physiotherapy, Rustenburg, South Africa: 2001.

Van Rooijen AJ, Rheeder P, Eales CJ, Molatoli HM. Barriers to and expectations of performing physical activity in female subjects with Type 2 Diabetes. Poster presentation. 38th SEMDSA Congress, Cape Town, South Africa: 2002.

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ABSTRACT

Type 2 Diabetes Mellitus (Type 2 DM) is present in the populations of almost all the countries in the world and is a significant disease burden in most developed countries. Evidence suggests that populations in Africa develop Type 2 DM at an increasing rate as they reject their traditional lifestyles. Furthermore, newly released figures by the Medical Research Council of South Africa indicate that diabetes is the 10^{th} most common cause for total life years lost in females in South Africa. Exercise is a low cost, non-pharmacological intervention that has been shown to be effective in metabolic control. Exercise is still vastly under-utilised in the management of Type 2 DM, especially in urban black females with Type 2 DM.

This study was designed to determine the effectiveness of an exercise intervention to decrease haemoglobin A_{1c} (HbA_{1c}) over a period of 12 weeks in Type 2 DM black female subjects, aged 40 to 65 years. This study consisted of three phases. Data captured in the first two phases were utilised to plan the exercise intervention. Questionnaires and focus groups were used in the first two phases of the study. The final phase of the study consisted of a randomised controlled trial. For this phase 157 female subjects, who were recruited at the Mamelodi hospital diabetes outpatient clinic, were randomised to either an experimental or a control group.

It was found that the subjects had little knowledge about their disease and that they lead a sedentary lifestyle. Subjects felt that Type 2 DM had a negative impact on their lives. Their attitudes about Type 2 DM showed a dependence on health professionals and they disagreed with the attitude that they should be involved in decision-making about their health care. The results of the focus groups indicated that patients viewed walking and household chores as suitable exercise for them. Personal barriers to exercise were lack of knowledge, tiredness and health-related stress.

Subjects expected that exercise would increase the functional capabilities, increase their knowledge and improve their well being. These findings were used to plan the exercise intervention, which consisted of a home-based exercise programme and fortnightly exercise sessions at the Mamelodi hospital. Subjects also had to complete a diary of their physical activities at home.

An analysis of co-variance (ANCOVA) was used to compare the experimental and control groups with respect to change in HbA_{1c}, and the secondary outcomes such as walking distance and quality of life outcomes. It was found that the exercise intervention was no more efficacious ($p=0.05$) than a supervised self-relaxation training intervention to decrease HbA_{1c}, over a period of 12 weeks. The exercise group was however able to walk a significantly further distance ($p<0.01$) than the control group after the 12-week intervention. While not significantly different between groups ($p=0.80$), the positive well-being improved significantly within both groups ($p<0.01$).

It is possible to improve blood glucose control by means other than medication in urban black female patients with Type 2 DM. The patients are willing to change their sedentary lifestyle to a more active one, but several environmental and personal barriers impact negatively on their attempts to do so. The role of the health care worker is to identify these barriers and to accompany the patient on the road to a healthier lifestyle. However, this population of women may need more assistance and support initially to take self-responsibility for their diabetes self-management eventually.

ABSTRAK

Tipe 2 Diabetes Mellitus (Tipe 2 DM) kom voor in volke in bykans al die lande van die wêreld en dra by tot 'n betekenisvolle siektelas in meeste van die ontwikkelende lande. Wetenskaplike bewyse dui daarop dat Tipe 2 DM toeneem, namate populasies in Afrika westerse gebruike aanneem. Nuwe syfers wat deur die Suid- Afrikaanse Mediese Navorsingsraad vrygestel is, dui daarop dat diabetes die 10de mees algemene oorsaak van dood onder vroue in Suid-Afrika is. Oefening is 'n bekostigbare, nie-farmakologiese intervensie wat effektief is om bloedglukose te beheer. Oefening word egter nie algemeen in die beheer van diabetes in veral stedelike swart vroue gebruik nie.

Die studie is ontwerp om die effektiwiteit van 'n oefeningsintervensie in die verlaging van hemoglobien A_{1c} (HbA_{1c}) vlakke, oor 'n periode van 12 weke, in 'n groep stedelike swart vroue tussen die ouderdomme 40 en 65 jaar te toets.

Die studie het uit drie fases bestaan. Die inligting wat in die eerste twee studies verkry is, is gebruik om die oefeningsintervensie te beplan. Vraelyste en fokusgroeponderhoude is in die eerste twee fases gebruik. Die laaste fase van die studie het 'n gerandomiseerde, kliniese proef behels. Vir die laaste fase is 157 vroulike proefpersone ewekansig in onderskeidelik 'n eksperimentele- en kontrole groep verdeel.

Daar is bevind dat die proefpersone min kennis oor hulle siekte gehad het en dat hulle hoofsaaklik 'n onaktiewe lewenstyl handhaaf. Proefpersone was ook van mening dat diabetes 'n negatiewe impak op hulle lewens het. Die proefpersone het nie saamgestem dat hulle betrokke in besluitneming oor hulle gesondheid sorg behoort te wees nie. Die resultate van die fokusgroepe het daarop gedui dat die proefpersone huishoudelik aktiwiteite en stap as geskikte tipes oefening beskou.

Gebrek aan kennis, moegheid en gesondheidverwante spanning is geïdentifiseer as persoonlike hindernisse tot deelname aan oefening.

Uitkomsverwagtinge van die proefpersone was dat oefening hulle funksionele werkverrigting, kennis en algemene welstand sou verbeter. Die oefeningsintervensie het bestaan uit tuisoefeninge en oefeningsklasse, elke twee weke by die Mamelodi hospital.

Die verskille in uitkomste tussen die eksperimentele en kontrole groepe met betrekking tot HbA_{1c} en die sekondêre uitkomste soos die loopafstand en kwaliteit van lewe uitkomste, is deur middel van 'n analise van ko-variansie bepaal (ANCOVA). Die resultate het getoon dat fisiese oefening nie meer effektief ($p=0.05$) as onderrig in self-ontspanningstegnieke was nie. Die eksperimentele groep kon egter betekenisvol verder loop ($p<0.01$) na die oefeningsintervensie. Die positiewe welsyn van die proefpersone in die twee groepe het nie betekenisvol verskil ($p=0.80$) na die intervensie nie, maar het wel betekenisvol verbeter in elke groep ($p<0.01$).

Dit is dus moontlik om stedelike swart vroue met Tipe 2 DM se bloedsuiker te kontroleer op ander metodes as deur die gebruik van medikasie. Die proefpersone was bereid om hulle onaktiewe lewenstyl te verander na 'n meer aktiewe een, maar is gekortwiek deur 'n aantal omgewings- en persoonlike hindernisse. Die rol van die gesondheidwerker is om die pasiënt op die pad na 'n gesonder lewenstyl te begelei. Dit blyk egter dat hierdie populasie vroue meer hulp en ondersteuning nodig sal hê om verantwoordelikheid vir hulle eie gesondheidsorg te aanvaar.

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Type 2 DM	Type 2 Diabetes Mellitus
HbA_{1c}	Haemoglobin A_{1c}
BMI	Body mass index
NHANES	National Health and Nutrition Examination Survey
WHO	World Health Organisation
SD	Standard deviation
BP	Blood pressure
DKNC	Diabetes Knowledge Scale
DAS-III	Revised Diabetes Attitude Scale-III
Pos	Positive
Neg	Negative
R	Correlation coefficient
HQOL	Health-related quality of life
B-cells	Beta cells
Mmol	Millimol
$[K^+]$	potassium