CHAPTER 5

RESULTS

5.1 Descriptive data

The participants in this study consisted of 40 chronic low back pain. Table 5.1 presents demographic data of subjects. Subjects were divided into Pilates (n=20) and control group (n=20). Mean age of Pilates and control were 34.03 and 33.25 years respectively. Mean duration of symptom were 4.16 and 2.84 years for Pilates and control respectively.

Table 5.1 Demographic data of Pilates and control groups

		N	Mean	SD	Range
Age	Pilates	20	34.30	6.22	26-48
	Control	20	33.25	8.06	24-49
Duration of symptom	Pilates	20	4.16	4.85	1-20
	Control	20	2.84	2.33	0.75-8

The statistic comparison of age and duration of symptom between groups are presented in table 5.2. No significant difference between Pilates and control groups was found in both age (p=0.647) and duration of symptom (p=0.281).

Table 5.2 comparison of age and duration of symptom between Pilates and control groups

		Levene's Test for Equality of Variances		Test for equality of mean		
		F	Sig.	t	df	Sig. (2-tailed)
Age	Equal variances assumed	.900	.349	.461	38	.647
	Equal variances not assumed			.461	35.708	.648
Duration of symptom	Equal variances assumed	3.552	.067	1.094	38	.281
	Equal variances not assumed			1.094	27.345	.283

5.2 Lumbopelvic stability test

Lumbopelvic stability outcome for the Pilates group is displayed in Figure 5.1. At week 0, all subjects failed lumbopelvic stability test. Seven subjects (35%) passed this test at week 4 and increased to 19 subjects (95%) at week 8. However 20 subjects (100%) from control group constantly failed this test at week 0, week 4 and week 8.

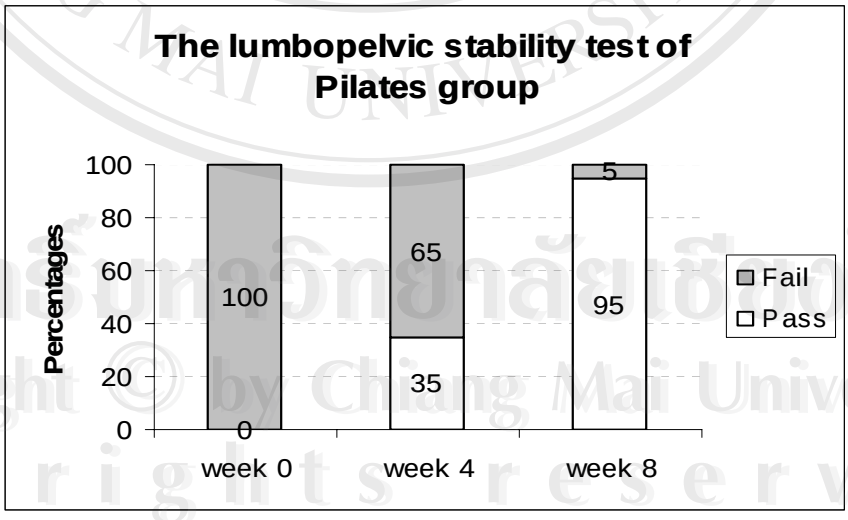

Figure 5.1 The lumbopelvic stability control of Pilates group

An analysis was done to determine the association between scoring a pass/fail in the lumbopelvic stability test in all subjects using Chi square test. Pearson Chi square was reported as $\chi^2(1) = 8.49$, p=0.004, and this result agree perfectly with the Pilates intervention at week 4. The study also found a significant relationship existed when tested at week 8 ($\chi^2(1) = 36.19$, $p< 0.001$).

Table5.3 Chi-square test for lumbopelvic stability score at week 4 and week 8 in Pilates group

	Value	df	Asymp. Sig. (2-tailed)
Week 4	8.49	1	0.004
Week 8	36.19	1	0.000

5.3 Flexibility test

A significant interaction of main effect was observed for the flexibility test. The mean value of sit and reach test was progressing in the Pilates group. There were 25.02, 30.65 and 33.87 cm at week 0, week 4, and week 8 respectively (table 5.4). Differences between these three means were significant: $F_{(2,38)}$=25.87, p<0.05 (table 5.5). For the control group, the mean values of flexibility were 27.70, 27.13 and 26.85 cm for when measured at week 0, 4 and 8 week respectively. However, no significant difference between three measures was found (p>0.05) as presented in table 5.5.

Table 5.4 The mean values of flexibility

Trial	Mean		Standard deviation	
	Pilates group	Control group	Pilates group	Control group
Week 0	25.02	27.70	8.40	10.22
Week 4	30.65	27.13	7.36	9.24
Week 8	33.87	26.85	5.08	9.17

Table 5.5 Difference of flexibility between week 0, week 4 and week 8

Source	df	Mean square	F	Sig.
Pilates group				
Flexibility sphericity assumed	2	402.18	25.87	0.000
Error (flexibility) sphericity assumed	38	15.55		
Control group				
Flexibility sphericity assumed	2	3.76	0.45	0.64
Error (flexibility) sphericity assumed	38	8.36		

Tukey's honestly significant different (HSD) test was applied to calculate the mean difference between the three trials as present in table 5.6. The minimum significant difference for Tukey's procedure was given by

$$\text{MSD} = q\sqrt{MS_e/n}$$

$$= 3.44\sqrt{15.55/20}$$

$$= 3.03$$

Absolute differences that were equal or greater than this value indicated significant results. According to these results, the three trials were different from each other in Pilates group at $p<0.05$.

Table 5.6 Significant differences for Tukey's HSD test of flexibility test

		Week 0	Week 4	Week 8
	Mean	25.02	30.65	33.87
Week 0	25.02	-	5.53	8.85
Week 4	30.65		-	3.22

The comparison of flexibility between Pilates and control groups is presented in table 5.7. No significant differences in flexibility between both groups was found at

week 0 ($F_{(1,38)}$=0.82, p=0.37) and week 4 ($F_{(1,38)}$= 1.78, p=0.19). However, significant differences was found at week 8 ($F_{(1,38)}$= 8.98, p<0.05).

Table 5.7 Comparison of flexibility between Pilates and control groups

		SS	df	MS	F	Sig.
Week 0	Between Groups	72.09	1	72.09	.82	.370
	Within Groups	3325.59	38	87.52		
	Total	3397.68	39			
Week 4	Between Groups	124.26	1	124.26	1.78	.190
	Within Groups	2651.99	38	69.79		
	Total	2776.24	39			
Week 8	Between Groups	493.51	1	493.51	8.98	.005
	Within Groups	2088.11	38	54.95		
	Total	2581.61	39			

5.4 Pain measurement

The mean value of average pain intensity level was decline in the Pilates group, with mean of 4.69 at week 0, 2.15 at week 4, and 1.05 at week 8 (table 5.8). Difference between these three means were significant: $F_{(2,38)}$=34.49, p<0.05 (table 5.9). However, the significant differences in pain intensity between three weeks of control group was not met: $F_{(2,38)}$=0.43, p>0.05. The mean values of average pain intensity were 4.39, 4.55, and 4.73 at week 0, week 4, and week 8 respectively.

Table 5.8 The mean values of average pain intensity level

Trial	Mean		Standard deviation	
	Pilates group	Control group	Pilates group	Control group
Week 0	4.69	4.39	1.30	1.57
Week 4	2.15	4.55	1.74	1.17
Week 8	1.05	4.73	1.20	1.78

Table 5.9 Difference of pain intensity between week0, week4 and week8

Source	df	Mean square	F	Sig.
Pilates group				
Average pain sphericity assumed	2	69.91	34.49	0.000
Error (average pain) sphericity assumed	38	2.03		
Control group				
Average pain sphericity assumed	2	0.58	0.43	0.66
Error (average pain) sphericity assumed	38	1.36		

A comparison of the mean difference between the three trials was calculated by Tukey's HSD. The minimum significant difference for Tukey's procedure was given by

$$MSD = q\sqrt{MS_e/n}$$
$$= 3.44\sqrt{2.03/20}$$
$$= 1.10$$

Absolute difference that are equal to or greater than this value are significant. The mean difference between the three trials is present in table 5.10. The three trials were difference from each other in Pilates group at $p<0.05$.

Table 5.10 Significant differences for Tukey's HSD test of pain intensity

		Week 0	Week 4	Week 8
	Mean	4.69	2.15	1.05
Week 0	4.69	-	2.54	3.64
Week 4	2.15		-	1.10

The comparison of average pain intensity between Pilates and control groups is presented in table 5.11. At baseline, the results of one-way ANOVA indicated that there was no significant differences in average pain intensity between both groups $F_{(1,38)}$=0.45, p>0.05. However, the significant differences were found at week 4 ($F_{(1,38)}$=26.20, p<0.05) and week 8($F_{(1,38)}$=58.50, p<0.05).

Table 5.11 Comparison of average pain between Pilates and control groups

		SS	df	MS	F	Sig.
Week 0	Between Groups	.93	1	.93	.45	.51
	Within Groups	79.06	38	2.08		
	Total	79.99	39			
Week 4	Between Groups	57.60	1	57.60	26.20	.000
	Within Groups	83.54	38	2.20		
	Total	141.14	39			
Week 8	Between Groups	135.42	1	135.42	58.50	.000
	Within Groups	87.97	38	2.32		
	Total	223.39	39			

5.5 Stress measurement

Psychological stress was determined using Inventory stress test questionnaire. Significant decrease in stress in the Pilates group was found. It was 2.53 in week 0, 1.85 in week 4, and 1.63 in week 8 (table 5.12), with Chi-square = 14.63, p<0.05

(table5.13). Whereas stress between the three trials in the control group was not different, with Chi-square = 4.67, $p>0.05$ (table5.13).

Table 5.12 The mean score of stress level

	Mean rank	
	Pilates	Control
Week 0	2.53	2.23
Week 4	1.85	1.85
Week 8	1.63	1.93

Table 5.13 Difference of stress level between week 0, week 4 and week 8

	Pilates	Control
Chi square	14.63	4.67
Asymp. Sig.	0.001	0.10

Post hoc analysis was made to find difference between the three trials using Wilcoxon signed ranks test. The results are reported in Table 5.14. Findings demonstrated that stress of the Pilates group significantly decrease from week 0 to week 4 with $Z = -2.83$, $p<0.05$. Significant difference between week 0 and week 8 was also found with $Z = -2.97$, $p<0.05$. Conversely, the difference between week 4 and week 8 was not met.

Table 5.14 Wilcoxon signed ranks test for significant differences of stress level in Pilates group

	Week 0 – Week 4	Week 0 – Week 8	Week 4 – Week 8
Z	-2.83	-2.97	-1.41
Aymp. Sig. (2 tailed)	0.005	0.003	0.157

A comparison between the Pilates and control groups at each trial was made using Mann-whitney U test. The finding demonstrated that there were no significant difference in both the Pilates and control groups at week 0, week 4, and week 8 (table 5.15). This finding indicated that subjects in both groups were equal in stress level.

Table 5.15 Comparison of stress level between Pilates and control groups

	Week 0	Week 4	Week 8
Mann-whitney U	131.50	178.50	152.50
Asymp. Sig. (2-tailed)	0.063	0.560	0.198