CHAPTER IV

RESULTS AND DISCUSSION

4.1 OVERVIEW

This chapter deals with the analysis of data obtained from the samples under study. The intent of the study was to examine the efficacy of knee traction with and without electrical stimulation on selected physical and clinical variables among moderate to severe osteoarthritis.

The study was formulated as a true random group design consisting of pre - test and post –test. The subjects (N=30) with knee osteoarthritis women were chosen from Spot Hospital in Chennai and their ages ranged between 50 to 60 years. The subjects were randomly assigned to three equal groups consists of twenty (n=10) subject in each. Further, Knee Traction with Electrical Stimulation acted as Experimental Group I and Knee Traction without Electrical Stimulation acted as Experimental Group II for a period of 12 weeks and Group III acted as a Control group. Pre-test was conducted for all the subjects on selected physical variables namely Strength (both left and right leg), Flexibility, Physical activity level and clinical variables namely pain and Swelling (both left and right leg). Experimental Group I was exposed to Knee Traction with Electrical Stimulation, experimental group II was exposed to Knee Traction without Electrical Stimulation and Control group (CG) was not exposed to any experimental treatment other than their regular daily activities. The

duration of experimental treatment period was 12 weeks. After the experimental treatment, all thirty subjects were administered on the selected physical and clinical variables. This final test scores formed the post test scores of the subjects. The pre and post test scores were subjected to statistical analysis using dependent't' test to find the mean difference among the groups. Analysis of Covariance (ANCOVA) was used to find out the significance among the mean differences, whenever the obtained 'F' ratio was found to be significant in adjusted post test, Scheffe's post hoc test was used. In all cases the level of significance was fixed 0.05 level to test hypotheses.

4.2 TEST OF SIGNIFICANCE

According to Moore, Notz & Flinger (2013), the data must be examined in methods suited to the research strategy. Only the research design may make such an analysis suitable and appropriate statistical analysis will be completed.

It is a vital part of the thesis in order to reach the conclusion by hypotheses examining. According to the outcomes in relation to the level of confidence, the hypotheses were either accepted or rejected during the testing process in test of significance.

Throughout the study, the test of significance is a procedure to measure the null hypothesis (H_0), with the consistent data were significant

or not significant by finding the differences between the groups and within the groups'. In this study, the null hypotheses (H_0) were rejected, when there were significant differences in the means of the groups being compared, if the attained F-value was higher than the table value. Conversely, if the attained values fell below the required values, the null hypotheses (H_0) was accepted, when there were no significant differences in the means of the groups being compared.

4.3 LEVEL OF SIGNIFICANCE

The subjects were compared on selected criterion variables among knee osteoarthritis patient on the effect of Knee Traction with Electrical Stimulation and Knee Traction without Electrical Stimulation. All the three study groups were measured at the beginning and end of the experimental period by the selected criterion variables from each group. The impact of Knee Traction with Electrical Stimulation and Knee Traction without Electrical Stimulation on the individuals may be seen in the difference between starting and final values on each specified criteria variable. The level of significance is termed as the probability level below which the hypothesis is rejected.

The p value obtained by dependent't' test was compared at the 0.05 level of confidence for the degrees of freedom, followed by ANCOVA statistical analysis was applied. To test the significance in each case, 0.05 was fixed as level of confidence , which was considered appropriate.

4.4 COMPUTATION OF DEPENDENT't' TEST

The statistical analysis of the significance of the mean difference scores in the selected and related physical and clinical variables among women with moderate to severe osteoarthritis of Knee Traction with Electrical Stimulation and Knee Traction without Electrical Stimulation and control group are presented in tables VI to VIII.

TABLE – VI

MEAN GAINS AND LOSSES BETWEEN PRE AND POST TEST SCORES OF KNEE TRACTION WITH ELECTRICAL STIMULATION GROUP

S.NO	Variables	Pre-Test Mean	Post-Test Mesn	Mean Difference	Std. Dev(±)	t' Ratio	P Value
1	Strength (R)	3.30	4.40	1.10	0.32	5.75	**0.000**
2	Strength (L)	3.20	6.40	-3.20	2.04	4.97	**0.000**
3	Flexibility	13.60	16.40	2.80	1.62	5.47	**0.000**
4	Physical Activity	50.10	36.70	13.40	7.28	5.82	**0.000**
5	Pain	26.30	17.20	9.10	4.87	5.91	**0.000**
6	Swelling (R)	20.75	18.80	1.95	1.34	4.61	**0.001**
7	Swelling (L)	21.04	18.75	2.29	1.87	3.87	**0.007**

***Significant at 0.05 level (P<0.05)**

According to the Table VI, the pre and post test mean, mean difference values and standard deviation of the data obtained from the

Knee Traction with Electrical Stimulation group (Group 1) on selected physical and clinical variables of women with moderate to severe osteoarthritis. Further, the collected data was statistically analyzed by dependent't' test to find out the significant differences if any between the pre and post test data. The obtained 'p' values of Knee Traction with Electrical Stimulation (Group 1) on selected variables such as Strength (right leg), Strength (left leg), Flexibility, Physical activity level, pain, Swelling (right leg) and Swelling (left leg) were significantly lower than the required p value at 0.05 level. The above inference gives that all the variable shows significant changes due to knee traction with Electrical Stimulation treatment

It was concluded that the Knee Traction with Electrical Stimulation group shows significant changes on selected physical and clinical variables among women with moderate to severe knee osteoarthritis. Thus the formulated hypothesis 1 was accepted.

The table VII shows, the pre and post test mean, mean difference values and standard deviation of the data obtained from the Knee Traction without Electrical Stimulation group (Group 2) on selected physical and clinical variables of women with moderate to severe knee osteoarthritis.

TABLE – VII
MEAN GAINS AND LOSSES BETWEEN PRE AND POST TEST SCORES OF KNEE TRACTION WITHOUT ELECTRICAL STIMULATION GROUP

S.NO	Variables	Pre-Test Mean	Post-Test Mean	Mean Diff	Std. Dev(±)	t' Ratio	P Value
1	Strength (R)	3.10	3.70	0.60	0.66	2.89	**0.030**
2	Strength (L)	3.80	3.60	0.20	0.64	1.04	**0.046**
3	Flexibility	14.50	15.70	1.20	0.75	5.03	**0.030**
4	Physical Activity	50.70	46.30	4.40	4.89	2.84	**0.048**
5	Pain	25.30	21.40	3.90	2.78	4.43	**0.017**
6	Swelling (R)	21.04	20.40	0.64	0.70	2.91	**0.049**
7	Swelling (L)	20.38	19.76	0.62	0.86	2.29	**0.041**

***Significant at 0.05 level (P<0.05)**

Further, the collected data was statistically analyzed by dependent 't' test to find out the significant differences if any between the pre and post test data. The obtained 'p' values of Knee Traction without Electrical Stimulation (Group 2) on selected variables such as Strength (right leg), Strength (left leg), Flexibility, Physical activity level, pain, Swelling (right leg) and Swelling (left leg) were significantly lower than the required p value at 0.05 level. The above inference gives that all the variable shows

significant changes due to the knee traction without Electrical Stimulation treatment.

It was concluded that the Knee Traction without Electrical Stimulation group shows significant changes on selected physical and clinical variables among women with moderate to severe knee osteoarthritis. Thus the formulated hypothesis 2 was accepted.

TABLE – VIII
MEAN GAINS AND LOSSES BETWEEN PRE AND POST TEST SCORES OF CONTROL GROUP

S.NO	Variables	Pre-Test Mean	Post-Test Mean	Mean Diff	Std. Dev(±)	t' Ratio	P Value
1	Strength (R)	3.60	3.10	0.50	0.55	2.87	0.051
2	Strength (L)	3.50	2.90	0.60	0.73	2.59	0.056
3	Flexibility	14.80	14.50	0.30	0.88	1.08	0.056
4	Physical Activity	46.40	48.40	2.00	2.45	2.58	0.082
5	Pain	24.20	25.00	0.80	3.49	0.73	0.627
6	Swelling (R)	19.50	19.89	0.39	0.61	2.02	0.174
7	Swelling (L)	19.56	19.89	0.33	0.54	1.93	0.190

***Significant at 0.05 level (P<0.05)**

The above table – VIII indicates that the pre and post test mean, mean difference values and standard deviation of the data obtained from the control group (Group 3) on selected physical and clinical variables of women with moderate to severe knee osteoarthritis. Further, the collected data was statistically analyzed by dependent 't' test to find out the significant differences if any between the pre and post test data.

. The obtained P values were 0.051, 0.056, 0.056, 0.082, 0.627, 0.174 and 0.190 of Strength (right leg), Strength (left leg), Flexibility, Physical activity level, pain, Swelling (right leg) and Swelling (left leg) respectively. The obtained p values were higher than the required p value. Hence the obtained p-values failed to reach the significant level on the criterion variables of physical and clinical variables at 0.05 level.

It was concluded that the control group was not significant on selected physical and clinical variables among women with moderate to severe knee osteoarthritis. Thus the formulated hypothesis 3 was rejected.

4.5 COMPUTATION OF ANALYSIS OF COVARIANCE ON SELECTED VARIABLES

The following tables illustrates the statistical result of the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and Control group (CG) on selected physical and clinical variables among women with moderate to severe knee osteoarthritis.

4.5.1 RESULTS ON STREGTH (RIGHT LEG)

The statistical analysis from the table IX shows that the pretest means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 3.30, 3.10 and 3.60 respectively. The obtained F-ratio 0.54 for the pre-test was lesser than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This revealed that there was no significant different between the experimental and control group, showing that the approach of distributing the subjects to groups by randomization was faultless.

The post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 4.40, 3.50 and 3.10 respectively. The obtained F-ratio 5.49 for the post-test was greater than the required table value of 3.35 for the degree of freedom 2 and 27 required for

significant at 0.05 level. This proved that the differences between the post test means of the subjects were significant.

Table – IX

Computation of Analysis of Covariance for the Pre, Post and Adjusted Post Test on Strength (Right Leg)

(Scores in kg)

Test	Exp Group 1	Exp Group 2	CG	SV	SS	df	MS	F
Pre test	3.30	3.10	3.60	B	1.27	2	0.633	**0.54**
				W	31.40	27	1.16	
Post test	4.40	3.50	3.10	B	8.87	2	4.43	**5.49***
				W	21.80	27	0.81	
Adjusted	4.42	3.66	2.92	B	11.21	2	5.60	**21.41***
				W	6.804	26	0.26	

***Significant at 0.05 level** (The required table value at 0.05 level of confidence with df - 2 and 27 is 3.35 and df - 2 and 26 is 3.37)

The adjusted post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2 and control groups were 4.42 , 3.66 and 2.92 respectively. The obtained F-ratio for the adjusted post-test value 21.41 was greater than the required table value of 3.37 for the degree of freedom 2 and 26 required for significant at 0.05 level. This proved that the

differences between the adjusted post-test means of the subjects were significant.

As a result, the study's analysis presented above shows that there was a significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups. Furthermore, the data on strength on right leg is subjected to Scheffe's post hoc test was used to evaluate which of the three paired means had a significant difference. The results are shown in Table X.

Table - X
Scheffe's Post Hoc Test for the Difference among Paired Means of Experimental and Control Groups on Strength (Right Leg)
(Scores in kg)

Exp Group 1	Exp Group 2	CG	MD	CI
4.42	3.66	-	**0.76**	0.57
4.42	-	2.92	**1.51**	0.57
-	3.66	2.92	**0.75**	0.57

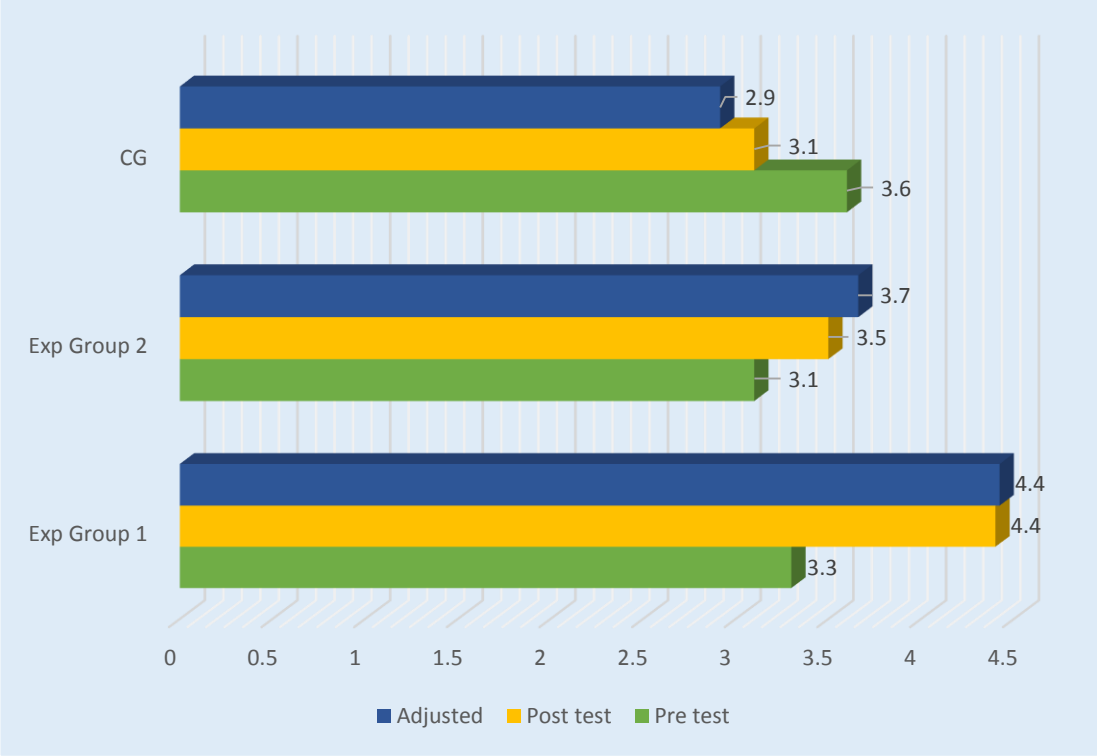
*Significant at 0.05 level of confidence

Table X showed the multiple mean comparison of the adjusted means of Knee traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2) was 0.76, Knee traction with electrical stimulation group (Exp Group 1) and Control groups (CG) was 1.51, Knee traction without electrical stimulation group (Exp Group 2) and Control groups (CG) was 0.75. The result

indicates that there was significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control group on strength (Right Leg). Hence, the Knee traction with electrical stimulation group had well increase on strength (Right Leg) among women with knee osteoarthritis as the mean difference were greater than the obtained confidence interval 0.57. For a greater understanding of the results of this study, the strength (Right Leg) of pre, post, and adjusted test mean values were displayed through a bar diagram in Figure 1.

Figure – 1

Bar Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on Strength (Right Leg) of Experimental and Control Groups (Scores in kg)



4.5.2 RESULTS ON STREGTH (LEFT LEG)

The statistical analysis from the table XI shows that the pretest means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 3.20, 3.70 and 3.50 respectively. The obtained F-ratio 0.43 for the pre-test was lesser than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This revealed that there was no significant different between the experimental and control group, showing that the approach of distributing the subjects to groups by randomization was faultless.

The post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 4.10, 3.70 and 2.90 respectively. The obtained F-ratio 4.22 for the post-test was greater than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This proved that the differences between the post test means of the subjects were significant.

The adjusted post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2 and control groups were 4.26 , 3.56 and 2.88 respectively.

Table – XI

Computation of Analysis of Covariance for the Pre, Post and Adjusted Post Test on Strength (Left Leg)
(Scores in kg)

Test	Exp Group 1	Exp Group 2	CG	SV	SS	df	MS	F
Pre test	3.20	3.70	3.50	B	1.27	2	0.633	**0.43**
				W	40.20	27	1.49	
Post test	4.10	3.70	2.90	B	7.47	2	3.73	**4.22***
				W	23.90	27	0.89	
Adjusted	4.26	3.56	2.88	B	9.45	2	4.72	**13.51***
				W	9.090	26	0.35	

***Significant at 0.05 level** (The required table value at 0.05 level of confidence with df - 2 and 27 is 3.35 and df - 2 and 26 is 3.37)

The obtained F-ratio for the adjusted post-test value 13.51 was greater than the required table value of 3.37 for the degree of freedom 2 and 26 required for significant at 0.05 level. This proved that the differences between the adjusted post-test means of the subjects were significant.

As a result, the study's analysis presented above shows that there was a significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups. Furthermore, the data on strength on left leg is subjected to Scheffe's post hoc test was used to evaluate which of the three paired means had a significant difference.

Table - XII
Scheffe's Post Hoc Test for the Difference among Paired Means of Experimental and Control Groups on Strength (Left Leg)
(Scores in kg)

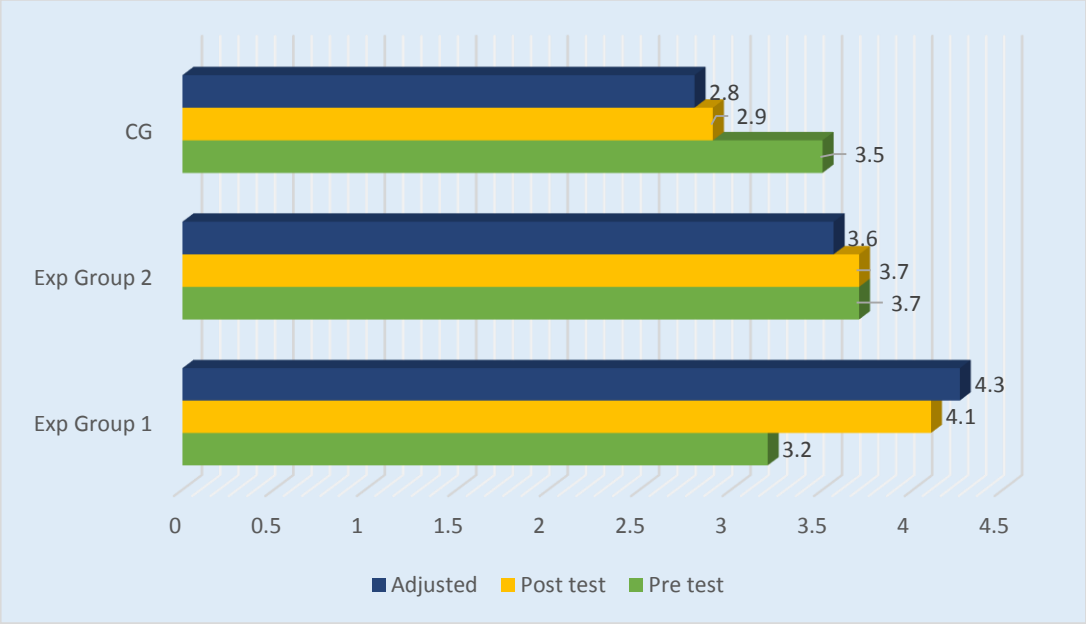
Exp Group 1	Exp Group 2	CG	MD	CI
4.26	3.56	-	**0.70**	0.66
4.26	-	2.88	**1.38**	0.66
-	3.56	2.88	**0.68**	0.66

*Significant at 0.05 level of confidence

Table XII showed the multiple mean comparison of the adjusted means of Knee traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2) was 0.70, Knee traction with electrical stimulation group (Exp Group 1) and Control groups (CG) was 1.38, Knee traction without electrical stimulation group (Exp Group 2) and Control groups (CG) was 0.68. The result indicates that there was significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control group on strength (Left Leg). Hence, the Knee traction with electrical stimulation group increased on strength (Left Leg) among women with knee osteoarthritis as the mean difference were greater than the obtained confidence interval 0.66.

For a greater understanding of the results of this study, the strength (Left Leg) pre, post, and adjusted test mean values were displayed through a bar diagram in Figure 2.

Figure – 2
Bar Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on strength (Left Leg) of Experimental and Control Groups (Scores in kg)



4.5.3 RESULTS ON FLEXIBILITY

The statistical analysis of flexibility from the table XIII shows that the pretest means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 13.60, 14.50 and 14.80 respectively. The obtained F-ratio 0.86 for the pre-test was lesser than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This revealed that there was no significant different between the experimental and control group, showing that the approach of distributing the subjects to groups by randomization was faultless.

The post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 16.40, 15.70 and 14.50 respectively. The obtained F-ratio 3.62 for the post-test was greater than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This proved that the differences between the post test means of the subjects were significant.

The adjusted post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2 and control groups were 17.04, 15.52 and 14.04 respectively.

Table – XIII

Computation of Analysis of Covariance for the Pre, Post and Adjusted Post Test on Flexibility
(Scores in cm)

Test	Exp Group 1	Exp Group 2	CG	SV	SS	df	MS	F
Pre test	13.60	14.50	14.80	B	7.80	2	3.900	0.86
				W	122.50	27	4.54	
Post test	16.40	15.70	14.50	B	38.47	2	19.23	3.62*
				W	143.00	27	5.30	
Adjusted	17.04	15.52	14.04	B	42.45	2	21.23	13.65*
				W	40.417	26	1.55	

***Significant at 0.05 level** (The required table value at 0.05 level of confidence with df - 2 and 27 is 3.35 and df - 2 and 26 is 3.37)

The obtained F-ratio for the adjusted post-test value 13.65 was greater than the required table value of 3.37 for the degree of freedom 2 and 26 required for significant at 0.05 level. This proved that the differences between the adjusted post-test means of the subjects were significant.

As a result, the study's analysis presented above shows that there was a significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups. Furthermore, the data on flexibility is subjected to Scheffe's post hoc test was used.

Table - XIV
Scheffe's Post Hoc Test for the Difference among Paired Means of Experimental and Control Groups on Flexibility
(Scores in cm)

Exp Group 1	Exp Group 2	CG	MD	CI
17.04	15.52	-	**1.52**	1.59
17.04	-	14.04	**3.00**	1.59
-	15.52	14.04	**1.47**	1.59

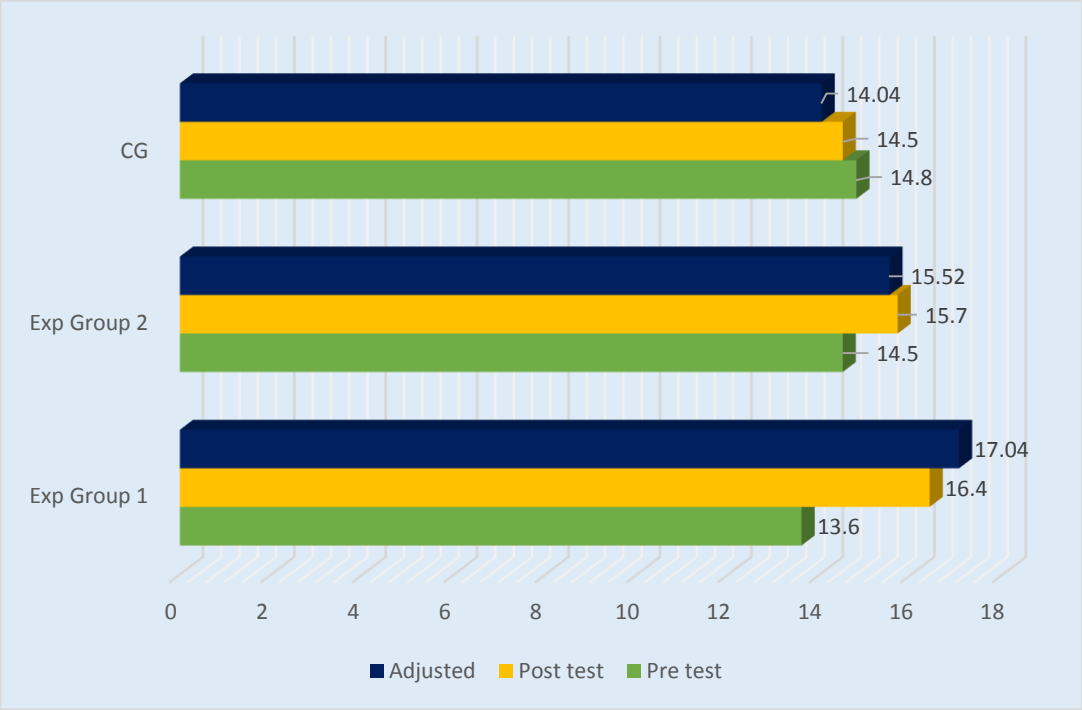
*Significant at 0.05 level of confidence

Table XIV showed the multiple mean comparison of the adjusted means of Knee traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2) was 1.72, Knee traction with electrical stimulation group (Exp Group 1) and Control groups (CG) was 3.00, Knee traction without electrical stimulation group (Exp Group 2) and Control groups (CG) was 1.47. The result indicates that there was significant difference among the Knee traction with electrical stimulation group (Exp Group 1) and control group on flexibility. Hence, the Knee traction with electrical stimulation group increased on flexibility among women with knee osteoarthritis as the mean difference were greater than the obtained confidence interval 1.59.

For a greater understanding of the results of this study, the flexibility of pre, post, and adjusted test mean values were displayed through a bar diagram in Figure 3.

Figure – 3

Bar Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on Flexibility of Experimental and Control Groups (Scores in cm)



4.5.4 RESULTS ON PHYSICAL ACTIVITY LEVEL

The statistical analysis from the table XV shows that the pretest means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 50.10, 50.70 and 46.40 respectively. The obtained F-ratio 0.91 for the pre-test was lesser than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This revealed that there was no significant different between the experimental and control group, showing that the approach of distributing the subjects to groups by randomization was faultless.

The post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 36.70, 46.30 and 48.40 respectively. The obtained F-ratio 5.29 for the post-test was greater than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This proved that the differences between the post test means of the subjects were significant.

Table – XV

Computation of Analysis of Covariance for the Pre, Post and Adjusted Post Test on Physical Activity Level

(Scores in scale)

Test	Exp Group 1	Exp Group 2	CG	SV	SS	df	MS	F
Pre test	50.10	50.70	46.40	B	108.47	2	54.233	**0.91**
				W	1611.40	27	59.68	
Post test	36.70	46.30	48.40	B	778.20	2	389.10	**5.29***
				W	1986.60	27	73.58	
Adjusted	35.73	44.76	50.91	B	1128.23	2	564.11	**26.32***
				W	557.340	26	21.44	

***Significant at 0.05 level** (The required table value at 0.05 level of confidence with df - 2 and 27 is 3.35 and df - 2 and 26 is 3.37)

The adjusted post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2 and control groups were 4.26 , 3.56 and 2.88 respectively. The obtained F-ratio for the adjusted post-test value 13.51 was greater than the required table value of 3.37 for the degree of freedom 2 and 26 required for significant at 0.05 level. This proved that the differences between the adjusted post-test means of the subjects were significant.

As a result, the study's analysis presented above shows that there was a significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups. Furthermore, the data on physical activity level Further, to determine which of the three paired means had a significant difference, the Scheffe's was applied as post hoc test and the results are presented in Table XVI

Table - XVI
Scheffe's Post Hoc Test for the Difference among Paired Means of Experimental and Control Groups on Physical Activity Level (Scores in scale)

Exp Group 1	Exp Group 2	CG	MD	CI
35.73	44.76	-	**9.03**	6.16
35.73	-	50.91	**15.18**	6.16
-	44.76	50.91	6.15	6.16

*Significant at 0.05 level of confidence

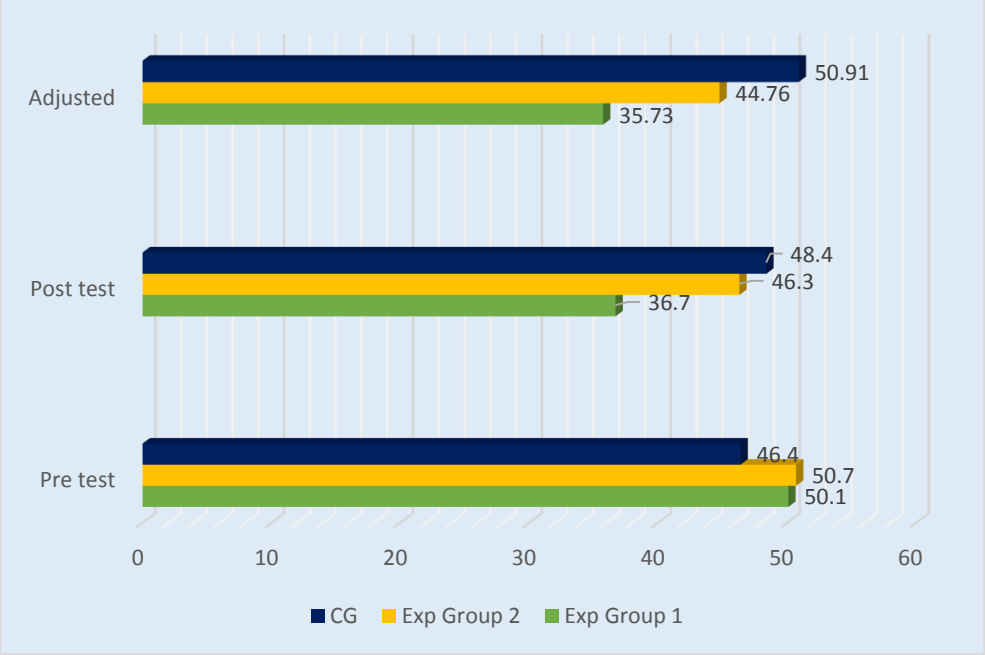
Table XVI showed the multiple mean comparison of the adjusted means of Knee traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2) was 9.03, Knee traction with electrical stimulation group (Exp Group 1) and Control groups (CG) was 15.18, Knee traction without electrical stimulation group (Exp Group 2) and Control groups (CG) was 6.15. The result indicates that there was significant difference among the Knee

traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2), Knee traction with electrical stimulation group (Exp Group 1) and control group on Physical activity Level. Hence, the Knee traction with electrical stimulation group increased on Physical activity Level among women with knee osteoarthritis as the mean difference were higher than the obtained confidence interval 0.66. Knee traction without electrical stimulation group (Exp Group 2) and control group does not have any significant difference between the group.

For a greater understanding of the results of this study, pre, post, and adjusted test mean values of Physical Activity Level were displayed through a bar diagram in Figure 4

Figure – 4

Bar Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on Physical Activity Level of Experimental and Control Group (Scores in scale)



4.5.5 RESULTS ON PAIN

The statistical analysis from the table XVII shows that the pretest means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 26.30, 25.30 and 24.20 respectively. The obtained F-ratio 0.80 for the pre-test was lesser than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This revealed that there was no significant different between the experimental and control group, showing that the approach of distributing the subjects to groups by randomization was faultless.

The post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 17.20, 21.40 and 25.0 respectively. The obtained F-ratio 11.37 for the post-test was greater than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This proved that the differences between the post test means of the subjects were significant.

Table – XVII
Computation of Analysis of Covariance for the Pre, Post and Adjusted Post Test on Pain
(Scores in scale)

Test	Exp Group 1	Exp Group 2	CG	SV	SS	df	MS	F
Pre test	26.30	25.30	24.20	B	22.07	2	11.033	0.80
				W	373.80	27	13.84	
Post test	17.20	21.40	25.00	B	304.80	2	152.40	**11.37***
				W	362.00	27	13.41	
Adjusted	16.65	21.38	25.57	B	376.61	2	188.31	**19.22***
				W	254.777	26	9.80	

***Significant at 0.05 level** (The required table value at 0.05 level of confidence with df - 2 and 27 is 3.35 and df - 2 and 26 is 3.37)

The adjusted post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2 and control groups were 16.65, 21.38 and 25.57 respectively. The obtained F-ratio for the adjusted post-test value 19.22 was greater than the required table value of 3.37 for the degree of freedom 2 and 26 required for significant at 0.05 level. This proved that the differences between the adjusted post-test means of the subjects were significant.

As a result, the study's analysis presented above shows that there was a significant difference among the Knee traction with electrical

stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups. Furthermore, the data on Pain is subjected to Scheffe's post hoc test was used to evaluate which of the three paired means had a significant difference.

Table - XVIII
Scheffe's Post Hoc Test for the Difference among Paired Means of Experimental and Control Groups on Pain
(Scores in scale)

Exp Group 1	Exp Group 2	CG	MD	CI
16.65	21.38	-	**4.74**	3.49
16.65	-	25.57	**8.92**	3.49
-	21.38	25.57	**4.19**	3.49

*Significant at 0.05 level of confidence

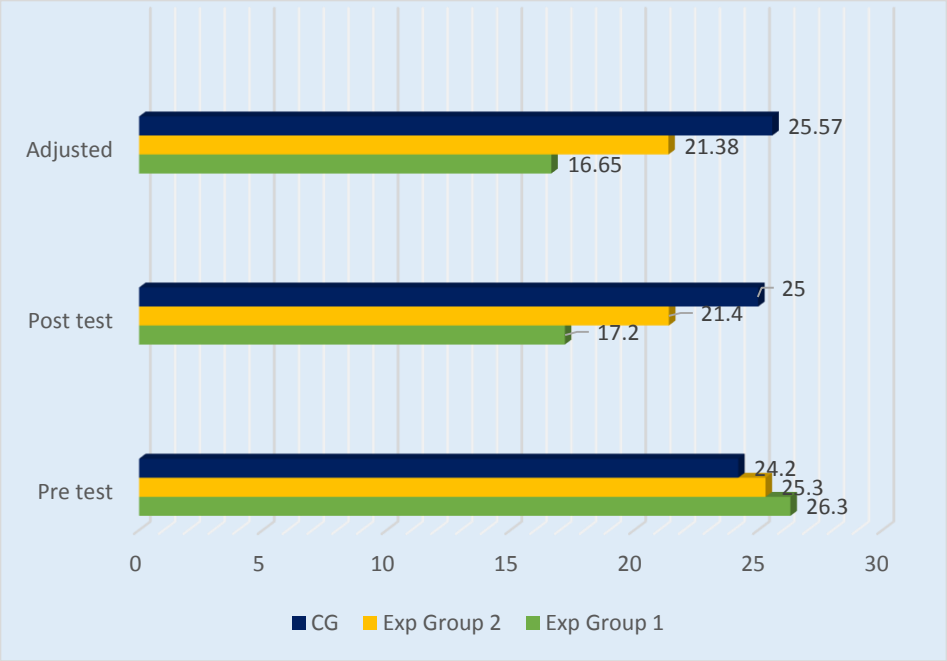
Table XVIII showed the multiple mean comparison of the adjusted means of Knee traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2) was 4.74, Knee traction with electrical stimulation group (Exp Group 1) and Control groups (CG) was 8.92, Knee traction without electrical stimulation group (Exp Group 2) and Control groups (CG) was 4.19. The result indicates that there was significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control group on Pain. Hence, the Knee traction with electrical stimulation group had decreased

the Pain among women with knee osteoarthritis as the mean difference were greater than the obtained confidence interval 3.49.

For a greater understanding of the results of this study, pre, post, and adjusted test mean values of pain were displayed through a bar diagram in Figure 5.

Figure – 5

Bar Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on Pain of Experimental and Control Groups (Scores in scale)



4.5.6 RESULTS ON SWELLING (RIGHT LEG)

The statistical analysis from the table XIX shows that the pretest means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 20.75, 21.04 and 19.50 respectively. The obtained F-ratio 1.19 for the pre-test was lesser than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This revealed that there was no significant different between the experimental and control group, showing that the approach of distributing the subjects to groups by randomization was faultless.

The post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 18.80, 20.90 and 20.49 respectively. The obtained F-ratio 3.89 for the post-test was greater than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This proved that the differences between the post test means of the subjects were significant.

The adjusted post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2 and control groups were 18.55, 20.43 and 21.21 respectively.

Table – XIX

Computation of Analysis of Covariance for the Pre, Post and Adjusted Post Test on Swelling (Right Leg)
(Scores in cm)

Test	Exp Group 1	Exp Group 2	CG	SV	SS	df	MS	F
Pre test	20.75	21.04	19.50	B	13.39	2	6.697	1.19
				W	152.49	27	5.65	
Post test	18.80	20.90	20.49	B	34.76	2	17.38	**3.89***
				W	121.11	27	4.49	
Adjusted	18.55	20.43	21.21	B	36.30	2	18.15	**16.17***
				W	29.193	26	1.12	

***Significant at 0.05 level** (The required table value at 0.05 level of confidence with df - 2 and 27 is 3.35 and df - 2 and 26 is 3.37)

The obtained F-ratio for the adjusted post-test value 16.17 was greater than the required table value of 3.37 for the degree of freedom 2 and 26 required for significant at 0.05 level. This proved that the differences between the adjusted post-test means of the subjects were significant.

As a result, the study's analysis presented above shows that there was a significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups. Furthermore, the data on swelling on right leg is subjected to Scheffe's post hoc test was used to evaluate which of the three paired means had a significant difference.

Table - XX
Scheffe's Post Hoc Test for the Difference among Paired Means of Experimental and Control Groups on Swelling (Right Leg)
(Scores in cm)

Exp Group 1	Exp Group 2	CG	MD	CI
18.55	20.43	-	1.17	1.18
18.55	-	21.21	**2.66**	1.18
-	20.43	21.21	0.79	1.18

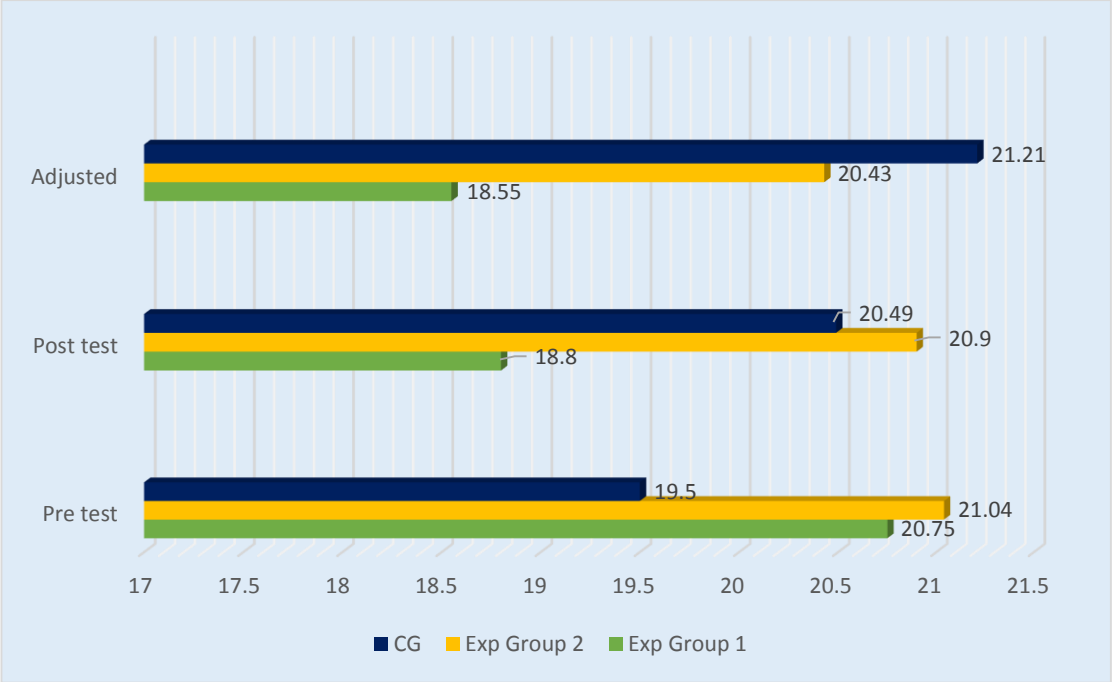
*Significant at 0.05 level of confidence

Table XX showed the multiple mean comparison of the adjusted means of Knee traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2) was 1.17, Knee traction with electrical stimulation group (Exp Group 1) and Control groups (CG) was 2.66, Knee traction without electrical stimulation group (Exp Group 2) and Control groups (CG) was 0.79. The result indicates that there was significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control group on swelling (Right Leg). Hence, the Knee traction with electrical stimulation group had decreased the swelling (Right Leg) among women with knee osteoarthritis as the mean difference were greater than the obtained confidence interval 0.57.

For a greater understanding of the results of this study, the swelling (Right Leg) of pre, post, and adjusted test mean values were displayed through a bar diagram in Figure 1.

Figure – 6

Bar Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on Swelling (Right Leg) of Experimental and Control Groups (Scores in cm)



4.5.7 RESULTS ON SWELLING (LEFT LEG)

The statistical analysis from the table XXI shows that the pretest means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 21.04, 20.38 and 19.56 respectively. The obtained F-ratio 0.95 for the pre-test was lesser than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This revealed that there was no significant different between the experimental and control group, showing that the approach of distributing the subjects to groups by randomization was faultless.

The post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups were 18.75, 19.96 and 21.25 respectively. The obtained F-ratio 3.62 for the post-test was greater than the required table value of 3.35 for the degree of freedom 2 and 27 required for significant at 0.05 level. This proved that the differences between the post test means of the subjects were significant.

The adjusted post-test means of Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2 and control groups were 18.22, 19.92 and 21.82 respectively.

Table – XXI

Computation of Analysis of Covariance for the Pre, Post and Adjusted Post Test on Swelling (Left Leg)
(Scores in cm)

Test	Exp Group 1	Exp Group 2	CG	SV	SS	df	MS	F
Pre test	21.04	20.38	19.56	B	10.99	2	5.497	0.95
				W	155.52	27	5.76	
Post test	18.75	19.96	21.25	B	45.26	2	22.63	**3.62***
				W	168.61	27	6.24	
Adjusted	18.22	19.92	21.82	B	60.72	2	30.36	**9.62***
				W	82.076	26	3.16	

***Significant at 0.05 level** (The required table value at 0.05 level of confidence with df - 2 and 27 is 3.35 and df - 2 and 26 is 3.37)

The obtained F-ratio for the adjusted post-test value 9.62 was greater than the required table value of 3.37 for the degree of freedom 2 and 26 required for significant at 0.05 level. This proved that the differences between the adjusted post-test means of the subjects were significant.

As a result, the study's analysis presented above shows that there was a significant difference among the Knee traction with electrical stimulation group (Exp Group 1), Knee traction without electrical stimulation group (Exp Group 2) and control groups. Furthermore, the data on swelling on Left leg is subjected to Scheffe's post hoc test was used to evaluate which of the three paired means had a significant difference.

Table - XXII
Scheffe's Post Hoc Test for the Difference among Paired Means of Experimental and Control Groups on Swelling (Left Leg)
(Scores in cm)

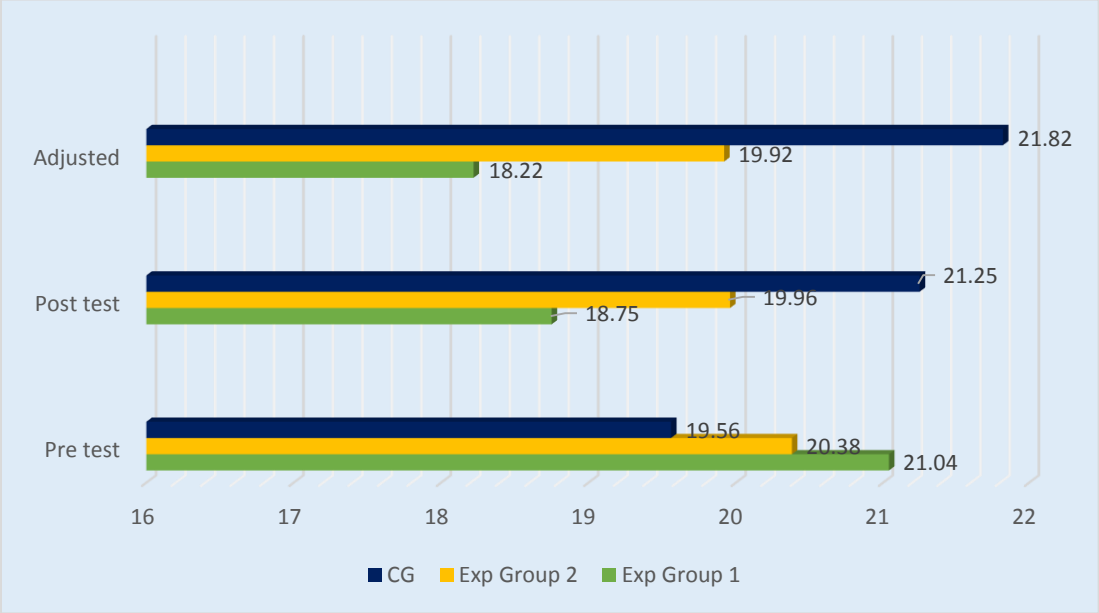
Exp Group 1	Exp Group 2	CG	MD	CI
18.22	19.92	-	1.70	1.98
18.22	-	21.82	**3.60**	1.98
-	19.92	21.82	1.90	1.98

*Significant at 0.05 level of confidence

Table XXII showed the multiple mean comparison of the adjusted means of Knee traction with electrical stimulation group (Exp Group 1) and Knee traction without electrical stimulation group (Exp Group 2) was 1.70, Knee traction with electrical stimulation group (Exp Group 1) and Control groups (CG) was 3.60, Knee traction without electrical stimulation group (Exp Group 2) and Control groups (CG) was 1.90. The result indicates that there was significant difference among the Knee traction with electrical stimulation group (Exp Group 1) and control group on swelling (Left Leg). Hence, the Knee traction with electrical stimulation group had decreased the swelling (Left Leg) among women with knee osteoarthritis as the mean difference were greater than the obtained confidence interval 0.57. For a greater understanding of the results of this study, the swelling (Left Leg) of pre, post, and adjusted test mean values were displayed through a bar diagram in Figure 7.

Figure – 7

Bar Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on swelling (Right Leg) of Experimental and Control Groups v



4.6 DISCUSSION ON FINDINGS

4.6.1 DISCUSSION ON PHYSICAL VARIABLE

Physical fitness may be considered as an autonomous factor in influencing osteoarthritis manifestations. As the physical aspect have more chances of increasing lifestyle disorders including osteoarthritis, osteopenia or osteoporosis (Hartman, Hochberg & Shamir, 2003). Obesity in particular can exacerbate the signs of bone loss, increasing morbidity and immobility (Ilich et al. 2015). In health related physical fitness, comprises the components of physical variable related to knee includes strength of leg, flexibility and physical activity level. Physical fitness is frequently seen as a more accurate (though indirect) measure of physical activity than self-report, and the terms physical activity and fitness are frequently used interchangeably. For example, physical activity increases through good strength and flexibility. (Wellsandt & Golightly, 2018).

Strength

From the results it was proved that there was a significant improvement on Strength (Right Leg) due to 12 weeks of Knee traction with electrical stimulation, when compared to control group among women with knee osteoarthritis. Among the experimental group, the results also proved that Knee traction with electrical stimulation improved strength in right Leg. Hence Knee traction with electrical stimulation group (Exp Group 1) was found to be better in improving strength (Right Leg) than

Knee traction with electrical stimulation group (Exp Group 2). From the results it was found that there was a significant improvement on Strength (Left Leg) due to Knee traction with electrical stimulation group (Exp Group 1) among women with knee osteoarthritis. The results also proved that there was a significant difference between Knee traction with electrical stimulation group (Exp Group 1) and Knee traction with electrical stimulation group (Exp Group 2) on improving the Strength (Left Leg). Hence Knee traction with electrical stimulation group (Exp Group 1) was found to be better in improving strength (Left Leg) than Knee traction with electrical stimulation group (Exp Group 2). The result of this study on strength (Right and Left Leg) has been reliable with the research done by Bremner et al. (2015) and Grevstad et al. (2015).

Electrical stimulation which involves using current to cause a muscular contraction, appears to be beneficial to build and strengthen the muscle. A study conducted by Tucker et al. 2010 used this stimulation and traction device in healthy people shown enhancement of circulation in peripheral, during and after stimulation and traction protocol shows significant changes in strength and flexibility which supports the study.

On the basis of the research done by Talbot et al. 2003, electrical stimulation increases strength without exacerbating pain in thirty four adults with knee osteoarthritis for 12 weeks.

The study conducted by Durmuş, D., Alaylı, G., & Cantürk (2009) evaluated that the efficacy of electrical stimulation on pain, disability, and

quadriceps strength in the patients with knee osteoarthritis. There was no significant difference in strength.

Fexibility

From the results it was found that there was a significant improvement on Flexibility due to Knee traction with electrical stimulation group (Exp Group 1) among women with knee osteoarthritis. The results also proved that there was a significant difference between Knee traction with electrical stimulation group (Exp Group 1) and control group on improving the flexibility.

The outcome of the current investigation is reliable with what was exposed in previous research studies. As stated by Zakir et al. 2016, there was Significant difference found between manual therapy (traction and stimulation) was superior than the exercise therapy treatment approaches in treating knee osteoarthritis for short term treatment sessions to improve flexibility.

The sudden gain in flexibility due to stimulation and traction may excite the knee and hip mechanoreceptors, which also improves the tolerance to tensioning. Eventually, this mechanism results in a sudden increase in flexibility. (Demirci et al. 2017). Mahmoodi et al. investigated the study which shows that traction improves range of movement (flexibility) and functional ability

Physical Activity Level

The body is supported by bones against the effects of gravity. When the muscles try to move, the bones resists. Bone responds to adequate weight-bearing physical activity like standing, sitting, walking and climbing by strengthening because it is a living tissue. The mechanism involves this occurrence may be that regular physical activity increases lubrication production, which in turn reduces the negative impacts of chondrocyte senescence (aging) and inhibits the cartilage degeneration of ameliorating.

From the findings, it was discovered that there was a significant improvement on Physical Activity Level due to Knee traction with electrical stimulation group (Exp Group 1) among women with knee osteoarthritis. The results also proved that there was a significant difference between Knee traction with electrical stimulation group (Exp Group 1) and Knee traction with electrical stimulation group (Exp Group 2) on improving the Physical Activity Level. Hence Knee traction with electrical stimulation group (Exp Group 1) was found to be better in improving Physical Activity Level than Knee traction without electrical stimulation group (Exp Group 2).

Mahmoodi et al. (2013) investigated the study which shows that traction improves the functional ability in severe knee osteoarthritis patient using kellgren Lawrence scale. This study conducted by Lee Dong Kyu, 2019 showed that knee joint traction therapy was effective in

improving pain, physical function, and depression in patients with degenerative arthritis. According to Pandya and Megha (2017) mechanical traction given for 10 minutes is more effective than hot pack in 24 older patients to improve physical activity.

Zakir et al. 2016 conducted the study on the effect of manual therapy vs exercise therapy for managing knee osteoarthritis and revealed that there was Significant difference found between manual therapy (traction and stimulation) was superior than the exercise therapy treatment approaches in treating knee osteoarthritis for short term treatment sessions to alleviating pain and to improve mobility.

4.6.2 DISCUSSION ON CLINICAL VARIABLE

Pain

Traction-induced movement promotes circulation and lowers unpleasant irritant concentration. Mechanically loosening a tight tissue should make the segment more mobile, reducing pain from restricted motion or tension on the tissue. Mechanoreceptor stimulation prevents the transmission of pain, and reflex muscle guarding inhibition lessens muscular discomfort (Vekariya et al. 2019).

The result of the study stated that there was a significant decrease in Pain due to Knee traction with electrical stimulation group (Exp Group 1) among women with knee osteoarthritis. The results also proved that there was a significant difference between Knee traction with electrical

stimulation group (Exp Group 1) and Knee traction with electrical stimulation group (Exp Group 2) on decreasing the Pain. Hence Knee traction with electrical stimulation group (Exp Group 1) was found to be better in improving Pain, than Knee traction with electrical stimulation group (Exp Group 2).

The current result was supported by the following studies. Lee Dong Kyu (2019) conducted the study on knee joint traction therapy which was effective in decreasing pain and depression, increasing physical function in patients with degenerative arthritis. Hedya (2019) conducted the study on the effect of traction reduce knee arthritis symptoms for reducing the pain and improves the quality of patients' life.

Subramanian, (2014) investigated the effectiveness of manual traction of knee joint. The result study indicated significant improvement in experimental group compared to control group in terms of pain using the subscale of KOOS questionnaire. According to Pandya and Megha (2017) mechanical traction given for 10 minutes is more effective than hot pack in 24 older patients to decrease pain.

Gaines et al. 2004 examined short and long term effects of the 12-week home-based neuromuscular electrical stimulation of the quadriceps femoris to reduce arthritis knee pain in older persons with knee osteoarthritis and found out no significant difference due to stimulation

The study conducted by Durmuş, D., Alaylı, G., & Cantürk (2009) evaluated that the efficacy of electrical stimulation on pain in the patients with knee osteoarthritis have no significant difference due to therapy.

Maher et al. 2010 explored that there was no significant difference in pain due to tibio-femoral traction but encourages the use of tibio femoral joint traction to stretch the shortened articular and periarticular tissues while reducing reported pain levels during and after treatment.

Zakir et al. 2016 conducted the study on the effect of manual therapy vs exercise therapy for managing knee osteoarthritis and revealed that there was Significant difference found between manual therapy (traction and stimulation) was superior than the exercise therapy treatment approaches in treating knee osteoarthritis for short term treatment sessions to alleviating pain, stiffness and functional mobility.

Swelling

The most prevalent sign of knee osteoarthritis is swelling, which impairs knee mechanism and muscular activity in osteoarthritis patients. Traction helps to reduce the space between the joints. (Rajoria et al. 2010)

From the results it was confirmed that there was a significant difference on swelling (Right Leg) due to Knee traction with electrical stimulation group (Exp Group 1) among women with knee osteoarthritis. The results also proved that there was a significant difference between Knee traction with electrical stimulation group (Exp Group 1) and Knee

traction with electrical stimulation group (Exp Group 2) on decreased the swelling (Right Leg). Hence Knee traction with electrical stimulation group (Exp Group 1) was found to be better in decreasing swelling (Right Leg) than Knee traction with electrical stimulation group (Exp Group 2).

The result of the study explored that there was a significant difference on swelling (Left Leg) due to Knee traction with electrical stimulation group (Exp Group 1) among women with knee osteoarthritis. The results also proved that there was a significant difference between Knee traction with electrical stimulation group (Exp Group 1) and control group decreased the swelling (Left Leg). Hence Knee traction with electrical stimulation group (Exp Group 1) was found to be better in decreasing swelling (Left Leg) than Knee traction with electrical stimulation group (Exp Group 2) and control group.

In the present study, the results findings of both right and left leg swelling were in agreement with the research studies that have exposed a positive relationship between, knee traction and stimulation on swelling. (Rajoria et al. 2010) founded that there was significant changes in swelling due to traction on knee joint osteoarthritis patient for 8 weeks. Sari Zubeyir et al. (2019) compared the effect of knee stimulation and traction on 89 patient, there was significant changes due to knee stimulation and traction and no significant difference in swelling in knee stimulation only group.

4.7 DISCUSSION ON HYPOTHESES

1. The research stated that there would be significant changes on selected Physical and Clinical variables due to Knee Traction with Electrical Stimulation among knee osteoarthritis patient was framed as the 1st hypothesis.

   It was concluded that due to the effect of Knee Traction with Electrical Stimulation on the selected Physical variables indices such as Strength, Flexibility, Physical Activity and Clinical Variable such as Pain and swelling among knee osteoarthritis patient were significantly altered. Hence, the researcher's 1st hypothesis was accepted at 0.05 level.

2. The research stated that there would be significant changes on selected Physical and Clinical variables due to Knee Traction without Stimulation among knee osteoarthritis patient was framed as the 2nd hypothesis.

   It was observed that due to the effect of Knee Traction without Stimulation on the selected Physical variables indices such as Strength, Flexibility, Physical Activity and Clinical Variable such as Pain and swelling among knee osteoarthritis patient were significantly altered. Hence, the researcher's 2nd hypothesis was accepted at 0.05 level.

3. The research stated that there would be significant changes on selected Physical and clinical variables in Control Group among knee osteoarthritis patient was framed as the 3rd hypothesis.

   The results of the study shows that Control Group (CG) on the selected Physical variables indices such as Strength, Flexibility, Physical Activity and Clinical Variable such as Pain and swelling among knee osteoarthritis women patient were not significantly altered. Hence, the researcher's 3rd hypothesis was rejected at 0.05 level.

4. The research stated that there would be significant changes on selected Physical variables in Knee Traction with Electrical Stimulation, Knee Traction without Stimulation and Control Group among knee osteoarthritis patient was framed as the 4th hypothesis.

   The results of the study shows that there was significant improvement on the selected Physical variables indices such as Strength, Physical Activity among knee osteoarthritis patient were significantly improved, whereas flexibility failed to reach the significant level. Hence, the researcher's 4th hypothesis was accepted at 0.05 level.

5. The research was stated that there would be significant changes on selected clinical variables in Knee Traction with Electrical Stimulation, Knee Traction without Stimulation and Control Group among knee osteoarthritis patient was framed as the 5th hypothesis.

The results of the study shows that there was significant improvement on the selected clinical variables indices such as pain were significantly reduced among knee osteoarthritis patient were significantly improved, Whereas swelling failed to reach the significant level. Hence, the researcher's 5th hypothesis was accepted at 0.05 level.