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A study on the effectiveness of home exercise programme and fitness walking on pain and disability for people with osteoarthritis of knee

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Abstract:
Background*: Osteoarthritis is one of the most common joint disorders in world today.[1]It is "a slowly progressive monoarticular disorder, effects late in the life, principally affecting the hands and large weight bearing joints and is characterized by pain, deformity, enlargement of the joints and limitation of motion. Occurrence of this condition is a combination of aging, obesity, high intensity sports or it may also even origin congenitally.[2]This study implements the effectiveness of fitness and home exercise programme among people associated with OA knee.*
Materials and Methods*: a group of 150 symptomatic subjects diagnose with osteoarthritis knee were selected for the study. On randomized sampling technique they were divided into two groups by flip coin method with each a consisting 75 patients. Group A was administrated fitness walking exercise and group B was administrated home exercise. Study was conducted for 12 months and evaluated prior and post intervention every 3 month with help of WOMAC index and VAS scale.*
Results*: The results obtained from analyzing data by statistical software SPSS 11.0 and systat 8.0. which showed a significant difference between pre and post test, 40.25% group A and 31.42% group B. with a higher hand the group A shows a better beneficiary in treating osteoarthritis knee patients with fitness walking.*
Conclusion: *as improvement noticed by the scores obtained from WOMAC index and VAS in fitness walking, the study implies fitness walking can be used more effectively to improve an individual pain and disability for subjects diagnosed with OA knee.*
Key Word*: osteoarthritis, fitness walking, graded exercise, WOMAC, VAS*

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I. Introduction

Osteoarthritis (OA) is the most common form of arthritis, and usually occurs in people above the age of 45 years. It equally affects the male and female population. Any working definition of OA entails consideration at radiological, pathological and clinical components.[3] Pathologically the disease is characterized by focal erosive lesions, cartilage destruction, subchondral cysts formation and large osteophytes at the margins of the joints." Clinically the disease is characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion and variable degrees of local inflammation, but without systemic effects. Histologically, the disease is characterized by fragmentation of the cartilage surface, cloning of chondrocytes, vertical clefts in the cartilage, variable crystal deposition, remodeling, and eventual violation of the tidemark by blood vessels. Radiologically Osteophytes are most easily identified at the articular margins of the tibia on the frontal view and along the margins of femur in lateral view of X-ray. Joint space narrowing may be severe and can result in direct apposition of femoral and tibial bone surfaces. The patellofemoral the compartment is also commonly affected in such scenarios.Biomechanically, the disease is characterized by alteration of the tensile, compressive and shear properties and hydraulic permeability of the cartilage, increased water, and excessive swelling. These cartilage changes are accompanied by increased stiffness of the subchondral bone.[4]There are number of risk factors that increase the chances of developing arthritis such as: a) Quadriceps activation failure b) or quadriceps inhibition c) Obesity d) Passive knee laxity e) Knee alignment f)Fear of physical activity and self-efficiency g) genitically.There are three major symptoms which almost every patient come across with severe OA. (1) Pain (2) Stiffness (3) Functional Impairments. Pain is the dominant symptom in OA

and the usual reason for seeking medical opinion. Initially it is typically aching in nature and relieved by rest.[5] A circadian pattern is demonstrable in many sufferers of OA. The pain is usually localized to joints without associated findings of inflammation such as fever, fatigue, and other systemic complaints. Stiffness in OA may vary from slowness of joint movement, to pain on initial movement.[6] Early morning stiffness is often interpreted as a measure of inflammation. But in OA, most patients complain more of inactive stiffness or getting later in the day. Stiffness is generally short lived and resolves in duration less than 30 minutes. Functional impairment in OA. Disability may include poor mobility, difficulty with activities of daily living, social isolation and loss of work opportunities with consequent financial concerns.[7] To identify the amount of impact by OA knee we need an accurate outcome measure, which is able to assess these parameters. WOMAC Index is considered as gold standard in western countries. It is a tri-dimensional, disease-specific, self-administration health status measure.[8] Visual analogue scale is used for assessment of pain intensity.[19] As a physiotherapy protocol the study is used to identify the effectiveness of fitness walking and home exercise programme in improving pain and disability function in symptomatic subjects having osteoarthritis of knee.

II. Material And Methods

This randomized sampling technique was conducted on patients with osteoarthritis knee. 150 patients were selected and randomized into two equal groups using flip coin method with each group consisting 75 patients.
StudyDesign: pre-post comparative design
StudyLocation: sara trust health camps in hsargatta, chikkabanavara, bettahalli,belladareke and referral from local gp's, orthopaedic and rheumatology department.
Study Duration: April 2005- April 2006
Samplesize:150 patients

Inclusion criteria:
1. Age above 50 years
2. Stiffness more than 30 minutes upon walking
3. Crepitus
4. Bony tenderness
5. Bony enlargement
6. No palpable warmth

Exclusion criteria:
1. Symptomatic back or hip disease
2. Secondary inflammation like, Rheumatoid arthritis
3. Symptoms effecting the ankle or feet symptoms originating from proximal source like hip or back
4. Patient with significant psychiatric or general medical morbidity
5. Intraarticular steroid injection, in knee within 3 months

Procedure methodology

Fitness Walking for group A: 8-week programme and health education after 8 weeks the pain and disability will be measured along with health education and fitness walking education and ask them to visit every 3 months for the next 1 year. The patients were asked to walk, at their own naturally preferred 'comfortable' pace, across a distance of 10 m. Timing of the central 8 m allowed one or two steps at either end of the walk for un-timed acceleration and deceleration, a process that has been shown to increase test-retest reliability. They had regular a walking program three times per week, starting with 10-min duration. Patients were permitted to use walking aids if they required them.[10]
Exercise for group B: A graded exercise programme was devised.
Five exercises were included: Isometric quadriceps contraction in full extension held for five seconds (subject sits
1. On floor with back supported and legs extended, with rolled up towel under one knee and contracts quadriceps by pushing into the floor against towel).
2. Quadriceps contraction held in mid flexion for five seconds (subject sits in Isotonic a ins lower leg to partially extended position and holds)
3.Isotonic hamstring contraction (subjects lies on front or side and bends knee bringing foot towards body).
4.Isotonic quadriceps contraction with resistance band held for five seconds (as for exercise 2)
5. Dynamic stepping exercise (walking up and down one step/stair)[11]
Exercise was in the above order and increased to maximum of 20 repetitions. Exercise was performed at home on daily basis having been taught by a physiotherapist in addition to initial visit, subjects were visited on 4

further occasions (3-6-9-12 months).
Visual analogue pain score Patients completed a 10 cm visual analogue scale based on the degree of pain they had experienced, in the last 7 days, whilst walking on a flat surface. Patients were not permitted to see previous scores.
Western Ontario and McMaster Universities OA Index: It is a tri-dimensional disease-specific, self-administered health status measure.

Statistical analysis

Data was analyzed using SPSS version 11.0 and systat 8.0 were used for the analysis of data and Microsoft word and excel have been used to generate graphs, tables etc. ANOVA has been used to find the significance of WOMAC and VAS during the study period. Student t test was used to identify difference between two groups by use of VAS and WOMAC. t-test was used for two population means for method of paired comparisons. Suggestive significance 0•05<p<0.10 * Moderately significant 0.01<p_. 0.05 ** Strongly significant.

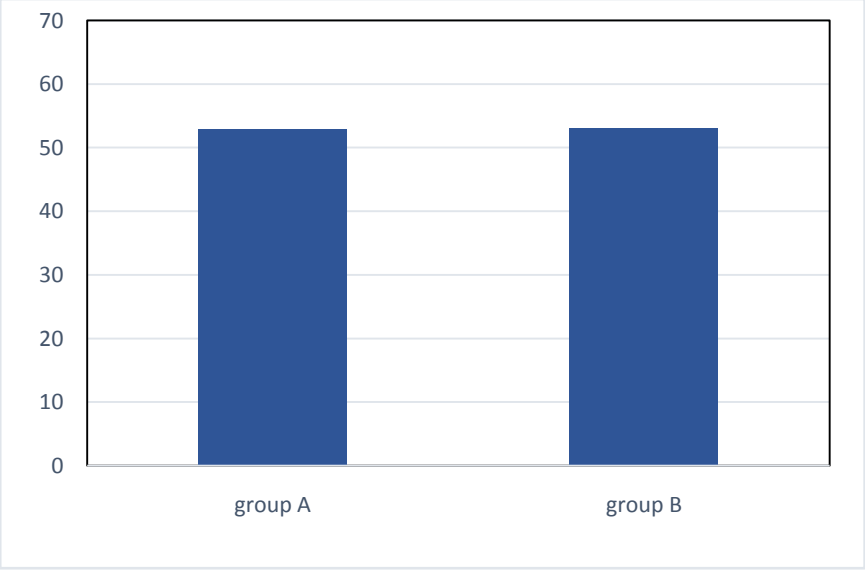
III. Result

A comparative study consisting of 150 patients and randomized into two groups with each 75 as group A fitness walking and group B graded strengthening exercise was undertaken to study the effect of treatment on pain, stiffness, difficulty which was measured by WOMAC, VAS score

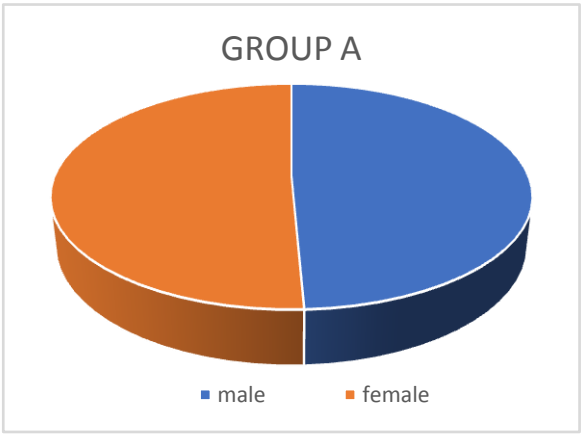
There was a significant difference seen between group A and group B. hence, research hypothesis is accepted and showed a better improvement (p value= 0.001*).

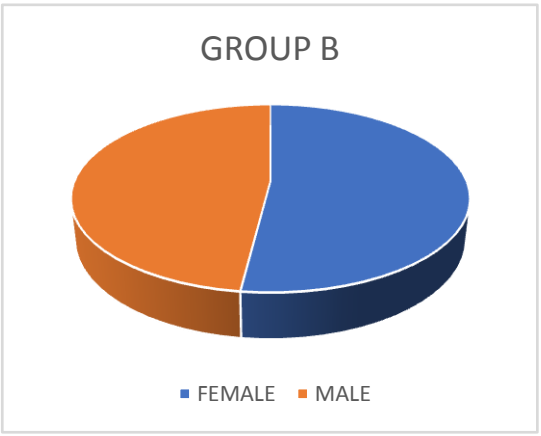
Table 1 shows distribution of subject's age, sex and BMI kg/m^2. In this study there are 52.97% subjects were 60 years and above in group A and 53.01% in group B. The male subjects allocated in group A is 37(49.3%) and group B is 36(48.0%) whereas female subjects in group A is 38(50.7%) and group B is 39 (52.0%). On evaluating BMI kg/m^2 mean in group A is 26.15 and group B is 26.18.

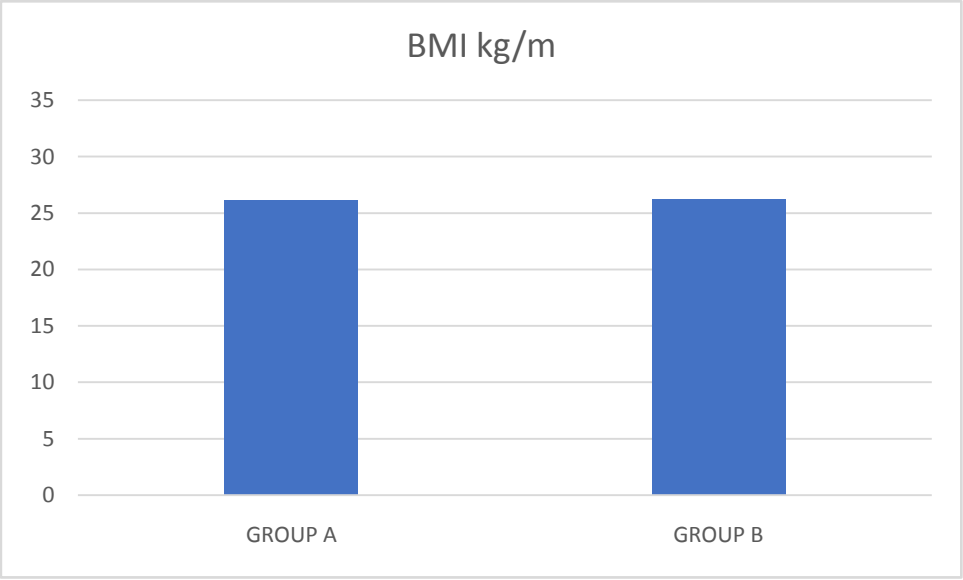
BASIC CHARACTERISTICS	**GROUP A**	**GROUP B**	**REMARKS**
NUMBER OF SUBJECTS	75	75	-
AGE IN YEAR (MEAN ± SD)	52.97±6.36	53.01±6.57	SAMPLES ARE AGE MATCHED WITH P=0.970
SEX MALE	37(49.3%)	36(48.0%)	SAMPLES ARE SEX MATCHED WITH P=0.869
FEMALE	38(50.7%)	39(52.0%)	
BMI KG/M^2 (MEAN ± SD)	26.15±2.72	26.18±2.72	SAMPLES ARE BMI MATCHED P=0.924



GRAPH 1: AGE IN YEARS



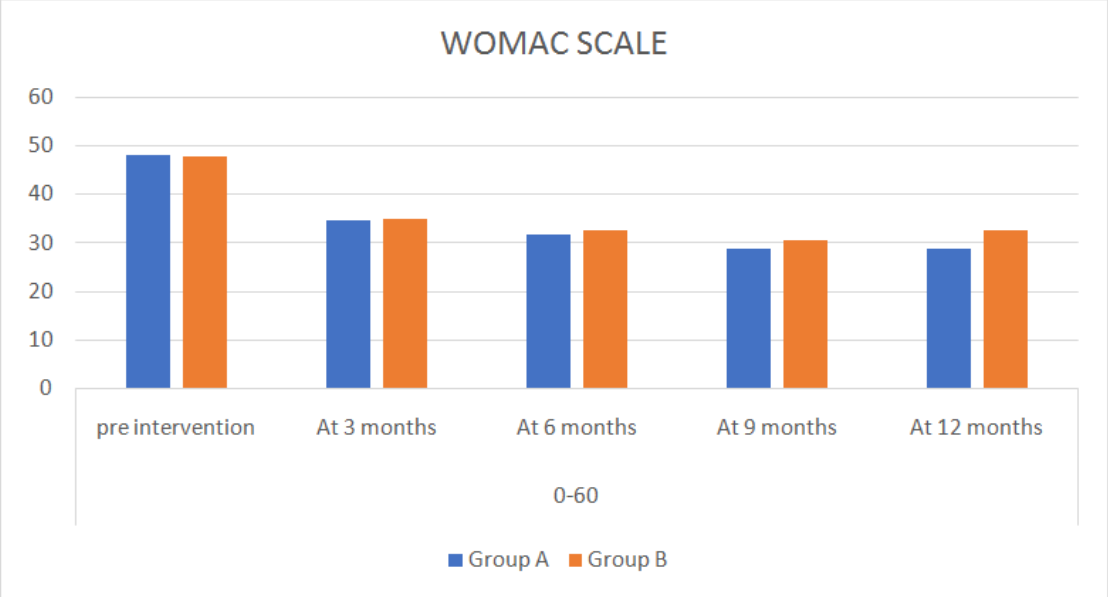




GRAPH 2: SEX AND BMI DISTRIBUTION

Table 2 signifies the result obtained from comparison of study parameter of WOMAC index between two groups.

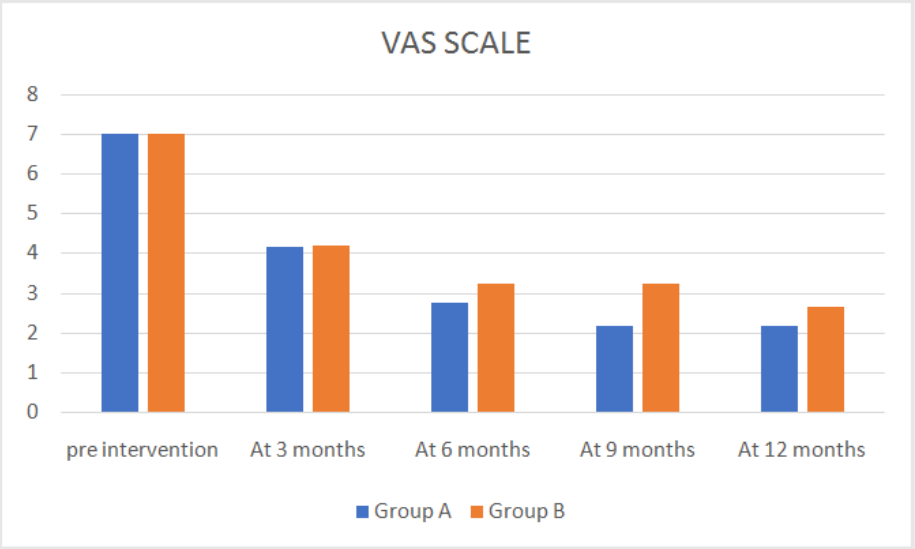
WOMAC scale	Group A	Group B	P value
pre-intervention	48.13±6.27	47.08±5.76	0.788
at 3 months	34.79±7.79	34.96±7.58	0.891
at 6 months	31.65±6.43	32.78±6.79	0.305
at 9 months	28.76±5.39	30.54±5.61	0.050*
at 12 months	28.76±5.39	32.78±6.97	< 0.001
significance by repeated measures anova	<0.001**	< 0.001**	-
significance	< 0.001**	< 0.001**	-
% change	40.25%	31.42%	-



GRAPH 3: COMPARISON OF STUDY PARAMETER WOMAC BETWEEN TWO

Table 3 signifies the result obtained from comparison of study parameter of WOMAC index between two groups.

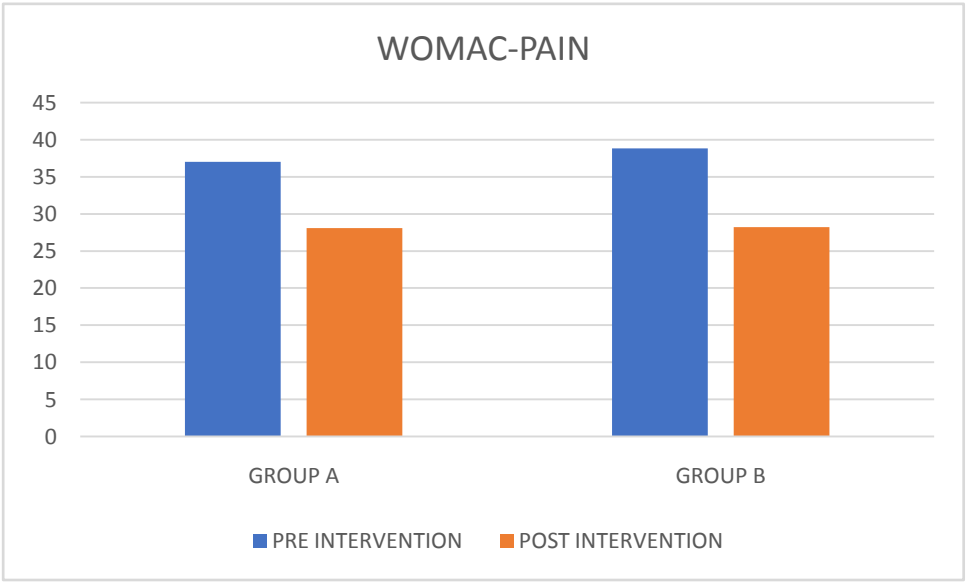
VAS scale	Group A	Group B	P value
pre-intervention	7.00±0.90	7.00±0.89	0.999
at 3 months	4.17±1.01	4.20±0.99	0.858
at 6 months	2.76±1.19	3.23±0.87	0.007*
at 9 months	2.17±0.84	3.23±0.87	0.001*
at 12 months	2.16±0.84	2.65±0.87	< 0.006**
significance by repeated measures anova	<0.001**	< 0.001**	-
significance	< 0.001**	< 0.001**	-
% change	69.14%	62.14%	-



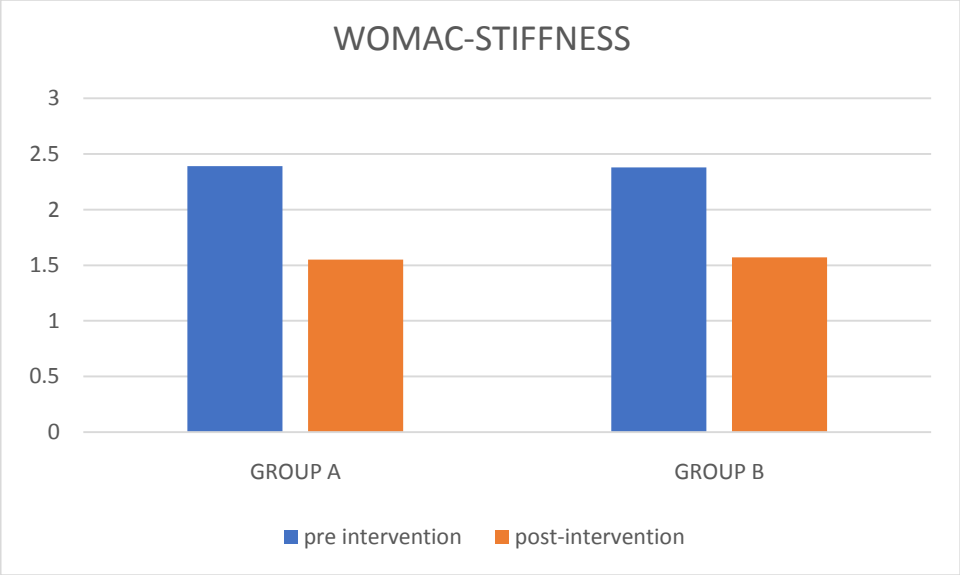
GRAPH 4: COMPARISON OF STUDY PARAMETER VAS BETWEEN TWO GROUPS

The table 4 signifies the result obtained from comparison of component of WOMAC scale between two groups by considering its aspects i.e. pain, stiffness and difficulty.

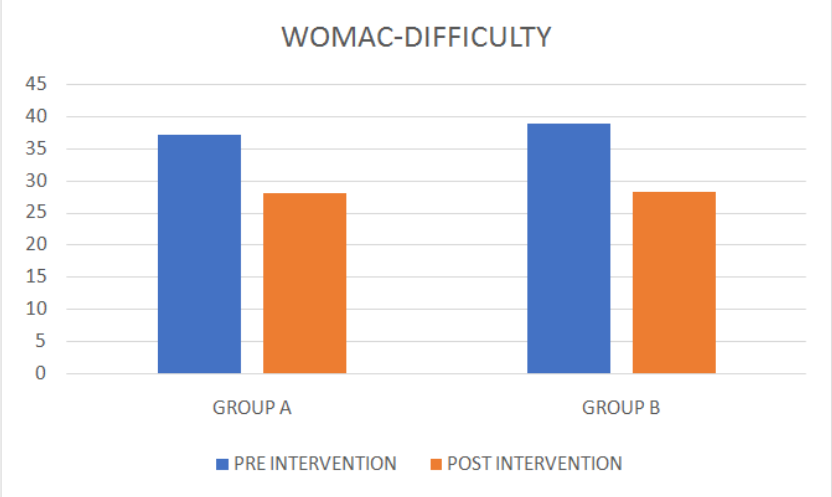
Components Of WOMAC	Group	Pre-intervention	Post-intervention	P value
pain	Group A	8.73±1.83	5.17±1.99	< 0.001**
	Group B	8.68±1.74	5.16±1.96	< 0.001**
stiffness	Group A	2.39±0.82	1.55±0.55	< 0.001**
	Group B	2.38±0.84	1.57±0.55	< 0.001**
difficulty	Group A	37.01±4.44	28.07±5.99	< 0.001**
	Group B	38.81±4.06	28.23±5.87	< 0.001**



GRAPH 5: COMPARISON OF COMPONENT OF PAIN-WOMAC SCALE



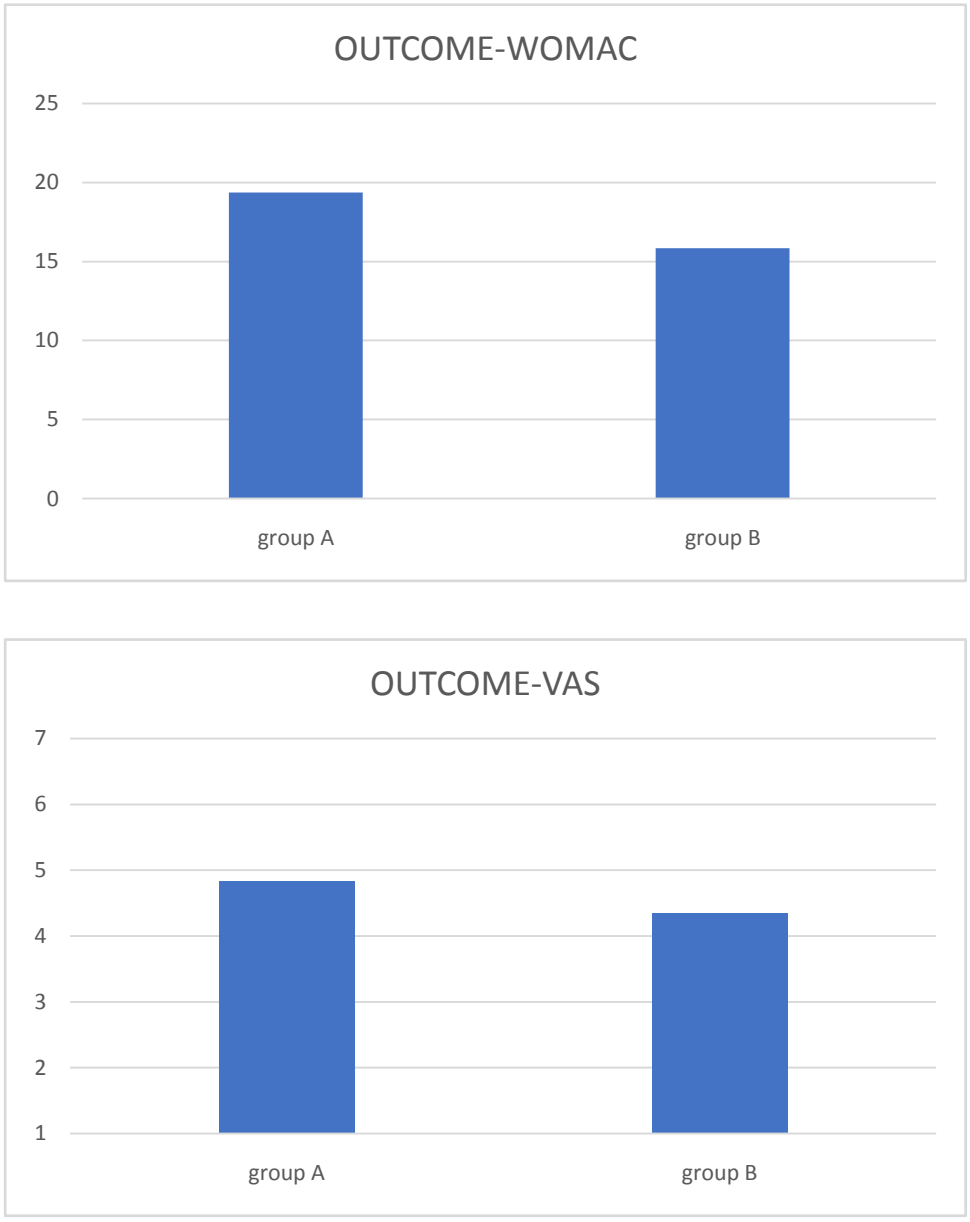
GRAPH 6: COMPARISON OF COMPONENT OF STIFFNESS-WOMAC SCALE



GRAPH 7: COMPARISON OF COMPONENT OF DIFFICULTY-WOMAC SCALE

The table 5 signifies the result obtained from comparison of outcome of study parameter scale of WOMAC and VAS between two groups.

Outcome	Group A	Group B	P value
WOMAC	19.37±3.83	15.85±3.98	< 0.001**
VAS	4.84±1.15	4.35±1.48	0.026*



GRAPH 8: COMPARISON OF OUTCOME -WOMAC SCALE AND VAS

IV. Discussion

The comparative study was conducted on 150 patients by dividing them into 75 each in a group. Were, group A was treated with fitness walking and group B was treated with graded strengthening exercise. The effect of treatment for pain, stiffness, difficulty was evaluated by WOMAC and VAS score. The above study had certain characteristics basis like age, sex, BMI.

The table 1 and its representing graph from present study includes the mean age and SD from group A is 52.97±6.36 and group B is 53.01±6.57. The sex distribution expressed in percentage for group A is 49% of male and 50% of female. Were as group B is 48% male and 52% female. The mean BMI and SD for group A is 26.15±2.72 and group B is 26.18±2.72. From the above results all the basic characteristic are matched at time of enrolment into the study so as to keep aside any influence of these parameter on intervention given by therapist to both the group.

Table 2 and its representing graph signifies the result obtained from comparison of study parameter of pre intervention and post intervention i.e., recorded at 3 months, 6 month, 9 months and 12 months of WOMAC index between two groups. The p value <0.001** Obtained from both the group is strongly significant.

Table 3 and its representing graph signifies the result obtained from comparison of study parameter of pre intervention and post intervention i.e., recorded at 3 months, 6 month, 9 months and 12 months of VAS score between two groups. The p values <0.001** Obtained from both the group is strongly significant.

The table 4 and its representing graph signifies the result obtained from comparison of component of WOMAC scale between two groups by considering its aspects i.e., pain, stiffness and difficulty that is evaluated pre and post intervention. which indicated strong level of significance <0.001** for both the group.

The table 5 and its representing graph representing numerical data obtained from study parameter of scale i.e., WOMAC and VAS between group A and group B. the level of significance of WOMAC showed <0.001** and VAS showed 0.026*. hence the p value of WOMAC is more significant than VAS.

Hence the study implies the fitness walking was more effective than graded strengthening exercise for OA knee patients.

LIMITATIONSOFSTUDY:

1. Complete symptomatic assessment with other added outcome measure.
2. Number participants can be increased.
3. Follow up was not proceeded beyond 12 months.
4. Only certain age group was considered for the study.

FUTURERECOMMENDATIONS:

Further study should be done on combining the other physiotherapy treatment protocol.

V. Conclusion

From this study, it is concluded that on evaluation from pre-intervention and post intervention on 3rd month, 6th month, 9th month and 12th month the fitness walking showed 40.25% improvement than graded strengthening
Exercise i.e., 31.42%.

The reason being at end of 12 months, both groups showed substantially equal improvement over baseline measurements. Subject in fitness walking group were less likely to be taking medications for their arthritis and were more satisfied with the overall outcome of rehabilitative treatment with subjects in the graded strengthening group.

References

[1]. Felson M. epidemiology of hip and knee osteoarthritis. Epidemiological reviews 1998:10: 1-28
[2]. Mcalindon T, Dieppe T. osteoarthritis definition and critera.Ann Rheum Dis 1989: 48: 531-2.
[3]. Mankin HJ, Brand KD, Schulmann LE. Workshop on the aetiopathology of the osteoarthritis. J Rheumatol 1986; 13:1177-
[4]. Brand T. Workshop on etiopathogenesis of osteoarthritis Rheumatol 1986;13:1126-60.
[5]. Fitzgerald GK. Therapeutic exercise for knee osteoarthritis: considering factors that may influence outcome. EurMedicophys Mm2005;163-7.
[6]. Canadian arthritis society 2000 (http://www.mhntis.ca)
[7]. Cushnaghan J, Dieppe PA. study of 500 patients with limb joint osteoarthritis analysis by age, sex and distribution of symptomatic joint sites Ann Rheum Dis 1991;50;8-13.
[8]. Bellamy N Validation study of a computerized version of the WOMAC VA 3.0 index. J Rheumatol 1997: 24: P 2413-2415.
[9]. P E Bijur.Acad Emerg Med. Reliability of the visual analogue scale measurement of acute pain.
[10]. Kovar PA, Allegrante JP, MacKenzie CR, Peterson MG, gutin B, Charlson ME. Supervised fitness walking in patients with osteoarthritis of the knee. Ann inten med 1992 apr 1;116(7):529-34.
[11]. Sheila C O'Relly. Effectiveness of home exercise on pain and disability from osteoarthritis of knee: Queens Medical center. Ann Rheum Dis 1999; 58:15-19.

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