

## CHAPTER 5

### RESULTS

The data was collected at two centers, with the objectives of the studies discussed in chapter 4. The results of the same are presented here separately for the two studies.

#### 5.1 STUDY ONE: SNEHAD N STUDY

This section discusses the results of study one.

##### 5.1.1 Socio-demographic data

The socio-demographic characteristics of the subjects are presented in Table 5.1 for discrete variables and Table 5.2 for continuous variables.

The study included both males and females. Out of 73 participants selected, 41 were males and 32 were females (Table 5.1). Further, in the yoga group, of 38 participants, 23 were males and 15 were females, and in the control group of 35 participants, it was 18 males and 17 females. There was no significant difference in the number of males and females between the two groups ( $p=0.437$ ).

The living and HIV status of the parents of the participants were also collected. It was noted that overall 30.1% of the participants only had both their parents alive, 38.4% had lost either their father or mother and the remaining 31.5% of the participants had lost both father and mother. Further, there was no significant difference between these numbers between the yoga group and the control group ( $p=0.664$ ).

Overall 87.7% of the participants' parents (both father and mother) were HIV positive. In 2.7% cases, only one of the parents was HIV positive. In 5.5% cases, neither of the parents were HIV+. In the remaining 4.1% cases, the HIV status of the parents was not

available. Further, there was no significant difference between the parental HIV status between the yoga and the control group ( $p=0.801$ ).

**Table 5.1: Socio-demographic data (Discrete data)**

Variables & classification		Total (n=73)	Yoga Group (n=38)	Control Group (n=35)	p
Gender	Male	41 (56.1%)	23 (60.5%)	18 (51.4%)	0.437
	Female	32 (43.9%)	15 (39.5%)	17 (48.8%)	
Parental life status	Both not alive	22 (30.1%)	10 (26.3%)	12 (34.3%)	0.664
	One alive	28 (38.4%)	16 (42.1%)	13 (37.1%)	
	Both Alive	23 (31.5%)	12 (31.6%)	11 (31.4%)	
Parental HIV status	Both infected	64 (87.7%)	33 (86.8%)	31 (88.6%)	0.801
	One infected	2 (2.7%)	2 (5.3%)	0 (0.0%)	
	None infected	4 (5.5%)	2 (5.3%)	2 (5.7%)	
	Not available	3 (4.1%)	1 (2.6%)	2 (5.7%)	

The average age of participants among both the yoga group and the control group was  $10.43 \pm 1.39$  (Mean  $\pm$  SD) years (Table 5.2). Considering group-wise, the average age of participants in the yoga group was  $9.79 \pm 1.45$  years and that in the control group was  $9.94 \pm 1.39$  years. There was no significant difference in the age between the two groups ( $p > 0.05$ ).

The average Body Mass Index (BMI) including all participants was  $14.76 \pm 0.945$  ( $\text{kg}/\text{m}^2$ ); Yoga group it was  $14.71 \pm 0.98$  ( $\text{kg}/\text{m}^2$ ) and in control group it was  $14.82 \pm 0.91$  ( $\text{kg}/\text{m}^2$ ). There was no significant difference between the two groups ( $p=0.630$ ).

**Table 5.2: Socio-demographic data (Continuous data)**

Anthropometric Variables	Overall (n=73) Mean $\pm$ SD	Yoga Group (n=38) Mean $\pm$ SD	Control Group (n=35) Mean $\pm$ SD	p
Age (Years)	$10.43 \pm 1.39$	$9.79 \pm 1.45$	$9.94 \pm 1.39$	0.527
BMI ( $\text{kg}/\text{m}^2$ )	$14.76 \pm 0.945$	$14.71 \pm 0.98$	$14.82 \pm 0.91$	0.630

### 5.1.2 HIV status and medical care

The subjects were recruited from an HIV/AIDS rehabilitation center, and all of them were HIV+. At the time of the start of the study, of the 73 participants, 44 were on ART and 29 were not on ART (Table 5.3). Of the 38 subjects in the YG 19 were on ART and 17 were not.

Similarly in the CG, of 35 participants, 18 were on ART and 17 were not on ART. There was no significant difference in the ART status between the two groups ( $p > 0.5$ ).

**Table 5.3: ART status of participants at baseline**

Variable		Overall (n=73)	Yoga group (n=38)	Control group (n=35)	P
ART status	On ART	44 (60.3%)	26 (68.4%)	18 (51.4%)	0.141
	Not on ART	29 (39.7%)	12 (31.6%)	17 (48.6%)	

At the end of the study, it was noted that one participant in the yoga group who was not on ART was given ART. In the control group, the status of one participant who was earlier not on ART was not available. The status of all other participants remained the same.

### 5.1.3 Immune parameters

The status of the immune system was assessed as explained in section 4.5.4. This section explains the results of the same.

#### 5.1.3.1 Immune parameters at baseline

The summary of the immune parameters of the subjects at the baseline is shown in Table 5.4. The average CD4 cell counts were  $881.8 \pm 352.8$  counts/ $\uparrow$ L for the yoga group and  $840.4 \pm 410.8$  counts/ $\uparrow$ L for the control group. There was no significant difference between the two groups ( $p = 0.646$ ). The average CD4/CD8 ratio was  $0.733 \pm 0.442$  for YG and  $0.695 \pm 0.322$  for the CG. There was no significant difference between the two groups ( $p = 0.685$ ).

**Table 5.4: Immune parameters at baseline**

Variables	Yoga group		Control group		P
	n	mean $\pm$ SD	n	mean $\pm$ SD	
CD4 cell count (Counts/ $\sim$ L)	38	$881.8 \pm 352.8$	35	$840.4 \pm 410.8$	0.646
CD4/CD8 ratio	36	$0.733 \pm 0.442$	35	$0.695 \pm 0.322$	0.685

#### 5.1.3.2 Immune parameters after intervention

CD4 counts decreased in the YG by 5.3% but increased in the CG by 2.4% (Table 5.5). In neither case, there was any significant difference ( $p > 0.05$ ). Similarly, the CD4/CD8 ratio also

decreased in the yoga group by 6.1% and the same increased in the control group by 1.2%. There were no significant differences in either of the cases ( $p > 0.05$ ). Thus, as in the case of baseline, there was no significant difference between YG and CG after intervention too in any of the immune parameters. Considering the individual cases there is a mixed response; with both increase and decrease of the immune parameters in both yoga and control groups (Figure 5.1). Through ANOVA (Analysis of Variance) (Table 5.6) it can be noted that there is no significant difference in the immune parameters between pre and post, YG and CG and 'group \* time' interaction ( $p > 0.05$ ).

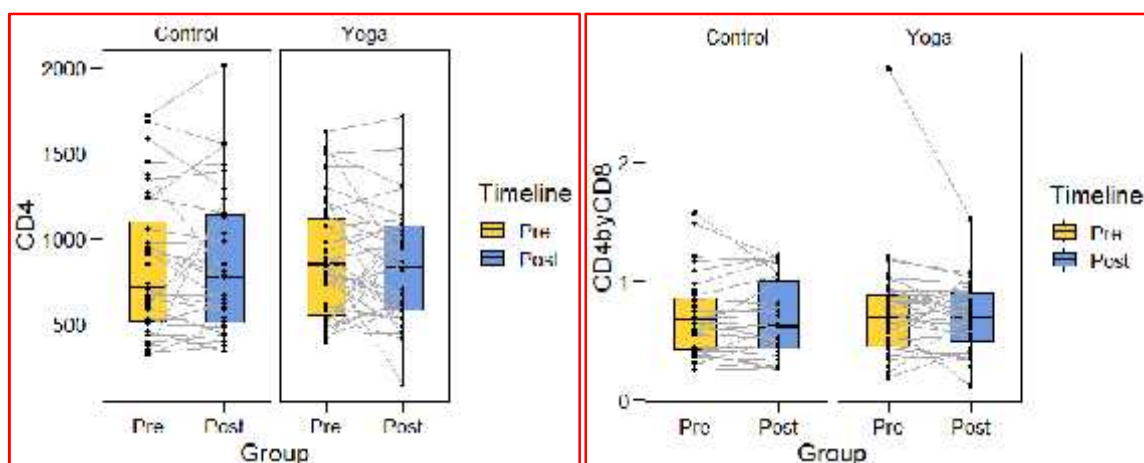
**Table 5.5: Comparison of immune parameters of YG and CG after intervention**

Parameter		Pre		Post		Diff. (Post-Pre)	p (within group)	p (Between groups)	p (Group * Time)
		n	Mean $\pm$ SD	n	Mean $\pm$ SD				
CD4 count (counts/ $\sim$ L)	YG	37	894.9 $\pm$ 348.3	37	847.8 $\pm$ 345.7	-47.1 $\downarrow$ (-5.3%)	0.365	0.850	0.646
	CG	30	845.8 $\pm$ 432.6	30	866.2 $\pm$ 429.5	20.4 $\uparrow$ (2.4%)	0.676		
CD4/CD8 ratio	YG	34	0.750 $\pm$ .446	34	0.705 $\pm$ .286	-0.045 $\downarrow$ (-6.1%)	0.395	0.878	0.832
	CG	29	0.673 $\pm$ .350	29	0.681 $\pm$ .324	0.008 $\uparrow$ (1.2%)	0.795		

**Legend:**  
 $\uparrow$ =Increased compared to pre (favorable)       $\downarrow$ =Decreased compared to pre (not favorable)

#### 5.1.4 Quality of life

Quality of life was assessed using the PedsQL questionnaire as explained in section 4.5.5. This section explains the results of the same.



**Figure 5.1 : Immune parameters before and after intervention**

**Table 5.6: ANOVA table for immune parameters**

Source of variation	Degrees of freedom	Sum of squares	Mean square	F	p
<b>Response variable : CD4</b>					
<b>Time</b>	1	1251	1251	0.0085	0.9266
<b>Group</b>	1	5859	5859	0.0398	0.8421
<b>Time x Group</b>	1	31110	31110	0.2116	0.6463
<b>Residuals</b>	136	19997014	147037		
<b>Response variable : CD4/CD8 ratio</b>					
<b>Time</b>	1	0.0249	0.024939	0.2040	0.6523
<b>Group</b>	1	0.0214	0.021436	0.1753	0.6761
<b>Time x Group</b>	1	0.0055	0.005524	0.0452	0.8320
<b>Residuals</b>	132	16.1406	0.122277		

#### 5.1.4.1 QOL at baseline

The mean PedsQL score indicating HRQOL was  $1,806.3 \pm 320.1$  in the yoga group and  $1,709.0 \pm 365.4$  in the control group (Table 5.7). There was no significant difference between the two groups ( $p=0.308$ ). The mean sub-scale score indicating the quality of psychosocial functioning was  $1,144.9 \pm 235.9$  in the yoga group and  $1,095.9 \pm 240.6$  in the control group. There was no significant difference between the two groups ( $p=0.457$ ). On similar lines, the mean subscale scores indicating the physical functioning, emotional function, social functioning and school functioning were  $661.3 \pm 128.7$ ,  $357.2 \pm 105.8$ ,  $408.1 \pm 75.8$  and  $379.6 \pm 87.7$  respectively in the yoga group and  $613.1 \pm 142.2$ ,  $309.6 \pm 111.6$ ,

408.6 ± 107.4 and 381.5 ± 61.2 respectively in the control group. There was no significant difference between the scores between the yoga group and the control group with  $p > 0.05$  in each case.

The mean score indicating the FRQOL was 1443.3 ± 254.8 in the yoga group and 1337.4 ± 263.0 in the control group. There was no significant difference between the total score between the two groups ( $p = 0.439$ ). The scores of the subscales indicating the general fatigue, sleep/rest fatigue and cognitive fatigue were 492.6 ± 89.8, 492.6 ± 102.6 and 458.1 ± 107.6 respectively in the yoga group and 468.5 ± 93.4, 445.8 ± 113.8 and 423.1 ± 107.7 respectively in the control group. There was no significant difference between the scores between the yoga group and the control group with  $p > 0.05$  in all the cases.

**Table 5.7: QOL scores at baseline**

Variable	Yoga group		Control group		P
	n	Mean ± SD	n	Mean ± SD	
<b>Health-related quality of life</b>					
PQ_PF	28	661.3 ± 116.6	26	613.1 ± 142.2	0.184
PQ_EF	27	357.2 ± 105.8	26	309.6 ± 115.9	0.118
PQ_SocF	27	408.1 ± 75.8	26	408.6 ± 107.4	0.983
PQ_SchF	28	379.6 ± 85.7	26	381.5 ± 61.2	0.927
PQ_PSF_Tot	27	1144.9 ± 235.9	26	1,095.9 ± 240.6	0.457
PQ_Tot	<b>27</b>	<b>1806.3 ± 320.1</b>	<b>26</b>	<b>1709.0 ± 365.4</b>	<b>0.308</b>
<b>Fatigue-related quality of life</b>					
PF_GF	27	492.6 ± 89.8	26	468.5 ± 93.45	0.324
PF_SF	26	492.6 ± 102.6	26	445.8 ± 113.8	0.123
PF_CF	27	458.1 ± 107.6	26	423.1 ± 107.7	0.241
PF_Tot	<b>27</b>	<b>1443.3 ± 254.8</b>	<b>26</b>	<b>1337.4 ± 263.0</b>	<b>0.149</b>
<b>Legend:</b>					
PQ=PedsQL QOL questionnaire, PQ_PF=PQ Physical Functioning score PQ_EF=PQ Emotional Functioning Score PQ_SocF=PQ Social Functioning score PQ_SchF=PQ School Functioning Score PQ_PSF_Tot=PQ Psychosocial Functioning score PQ_Tot=PQ HRQOL total score		PF=PedsQL multidimensional fatigue questionnaire, PF_GF=PF General Fatigue score PF_SF=PF Sleep/rest Fatigue score PF_CF=PF Cognitive Fatigue score PF_Tot=PF FRQOL total score			

#### 5.1.4.2 Quality of life after intervention

The average total HRQOL decreased in both groups (Table 5.8). The extent of decrease in the yoga group was more (14.4%) than in the control group (1.23%). There was a significant difference between the pre and the post scores in the yoga group ( $p=0.039$ ) but was not significant in the control group ( $p=0.883$ ). There was no significant difference between the yoga group and the control group after the intervention ( $p=0.166$ ). There was no significant difference in the group \* time interaction between the two groups ( $p=0.098$ ).

The mean sub-scale scores indicating the quality of psychosocial functioning shows a decrease in the post values compared to the pre values in both the yoga group (14.3%) and the control group (7.5%). The decrease was not significant either in the yoga group ( $p=0.055$ ) and/or in the control group ( $p=0.241$ ).

The mean sub-scale score indicating the quality of physical functioning decreased by 12.4% in the yoga group and increased by 10.1% in the control group. There was no significant difference between the pre and the post scores neither in the yoga group ( $p=0.119$ ) nor in the control group ( $p=0.127$ ).

The mean sub-scale scores indicating the quality of emotional functioning show a reduction in the post values compared to the pre values in the yoga group (6.25%) and increase in the control group (16.6%). However, the differences were not significant in neither the yoga group ( $p=0.81$ ) nor in the control group ( $p=0.544$ ).

The mean sub-scale scores indicating the quality of social functioning show a decrease in the post values compared to the pre values in both the yoga group (13.4%) and the control group (10.4%). However, the decrease was not significant neither in the yoga group ( $p=0.89$ ) nor in the control group ( $p=0.184$ ).

The mean sub-scale scores indicating the quality of school functioning show a decrease in the post values compared to the pre values in both the yoga group (17.4%) and the control group (19.2%). The decrease was not significant in the yoga group ( $p=0.29$ ) but significant in the control group ( $p=0.006$ ).

The average FRQOL score decreased in the yoga group, while it increased in the control group. While the score decreased by 8.1% in the yoga group and was significant ( $p=0.05$ ), it increased by 0.6% in the control group and was not significant ( $p=0.905$ ).

The mean sub-scale scores indicating the quality of general fatigue shows an increase in the post values both in the yoga group and control group. While in the yoga group the increase was 0.7% and non-significant ( $p=0.873$ ), in the control group it was 1.0% and was non-significant ( $p=0.853$ ).

The mean sub-scale scores indicating the quality of sleep/rest fatigue shows a decrease in the mean post values in the yoga group by 12.4% and was significant ( $p=0.012$ ). On the other hand, it shows a non-significant increase ( $p=0.742$ ) in the control group, which increased by 2.1%.

The mean sub-scale scores indicating the quality of cognitive fatigue shows a decrease in the mean post values in the yoga group by 13.0% and was non-significant ( $p=0.091$ ). On the other hand, it shows a non-significant increase ( $p=0.887$ ) in the control group, which increased by 1.1%.

Further, there were no significant differences between the post values between the yoga group and the control group ( $p>0.05$ ) for any of the sub-scale scores. Also, ANOVA analyses revealed that there was no significant difference in the group \* time interaction effect in any of the subscale scores ( $p>0.05$ ) except for physical functioning score ( $p=0.032$ ).

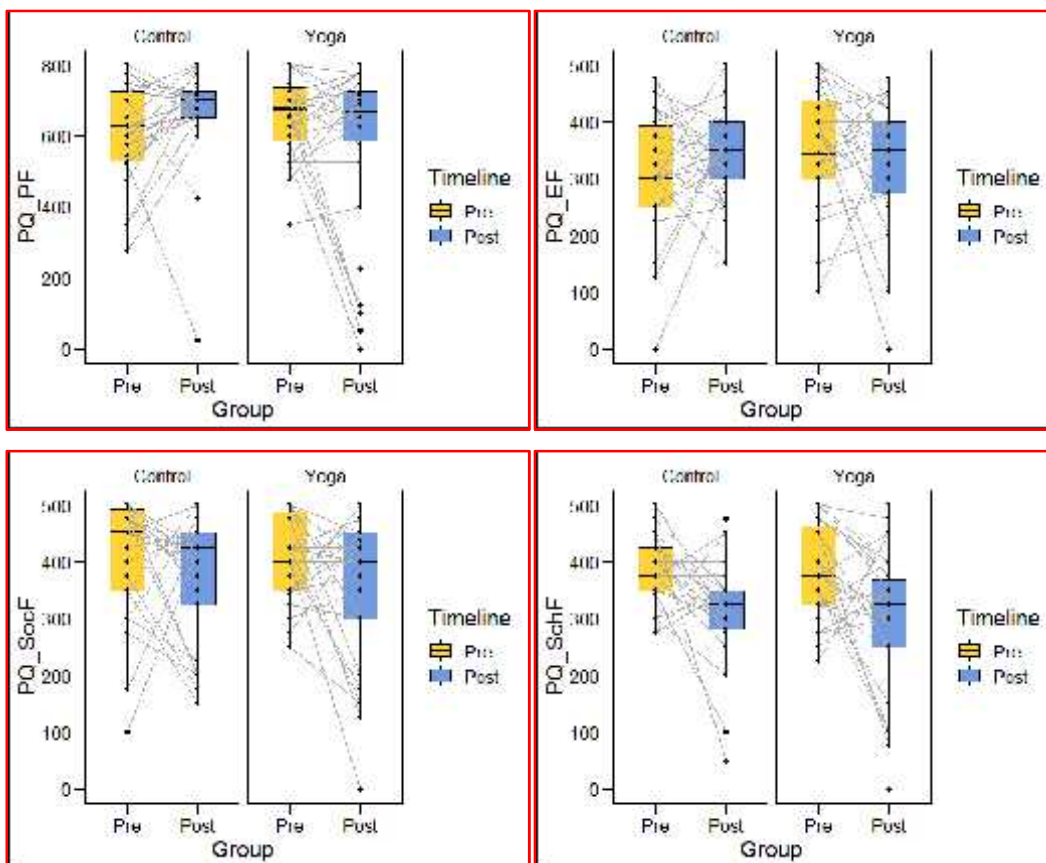


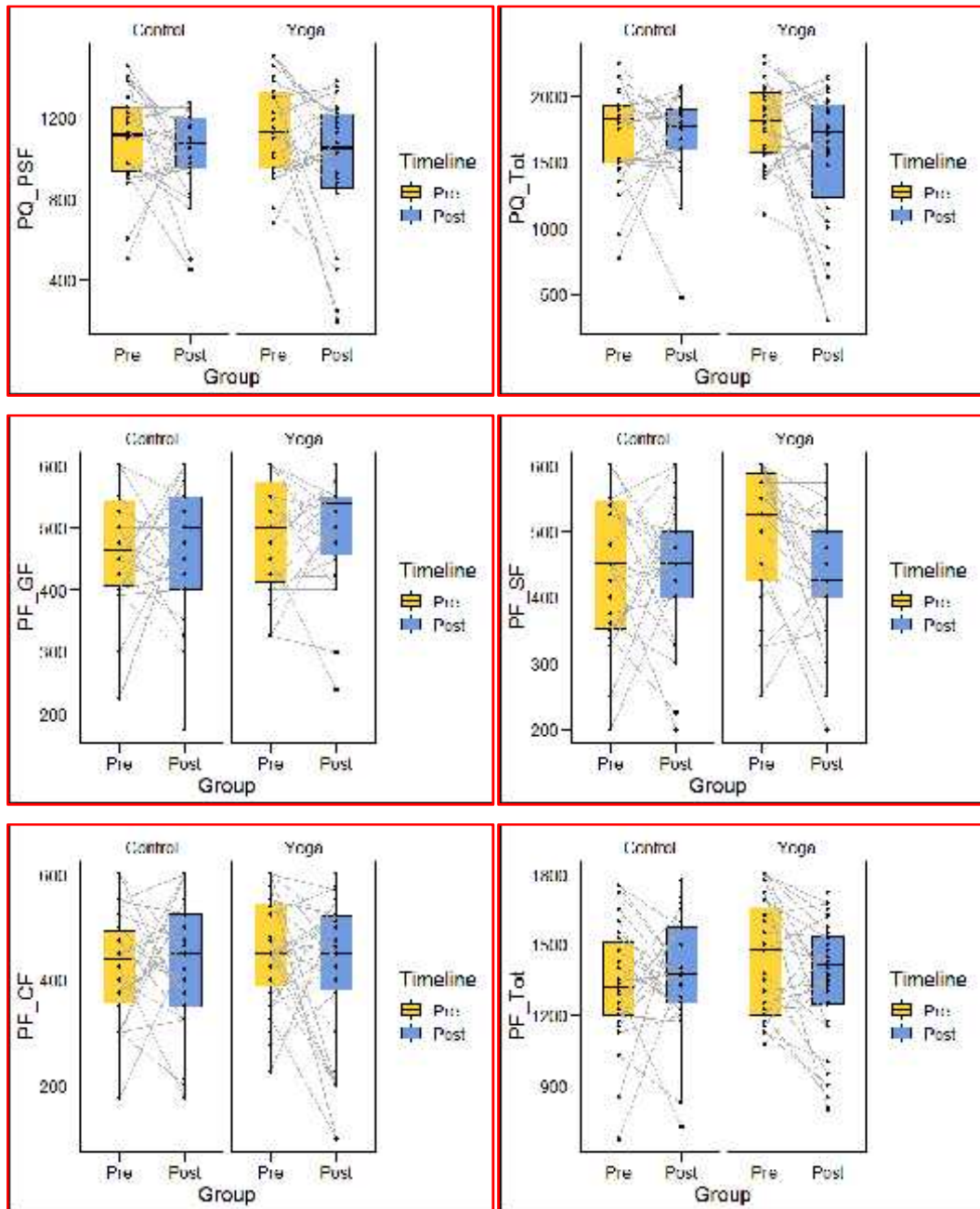
**Table 5.8: Comparison of QOL between YG and CG after intervention**

Parameter	Pre		Post		Difference (Post-Pre)	p (within group)	p (Between groups)	p (Group *Time)	
	n	Mean±SD	n	Mean±SD					
<b>Health-related quality of life</b>									
PQ_PF	YG	27	647.5 ± 130.3	27	567.1 ± 254.2	-80.4↓ (-12.4%)	0.119	0.068	0.032*
	CG	25	605.7 ± 139.9	25	667.0 ± 153.4	61.3↑ (10.1%)	0.127		
PQ_EF	YG	26	359.4 ± 107.3	26	326.9 ± 113.6	-32.5↓ (-9.0%)	0.309	0.617	0.118
	CG	25	312.0 ± 113.2	25	341.0 ± 75.0	29.0↑ (9.3%)	0.310		
PQ_SocF	YG	26	408.4 ± 77.3	26	353.8 ± 137.4	-54.6↓ (-13.4%)	0.089	0.414	0.545
	CG	25	405.0 ± 108.0	25	363.0 ± 119.3	-42.0↓ (-10.4%)	0.184		
PQ_SchF	YG	27	377.8 ± 88.1	27	312.0 ± 118.4	-65.7↓ (-17.4%)	.029*	0.459	0.606
	CG	25	382.8 ± 62.1	25	309.3 ± 92.0	-73.5↓ (-19.2%)	0.006**		
PQ_PSF	YG	26	1150.5 ± 238.8	26	985.6 ± 335.3	-164.9↓ (-14.3%)	0.055	0.394	0.271
	CG	25	1095.8 ± 245.5	25	1013.3 ± 220.0	-82.5↓ (-7.5%)	0.241		
PQ_Tot	YG	26	<b>1809.4 ± 326.0</b>	26	<b>1549.5 ± 547.7</b>	<b>-259.9↓ (-14.4%)</b>	<b>0.039 *</b>	<b>0.166</b>	<b>0.098</b>
	CG	25	<b>1701.4 ± 370.8</b>	25	<b>1680.3 ± 334.6</b>	<b>-21.2↓ (-1.2%)</b>	<b>0.833</b>		
<b>Fatigue-related quality of life</b>									
PF_GF	YG	26	492.3 ± 91.6	26	495.6 ± 84.9	3.3↑ (0.7%)	0.873	0.243	0.903
	CG	25	469.2 ± 95.3	25	474.0 ± 91.4	4.8↑ (1.0%)	0.853		
PF_SF	YG	26	498.1 ± 100.5	26	436.5 ± 96.5	-61.5↓ (-12.4%)	0.012 *	0.739	0.151
	CG	24	441.8 ± 116.9	24	451.3 ± 94.5	9.5↑ (2.1%)	0.742		
PF_CF	YG	26	464.2 ± 104.9	26	404.0 ± 149.7	-60.2↓ (-13.0%)	0.091	0.615	0.258
	CG	25	428.0 ± 106.9	25	432.6 ± 115.5	4.6↑ (1.1%)	0.887		
PF_Tot	YG	26	<b>1454.6 ± 252.9</b>	26	<b>1336.2 ± 260.3</b>	<b>-118.5↓ (-8.1%)</b>	<b>0.050*</b>	<b>0.957</b>	<b>0.281</b>
	CG	25	<b>1339.3 ± 268.3</b>	25	<b>1347.8 ± 226.1</b>	<b>8.5↑ (0.6%)</b>	<b>0.905</b>		
<b>Legend:</b>									
PQ=PedsQL QOL questionnaire,					PF=PedsQL multidimensional Fatigue questionnaire,				

Parameter	Pre		Post		Difference (Post-Pre)	P (within group)	P (Between groups)	P (Group *Time)
	n	Mean±SD	n	Mean±SD				
PQ_PF=PQ Physical Functioning score, PQ_EF=PQ Emotional Functioning Score, PQ SocF=PQ Social Functioning score, PQ_SchF=PQ School Functioning Score, PQ_PSF_Tot=PQ Psychosocial Functioning score (sub-total), PQ_Tot=PQ HRQOL total score					PF_GF=PF General Fatigue score, PF_SF=PF Sleep/rest Fatigue score, PF_CF=PF Cognitive Fatigue score, PF_Tot=PF FRQOL total score ↑=Increased compared to pre (favorable), ↓=Decreased compared to pre (not favorable) *=Significant with p<0.05 **=Significant with p<0.01			

Figure 5.2 shows the quality of life parameters before and after intervention. It can be noted that there were mixed responses for the various HRQOL and FRQOL parameters, with cases of both increase and decrease of QOL between pre and post-intervention; both in yoga and control groups.





**Figure 5.2: QOL parameters before and after intervention**

### 5.1.5 Depression

Depression of the participants was assessed using the CDI2-SR questionnaire as explained in 4.5.6. This section explains the results of the same.

#### 5.1.5.1 Depression at baseline

Depression was assessed using CDI2-SR. The mean CDI-Total score at the baseline was  $13.79 \pm 9.92$  (Mean  $\pm$  SD) for the YG and  $11.64 \pm 8.51$  for the CG. There was no

significant difference between the total score between the two groups ( $p= 0.42$ ). Similarly, the mean total CDI-T score at the baseline was  $62.00 \pm 15.12$  for the yoga group and  $58.68 \pm 13.52$  for the CG. There was no significant difference between the status in YG and CG ( $p=0.42$ ). Further, the various sub-scale also did not have significant differences in scores between YG and CG both for raw scores and T-scores ( $p>0.05$ ). Table 5.9 shows the detailed scores of the various subscales for both raw scores and T-scores.

**Table 5.9: CDI2-SR raw scores and T-scores at baseline**

Scale / Subscale	CDI Raw score			CDI T-score		
	Yoga group	Control group	p	Yoga group	Control group	p
CDI-EP	$6.87 \pm 5.41$	$5.56 \pm 4.62$	0.36	$60.71 \pm 13.86$	$57.24 \pm 12.79$	0.36
CDI-NMPS	$4.00 \pm 3.60$	$2.80 \pm 2.32$	0.51	$58.67 \pm 15.18$	$53.68 \pm 9.67$	0.18
CDI-NSE	$2.88 \pm 2.54$	$2.76 \pm 2.75$	0.88	$59.05 \pm 18.62$	$56.48 \pm 16.59$	0.55
CDI-FP	$6.92 \pm 5.40$	$6.08 \pm 4.31$	0.55	$61.50 \pm 15.96$	$59.84 \pm 14.30$	0.70
CDI-INE	$4.38 \pm 3.65$	$3.32 \pm 2.47$	0.24	$58.67 \pm 15.18$	$53.20 \pm 10.28$	0.23
CDI-IP	$2.54 \pm 2.17$	$2.76 \pm 2.36$	0.73	$63.17 \pm 16.25$	$63.84 \pm 15.42$	0.88
CDI_Total	$13.79 \pm 9.92$	$11.64 \pm 8.51$	0.42	$62.00 \pm 15.12$	$58.68 \pm 13.52$	0.42

**Legend:**

CDI=Children’s Depression Inventory  
EP=Emotional Problems  
NMPS=Negative Mood Physical Symptoms  
NSE=Negative Self Esteem  
FP=Functional Problems  
INE=Ineffectiveness  
IP=Interpersonal Problems

### 5.1.5.2 Depression after intervention

The mean net CDI scores indicating the depression of the participants show an increase in the post values compared to the pre values in both the yoga group (15.37%) and the control group (26.11%)(Table 5.10). However, the change was not significant neither in the yoga group ( $p=0.349$ ) nor in the control group ( $p=0.153$ ).

The mean sub-scale scores indicating the emotional problems show an increase in the post values compared to the pre values in both the yoga group (17.46%) and the control group (35.25%). However, the change was not significant neither in the yoga group ( $p=0.331$ ) nor in the control group ( $p=0.107$ ).

The mean sub-sub-scale scores indicating the negative mood (part of the emotional problem) show a decrease in the post values compared to the pre values in both the yoga group (10.25%) and control group (75.71%). However, the change was not significant in the yoga group ( $p=0.610$ ) but significant in the control group ( $p=0.004$ ).

The mean sub-sub-scale scores indicating the negative self-esteem (part of the emotional problem) show an increase in the post values compared to the pre values in the yoga group (27.43%) and decrease in the control group (5.79%). However, the change was not significant both in the yoga group ( $p=0.276$ ) and in the control group ( $p=0.780$ ).

The mean sub-scale scores indicating the functional problems show an increase in the post values compared to the pre values both in the yoga group (13.15%) and control group (17.76%). However, the change was not significant both in the yoga group ( $p=0.475$ ) and in the control group ( $p=0.320$ ).

The mean sub-sub-scale scores indicating the ineffectiveness (part of the functional problem) show an increase in the post values compared to the pre values in both the yoga group (35.15%) and the control group (54.21%). However, the increase was not significant in the yoga group ( $p=0.145$ ) while it was significant in the control group ( $p=0.019$ ).

The mean sub-sub-scale scores indicating the interpersonal problem (part of the functional problem) shows a decrease in the post values compared to the pre values both in the yoga group (24.6%) and in the control group (26.08%). However, the decrease was not significant both in the yoga group ( $p=0.217$ ) and the control group ( $p=0.177$ ).

As in the case of baseline, there was no significant difference between the yoga group and the control group after intervention in any of the CDI parameters ( $p>0.05$ ). Also, ANOVA analyses revealed that there were no significant differences in the group \* time interaction effect in any of the cognitive function scores ( $p>0.05$ ).

**Table 5.10: CDI2-SR raw-scores of YG and CG, pre and post-intervention**

Parameter		Pre		Post		Difference (Post-Pre)	p (within group)	p (Between groups)	p (Group *Time)
		n	Mean±SD	n	Mean±SD				
CDI-EP	YG	24	6.87 ± 5.40	24	8.08 ± 4.45	1.20↑ (17.46%)	0.331	0.661	0.696
	CG	25	5.56 ± 4.62	25	7.52 ± 4.48	1.96↑ (35.25%)	0.107		
CDI-NMPS	YG	24	4.00 ± 3.59	24	4.41 ± 2.55	-0.41↓ (-10.25%)	0.610	0.175	0.144
	CG	25	2.80 ± 2.32	25	4.92 ± 2.82	-2.12↓ (-75.71%)	0.004**		
CDI-NSE	YG	24	2.87 ± 2.54	24	3.66 ± 2.56	0.79↑ (27.43%)	0.276	0.108	0.342
	CG	25	2.76 ± 2.75	25	2.60 ± 1.93	-0.16↓ (-5.79%)	0.780		
CDI-FP	YG	24	6.91 ± 5.40	24	7.83 ± 2.6	0.91↑ (13.15%)	0.475	0.485	0.923
	CG	25	6.08 ± 4.31	25	7.16 ± 3.93	1.08↑ (17.76%)	0.320		
CDI-INE	YG	24	4.37 ± 3.64	24	5.91 ± 2.78	1.54↑ (35.15%)	0.145	0.324	0.829
	CG	25	3.32 ± 2.47	25	5.12 ± 2.81	1.80↑ (54.21%)	0.019*		
CDI-IP	YG	24	2.54 ± 2.16	24	1.91 ± 1.10	-0.625↓ (-24.6%)	0.217	0.774	0.903
	CG	25	2.76 ± 2.36	25	2.04 ± 1.81	-0.72↓ (-26.08%)	0.177		
CDI-Total	YG	24	13.79 ± 9.92	24	15.91 ± 6.15	2.12↑ (15.37%)	0.349	0.804	0.735
	CG	25	11.64 ± 8.51	25	14.68 ± 7.66	3.04↑ (26.11%)	0.153		

**Legend:**

CDI=Children’s Depression Inventory,  
EP=Emotional Problems,  
NMPS=Negative Mood Physical Symptoms,  
NSE=Negative Self Esteem,  
FP=Functional Problems,  
INE=Ineffectiveness,

IP=Interpersonal Problems,  
↓=Decreased compared to pre (favorable),  
↑=Increased compared to pre (not favorable),  
\* = Significant with p<0.05,  
\*\* = Significant with p<0.01,  
\*\*\* = Significant with p<0.001

The mean total CDI-T score at the baseline was 62.00 ± 15.12 for the yoga group and 58.68 ± 13.52 for the CG (Table 5.11). There was no significant difference between the status in YG and CG (p=0.42). However, while depression of the participants in the yoga group was ‘high average’, those in the control group were ‘average’. Further, the various sub-scale also did

not have significant differences in scores between the yoga group and the control group both for raw scores and T-scores ( $p>0.05$ ).

**Table 5.11: CDI T-score and categorization at baseline**

Scale / Subscale	Yoga group		Control group		P
	T-score (Mean ± SD)	Depression category	T-score (Mean ± SD)	Depression category	
CDI-EP_T	60.71 ± 13.86	High average	57.24 ± 12.79	Average	0.36
CDI-NMPS_T	58.67 ± 15.18	Average	53.68 ± 9.67	Average	0.18
CDI-NSE_T	59.05 ± 18.62	Average	56.48 ± 16.59	Average	0.55
CDI-FP_T	61.50 ± 15.96	High average	59.84 ± 14.30	Average	0.70
CDI-INE_T	58.67 ± 15.18	Average	53.20 ± 10.28	Average	0.23
CDI-IP_T	63.17 ± 16.25	High average	63.84 ± 15.42	High average	0.88
CDI_Total_T	<b>62.00 ± 15.12</b>	<b>High average</b>	<b>58.68 ± 13.52</b>	<b>Average</b>	<b>0.42</b>
<b>Legend:</b>					
CDI=Children’s Depression Inventory			FP=Functional Problems		
EP=Emotional Problems			INE=Ineffectiveness		
NMPS=Negative Mood Physical Symptoms			IP=Interpersonal Problems		
NSE=Negative Self Esteem			T=T-score		

The mean net CDI T-scores indicating the depression of the participants shows an increase in the post values compared to the pre values in both the yoga group (3.41%) and the control group (6.59%) (Table 5.12). However, the change was significant neither in the yoga group ( $p=0.349$ ) nor in the control group ( $p=0.286$ ). The overall depression increased in both the groups; while in the yoga group it moved from ‘high average’ to ‘elevated’, in the control group it moved from ‘average’ to ‘high average’.

The mean sub-scale T-scores indicating the emotional problems show an increase in the post values compared to the pre values in both the yoga group (5.89%) and the control group (8.73%). However, the improvement was significant neither in the yoga group ( $p=0.274$ ) nor in the control group ( $p=0.128$ ). The emotional issues were ‘high average’ in the yoga group both before and after the intervention, while in the control group it moved from ‘average’ to ‘high average’.



The mean sub-sub-scale T-scores indicating the negative mood (part of the emotional problem) shows an increase in the post values compared to the pre values in both yoga group (3.05%) and control group (15.79%). However, the increase was not significant in the yoga group ( $p=0.601$ ) while it was significant in the control group ( $p=0.007$ ). The negative mood issues moved from 'average' to 'high average' both in the yoga group and control group.

The mean sub-sub-scale T-scores indicating the negative self-esteem (part of the emotional problem) shows an increase in the post values compared to the pre values both in the yoga group (10.69%) and in the control group (3.47%). However, the change was significant neither in the yoga group ( $p=0.181$ ) nor in the control group ( $p=0.523$ ). While the negative self-esteem among the participants changed from 'average' to 'elevated' in the yoga group it remained 'average' in the control group.

The mean sub-scale T-scores indicating the functional problems show an increase in the post values compared to the pre values both in the yoga group (6.16%) and the control group (4.61%). However, the improvement was significant neither in the yoga group ( $p=0.340$ ) nor in the control group ( $p=0.444$ ). While the functional problems remained 'high average' in the yoga group both before and after yoga intervention, they move from 'average' to 'high average' in the control group.

The mean sub-sub-scale T-scores indicating the ineffectiveness (part of the functional problem) shows an increase in the post values compared to the pre values in both the yoga group (11.21%) and control group (13.68%). However, the increase was not significant in the yoga group ( $p=0.135$ ) but significant in the control group ( $p=0.024$ ). The ineffectiveness issues moved from 'average' to 'high average' both in the yoga group and control group.

The mean sub-sub-scale T-scores indicating the interpersonal problem (part of the functional problem) shows a decrease in the post values compared to the pre values both in the yoga



group (6.33%) and in the control group (6.26%). However, the decrease was significant neither in the yoga group (p=0.316) and nor in the control group (p=0.316). The interpersonal issues improved from ‘high average’ to ‘average’ in both the yoga group and the control group.

Thus, through the T-scores, it can be concluded that even at the baseline and after the intervention the depression of the participants was more both in the yoga group and control group. As in the case of baseline, there was no significant difference between YG and CG after intervention as well. There were no significant differences in the group \* time interaction for any of the CDI parameters (p>0.05).

Overall, although there is an increase in depression, the extent of increase is higher in the control group (6.59%) than in the yoga group (3.41%).

**Table 5.12: CDI2-SR T-scores and depression categories pre and post intervention**

CDI parameters (T-scores)		Pre		Post		Difference (Post – Pre)	p	p (Group * Time)
		n	Mean ± SD (Depression category)	n	Mean ± SD (Depression category)			
CDI-EP_T	YG	24	60.71 ± 13.86 (High average)	24	64.29 ± 12.17 (High average)	3.58↑ (5.89%)	0.274	0.970
	CG	25	57.24 ± 12.79 (Average)	25	62.24 ± 11.85 (High average)	5.00↑ (8.73%)	0.128	
CDI-NMPS_T	YG	24	58.67 ± 15.18 (Average)	24	60.46 ± 10.93 (High average)	1.79↑ (3.05%)	0.601	0.491
	CG	25	53.68 ± 9.67 (Average)	25	62.16 ± 12.15 (High average)	8.48↑ (15.79%)	0.007**	
CDI-NSE_T	YG	24	59.05 ± 18.62 (Average)	24	65.79 ± 12.82 (Elevated)	6.29↑ (10.69%)	0.181	0.597
	CG	25	56.48 ± 16.59 (Average)	25	58.44 ± 10.52 (Average)	1.96↑ (3.47%)	0.523	
CDI-FP_T	YG	24	61.50 ± 15.96 (High average)	24	64.29 ± 8.96 (High average)	3.79↑ (6.16%)	0.340	0.878
	CG	25	59.84 ± 14.30 (Average)	25	62.60 ± 13.15 (High average)	2.76↑ (4.61%)	0.444	
CDI-INE_T	YG	24	58.67 ± 15.18 (Average)	24	64.25 ± 11.85 (High average)	6.58↑ (11.21%)	0.135	0.860
	CG	25	53.20 ± 10.28 (Average)	25	60.48 ± 11.83 (High average)	7.28↑ (13.68%)	0.024	
CDI-IP_T	YG	24	63.17 ± 16.25 (High average)	24	59.17 ± 9.73 (Average)	-4.00↓ (-6.33%)	0.316	0.713

CDI parameters (T-scores)		Pre		Post		Difference (Post – Pre)	p	p (Group * Time)
		n	Mean ± SD(Depression category)	n	Mean ± SD(Depression category)			
	CG	25	63.84 ± 15.42 (High average)	25	59.84 ± 15.58 (Average)	-4.00↓ (-6.26%)	0.316	
CDI- Total_T	YG	24	62.00 ± 15.12 (High average)	24	65.88 ± 10.00 (Elevated)	2.12↑ (3.41%)	0.349	0.994
	CG	25	58.68 ± 13.52 (Average)	25	63.64 ± 12.38 (High average)	3.87↑ (6.59%)	0.286	

**Legend:**

CDI=Children’s Depression Inventory  
EP=Emotional Problems  
NMPS=Negative Mood Physical Symptoms  
NSE=Negative Self Esteem  
FP=Functional Problems

INE=Ineffectiveness  
IP=Interpersonal Problems  
T=T-score  
↓=Decreased compared to pre (favorable)  
↑=Increased compared to pre (not favorable)

### 5.1.6 Cognitive functions

The details of cognitive function tests were explained in section 4.5.7. This section explains the results of the same.

#### 5.1.6.1 Cognitive functions at baseline

There was no significant difference ( $p > 0.05$ ) between the yoga and control groups at baseline (Table 5.13) for all the cognitive assessments made viz., DSF, DSB, DS total, Stroop WS, Stroop CS, Stroop CWS and SDMT.

**Table 5.13: Cognitive functions at baseline**

Variables	Yoga group		Control group		p
	n	Mean ± SD	n	Mean ± SD	
DSF	32	6.63 ± 1.73	27	6.74 ± 1.31	0.772
DSB	32	2.63 ± 1.26	27	2.89 ± 1.25	0.425
DSTot	32	9.25 ± 2.50	27	9.63 ± 2.02	0.522
SWS	28	42.93 ± 17.42	25	50.36 ± 17.16	0.124
SCS	28	39.92 ± 9.69	24	44.92 ± 5.97	0.033
SCWS	26	24.04 ± 6.36	23	25.91 ± 4.37	0.232
SDMT	30	30.13 ± 6.57	26	32.04 ± 7.23	0.310

**Legend:**

DSF= Digit Span Forward,  
DSB=Digit Span Backward,  
DSTot = Digit Span Total ,  
SWS = Stroop Word score,  
SCS = Stroop Colour Score,  
SCWS = Stroop Colour-Word Score,  
SDMT = Symbol Digit Modulation Test score

### 5.1.6.2 Cognitive functions after intervention

Figure 5.3 shows the results of cognitive functions. The mean digit span forward total score increased in both the yoga group (1.5%) and the control group (10.4%)(Table 5.14). The increase in score was not significant in the yoga group ( $p=0.712$ ) while significant in the control group ( $p=0.032$ ).

The mean digit span backward score increased in both the yoga group (16.9%) and the control group (20.9%). However, the increase in score was neither significant in the yoga group ( $p=0.138$ ) nor in the control group ( $p=0.069$ ).

The mean digit span total score also increased both in the yoga group (6.8%) and the control group (14.4%). However, the increase was not significant in the yoga group ( $p=0.185$ ) and significant in the control group ( $p=0.007$ ).

The mean Stroop-word-score increased both in the yoga group (11.9%) and the control group (9.7%). The increase was significant both in the yoga group ( $p=0.006$ ) and the control group ( $p=0.035$ ).

The mean Stroop-color-score increased both in the yoga group (6.7%) and the control group (4.1%). However, the increase was not significant both in the yoga group ( $p=0.067$ ) and the control group ( $p=0.299$ ).

The mean Stroop-color-word-score increased both in the yoga group (16.8%) and the control group (9.5%). The increase was significant in the yoga group ( $p=0.007$ ) and not significant in the control group ( $p=0.076$ ).

The mean Symbol-digit modulation test score increased both in the yoga group (9.8%) and the control group (12.3%). The increase was not significant in the yoga group ( $p=0.118$ ) but significant in the control group ( $p=0.012$ ).

Further, there were no significant differences between the post values between the yoga group and the control group ( $p>0.05$ ) for any of the cognitive function scores. Also, ANOVA analyses revealed that there were no significant differences in the group \* time interaction effect in any of the cognitive function scores ( $p>0.05$ ).

**Table 5.14: Comparison of Cognitive Functions of YG and CG, pre and post-intervention**

Parameter		Pre		Post		Difference (Post – Pre)	P (within group)	P (Between groups)	P (Group* Time)
		n	Mean±SD	n	Mean±SD				
DSF	YG	30	6.63 ± 1.790	30	6.73 ± 1.780	0.100↑ (1.5%)	0.712	0.544	0.816
	CG	24	6.83 ± 1.341	24	7.54 ± 1.285	0.708↑ (10.4%)	0.032*		
DSB	YG	31	2.68 ± 1.24	31	3.13 ± 1.82	0.45↑ (16.9%)	0.138	0.339	0.810
	CG	23	2.91 ± 1.240	23	3.52 ± 1.163	0.60↑ (20.9%)	0.069		
DSTot	YG	30	9.33 ± 2.55	30	9.97 ± 3.23	0.63↑ (6.8%)	0.185	0.363	0.779
	CG	24	9.83 ± 2.036	24	11.25 ± 2.152	1.41↑ (14.4%)	0.007**		
SWS	YG	26	42.62 ± 17.34	26	47.69 ± 13.85	5.07↑ (11.9%)	0.006**	0.144	0.771
	CG	23	51.35 ± 17.050	23	56.35 ± 14.646	5.00↑ (9.7%)	0.035*		
SCS	YG	26	40.04 ± 9.52	26	42.73 ± 9.76	2.69↑ (6.7%)	0.067	0.200	0.556
	CG	22	44.45 ± 6.092	22	46.27 ± 7.369	1.81↑ (4.1%)	0.299		
SCWS	YG	24	24.00 ± 6.62	24	28.04 ± 5.99	4.04↑ (16.8%)	0.007**	0.726	0.308
	CG	20	26.25 ± 4.07	20	28.75 ± 5.911	2.50↑ (9.5%)	0.076		
SDMT	YG	28	30.54 ± 6.51	28	33.54 ± 9.71	3.00↑ (9.8%)	0.118	0.232	0.832
	CG	23	32.65 ± 7.30	23	36.65 ± 5.73	4.00↑ (12.3%)	0.012*		

**Legend:**

DSF= Digit Span Forward  
DSB=Digit Span Backward  
DSTot= Digit Span Total  
SWS= Stroop Word score  
SCS = Stroop Colour Score  
SCWS = Stroop Colour-Word Score

SDMT = Symbol Digit Modulation Test score  
YG = Yoga Group  
CG= Control Group  
↑=Increased compared to pre (favorable)  
\* = Significant with  $p<0.05$   
\*\* = Significant with  $p<0.01$

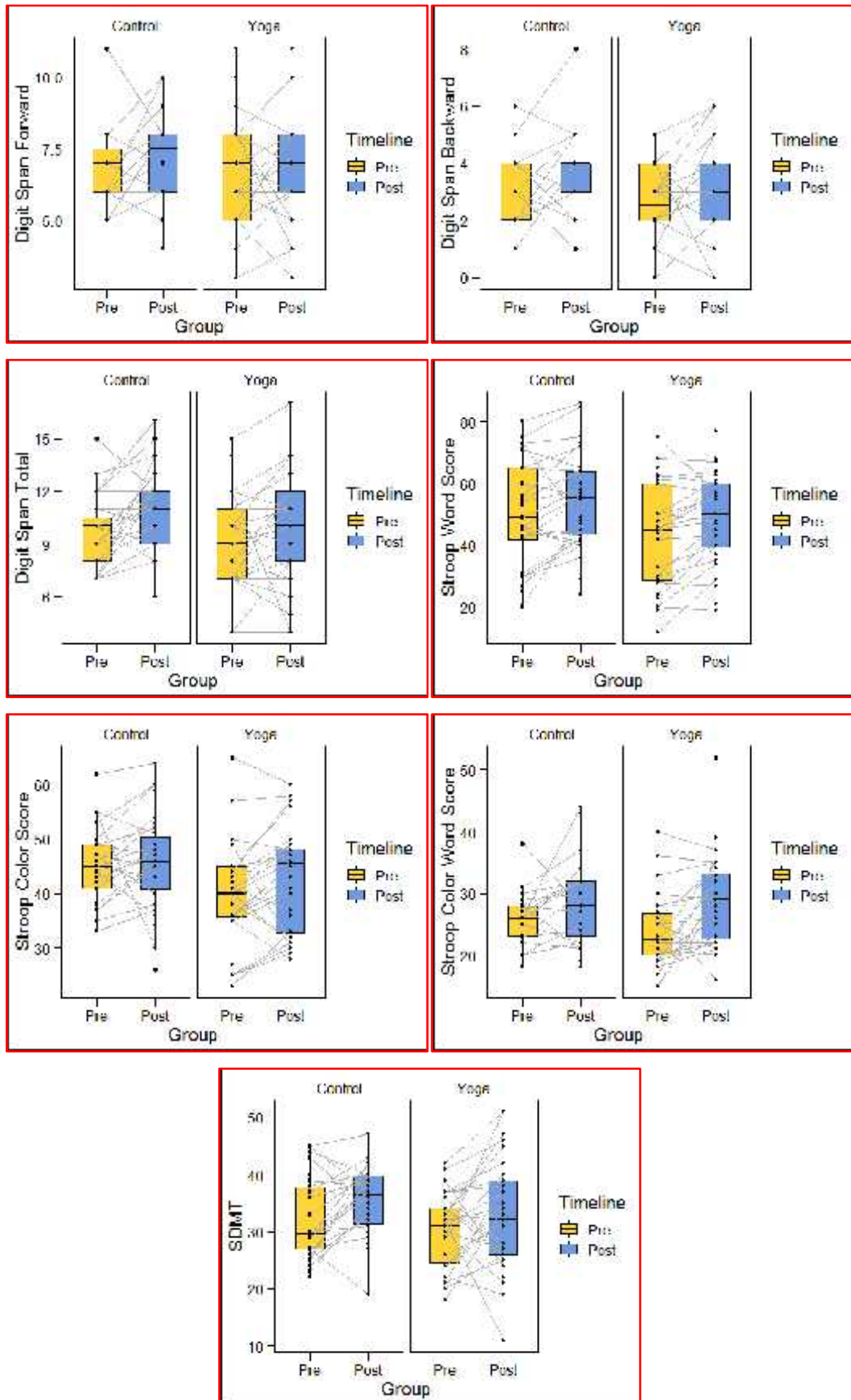


Figure 5.3: Results of cognitive functions

## 5.2 STUDY TWO: AMMAMANE STUDY

This section presents the results of study two.

### 5.2.1 Socio-demographic data

The participants included 18 children/adolescents of age between 8-18 years. The mean age was  $13.5 \pm 2.46$  years (Mean  $\pm$  SD). Of 18 participants, 14 were males and 4 were females.

### 5.2.2 General health condition

At the beginning of the study, the subjects had several opportunistic infections and health issues; viz., skin infection, eye and ear problems, all of which were significantly reduced at the time of final data collection (Table 5.15).

**Table 5.15: General medical issues of the participants**

PID	Medical issues	
	Pre	Post
A01	Swelling below ears	Reduced
A03	NA	NA
A04	Skin infection	Nil
A05	Blood from nose	Nil
A06	Liquid discharge from ear	Reduced
A12	Skin infection, stomach pain and tiredness	Nil
A13	Skin infection	Reduced
A14	Tiredness due	Nil
A15	Chest pain, Mesenteric Lymphadenitis and skin infection	Nil
A16	Eye infection	Reduced
A22	Skin infection and blood from nose	Nil

### 5.2.3 Immune parameters

The status of the immune system was assessed as explained in section 4.5.4. This section explains the results of the same. The mean CD4 cell counts significantly increased from  $571.1 \pm 238.0$  counts/ $\uparrow$ L before yoga, to  $717.4 \pm 241.7$  counts/ $\uparrow$ L after yoga ( $p=0.039$ ) (Table 5.16). Mean CD4/CD8 ratio also increased from  $0.814 \pm 0.272$  to  $1.016 \pm 0.250$  between pre and post-assessments, although the difference was not significant ( $p=0.091$ ). The average

viral load significantly reduced from 55487.5±56996.4 copies/mL before yoga to 5755.4±6539.3 copies/mL after yoga (p=0.041).

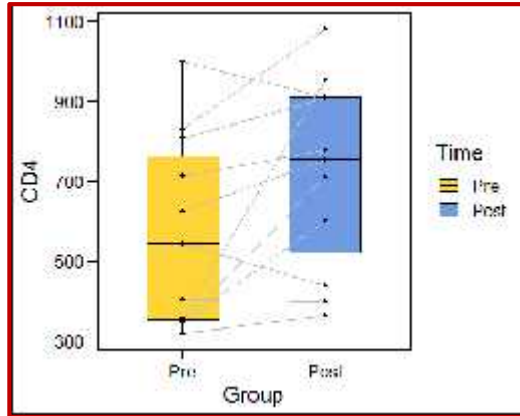
**Table 5.16: Immune parameters before and after intervention**

Parameter	Pre (Mean±SD)	Post (Mean±SD)	Diff. (Post- Pre)	P
CD4 count (counts/~L)	571.1±238.0	717.4±241.7	146.3↑ (25.57%)	0.039*
CD4/CD8 ratio	0.814 ± 0.272	1.016 ± 0.250	0.202↑ (24.82%)	0.091
Viral load (copies/mL)	55487.5±56996.4	5755.4±6539.3	-49732↓ (-89.63%)	0.041*
<b>Legend:</b>				
↑=Increased compared to pre (favorable)				
↓=Decreased compared to pre (favorable)				
*=Significant with p<0.05				

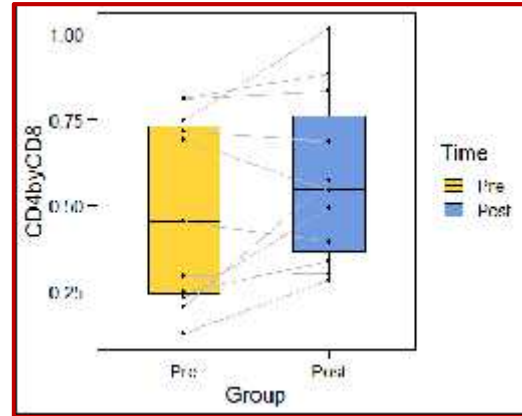
Table 5.17 shows the case to case comparison of the immune parameters. Figure 5.4 to Figure 5.6 shows the distribution of CD4, CD4/CD8 ratio and viral load respectively along with the change in the parameters case to case between pre and post-yoga.

**Table 5.17: Summary of immune parameters pre and post-yoga intervention**

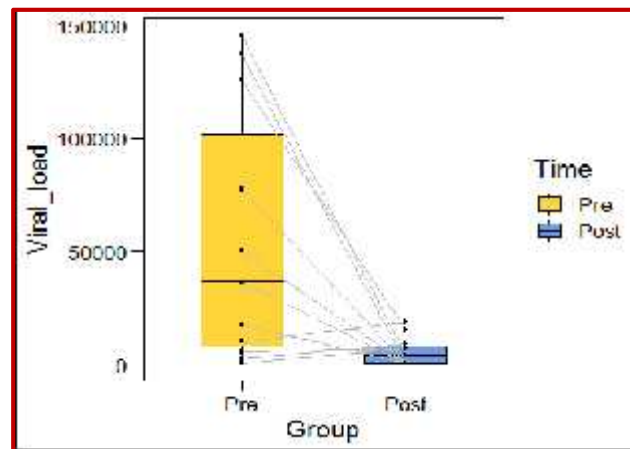
ID	CD4		CD4/CD8 ratio		Viral load	
	Pre	Post	Pre	Post	Pre	Post
A01	346	600↑	0.23	0.49↑	77455	310 ↓
A03	356	952↑	0.20	0.57↑	145662	4188↓
A04	712	777↑	0.81	0.88↑	5676	7029↑
A05	543	439↓	0.29	0.30↑	18008	310 ↓
A06	403	397↓	0.45	0.39↓	126009	15468↓
A12	624	753↑	0.71	0.68↓	2567	9153↑
A13	348	710↑	0.12	0.28↑	137511	310 ↓
A14	829	1081↑	0.74	1.01↑	304	7234↑
A15	317	364↑	0.24	0.33↑	50461	310 ↓
A16	997	911↓	0.69	0.54↓	10121	18687↑
A22	807	907↑	0.81	0.83↑	36589	310 ↓
<b>Legend:</b>						
ID=Participant Identity number			↓=Decreased compared to pre (favorable)			
CD4 = CD4 cell count (cells/mm <sup>3</sup> )			↑=Increased compared to pre (not favorable)			
↑=Increased compared to pre (favorable)			↓=Decreased compared to pre (not favorable)			



**Figure 5.4: CD4 cell counts pre and post-intervention, case by case**



**Figure 5.5: CD4/CD8 ratio, pre and post-intervention, case by case**



**Figure 5.6: Viral loads pre and post-intervention, case by case**

#### 5.2.4 Quality of Life

Quality of life was assessed using the PedsQL questionnaire as explained in section 4.5.5. This section explains the results of the same. Table 5.18 also shows a summary of QOL scores.

The total HRQOL score questionnaire had an average pre score of  $1439.7 \pm 346.22$  and an average post score of  $1677.1 \pm 280.57$ . The total psychosocial score increased from  $956.8 \pm 201.23$  to  $1081.3 \pm 211.97$ , which was statistically significant ( $p=0.013$ ). Of the four sub-scale scores, the physical functioning sub-scale score significantly improved ( $p=0.004$ ) while the emotional, social and school functioning scores although showed improvement was not significant ( $p=0.068, 0.123$  and  $0.212$  respectively).



The fatigue related quality of life (FRQOL) of the participants assessed through the PedsQL fatigue questionnaire indicates an average total fatigue score of  $1024.3 \pm 331.87$  before yoga and  $1208.9 \pm 344.13$  after yoga. The increase was statistically significant ( $p=0.033$ ). The three sub-scales showed an increase in FRQOL, which means that the fatigue levels reduced. While general fatigue and cognitive fatigue scales indicated no significant improvement ( $p=0.203$  and  $0.136$  respectively), the sleep fatigue scores indicated significant improvement ( $p=0.022$ ).

**Table 5.18: Summary of QOL results**

QOL parameter	Pre (Mean±SD)	Post (Mean±SD)	Difference (Post-Pre)	P
<b>Health related Quality of Life</b>				
Physicalfunctioningscore (PQ_PF)	482.9 ± 166.04	595.8 ± 96.35	112.9↑(23.4%)	0.004**
Emotionalfunctioningscore (PQ_EF)	295.1 ± 84.36	337.5 ± 79.64	42.4↑ (14.4%)	0.068
Socialfunctioningscore (PQ_SocF)	363.2 ± 87.08	406.3 ± 81.6	43.1↑ (11.9%)	0.123
Schoolfunctioningscore (PQ_SchF)	298.4 ± 74.79	337.5 ± 111.56	39.1↑(13.1%)	0.212
Totalpsychosocial score (PQ_PSF_Tot)	956.8 ± 201.23	1081.3 ± 211.97	124.5↑ (13%)	0.04*
TotalHRQOLscore (PQ_Tot)	1439.7 ± 346.22	1677.1 ± 280.57	237.4↑ (16.5%)	0.013*
<b>Fatigue related quality of life</b>				
General fatigue score (PF_GF)	417.4 ± 108.05	458.3 ± 105.37	40.9↑ (9.8%)	0.203
Sleep fatigue score (PF_SF)	301.4 ± 125.87	392.2 ± 137.68	90.8↑ (30.1%)	0.022*
Cognitive fatigue score (PQ_CF)	305.6 ± 155.13	358.3 ± 150.24	52.7↑ (17.2%)	0.136
Total FRQOL Score (PF_Tot)	1024.3 ± 331.87	1208.9 ± 344.13	184.6↑ (18%)	0.033*
<b>Legend:</b>				
↑=Increased compared to pre (favorable)				
**=Significant with $p<0.01$				
*=Significant with $p<0.05$				

### 5.2.5 Depression

The average of the total CDI score increased by 4.1 units from  $10.7 \pm 4.98$  to  $14.8 \pm 6.63$  (Table 5.19). This implies a significant ( $p=0.015$ ) increase in the depression by 38.3%.

**Table 5.19: Results of CDI parameters**

CDI parameter	Pre (Mean±SD)	Post (Mean±SD)	Difference (Post-Pre)	P
CDI-EP	5.7±2.43	7.7±3.74	2.0↑ (35.1%)	0.039*
CDI-NMPS	5.1±2.07	5.2±2.85	0.1↑ (2.0%)	0.887
CDI-NSE	0.6±1.14	2.6±1.62	2.0↑ (333.3%)	<0.001***
CDI-FP	5.1±3.59	7.1±3.67	2.0↑ (39.2%)	0.082
CDI-INE	3.2±2.29	4.9±2.55	1.7↑ (53.1%)	0.032*
CDI-IP	1.8±1.73	2.1±1.97	0.3↑ (16.7%)	0.571
CDI-Total	<b>10.7±4.98</b>	<b>14.8±6.63</b>	<b>4.1↑ (38.3%)</b>	<b>0.015*</b>

**Legend:**

CDI=Children's Depression Inventory  
EP=Emotional Problems  
NMPS=Negative Mood Physical Symptoms  
NSE=Negative Self Esteem  
FP=Functional Problems  
INE=Ineffectiveness

IP=Interpersonal Problems  
↑=Increased compared to pre (not favorable)  
\*\*\*=Significant with p<0.001  
\*\*=Significant with p<0.01  
\*=Significant with p<0.05

**Table 5.20: Results of CDI T-scores and depression category**

CDI parameter	Mean±SD (Depression category)		Difference (Post-Pre)	p
	Pre	Post		
CDI-EP_T	56.1 ± 6.66 (Average)	61.4 ± 9.77 (High average)	5.3↑ (9.4%)	0.041*
CDI-NMPS_T	57.3 ± 15.11 (Average)	61.2 ± 11.3 (High average)	3.9↑ (6.8%)	0.203
CDI-NSE_T	46.8 ± 6.43 (Average)	58.2 ± 9.22 (Average)	11.4↑ (24.3%)	<0.001***
CDI-FP_T	54.4 ± 11.14 (Average)	56.4 ± 16.44 (Average)	2.0↑ (3.6%)	0.631
CDI-INE_T	51.3 ± 8.78 (Average)	57.3 ± 10.2 (Average)	6.0↑ (11.6%)	0.041*
CDI-IP_T	57.2 ± 14.97 (Average)	59.5 ± 15.97 (Average)	2.3↑ (4.0%)	0.632
CDI-Total_T	55.7 ± 8.42 (Average)	61.1 ± 10.33 (High average)	5.4↑ (9.7%)	0.029*

**Legend:**

CDI=Children's Depression Inventory  
T=T-score  
EP=Emotional Problems  
NMPS=Negative Mood Physical Symptoms  
NSE=Negative Self Esteem  
FP=Functional Problems

INE=Ineffectiveness  
IP=Interpersonal Problems  
↑=Increased compared to pre (not favorable)  
\*\*\*=Significant with p<0.001  
\*=Significant with p<0.05

The average of the total CDI-T-score increased from  $55.7 \pm 8.42$  to  $61.1 \pm 10.33$ . Thus there was a significant increase in the depression ( $p=0.029$ ). Similarly, all the subscales and the sub-sub scales showed an increase in the average T scores. Although there is an increase in the depression of the children, a closer examination shows that the depression state has only moved from the higher range of lower depression state to lower range of high depression state and not into the elevated or very elevated state.

### 5.2.6 Cognitive functions

The results of the cognitive tests are summarized in Table 5.21. It might be noted that the number of participants in each of the test differs since English reading ability is required for the Stroop test. The other reason is that some children hesitated to take some tests.

The average DSTot score had no significant improvement ( $p=0.266$ ). A split-up of the score indicated that DSF score decreased with no significance ( $p=0.059$ ) and the DSB score showed a significant increase ( $p=0.009$ ). There was an improvement in the average Stroop Word Score (SWS) and Stroop Colour Score (SCS), although not statistically significant. The average Stroop Colour Word score (SCWS) decreased, but not significantly ( $p=0.458$ ). There was a significant increase in the scores of SDMT ( $p<0.001$ ) and SLCT ( $p=0.01$ ).

**Table 5.21: Results of Cognitive Tests**

Cognitive function test	Pre		Post		Difference (Post-Pre)	P
	n	(Mean±SD)	n	(Mean±SD)		
DSF	13	7.2±1.77	13	6±2.27	-1.2 ↓ (-16.7%)	0.059
DSB	13	1.8±1.46	13	4.1±3.2	2.3 ↑ (127.8%)	0.009*
DSTot	13	9±2.89	13	10.1±4.35	1.1 ↑ (12.2%)	0.266
SWS	9	40.9±23.18	19	55.3±33.42	14.4 ↑ (35.2%)	0.051
SCS	9	33.1±7.15	9	37.1±19.17	4 ↑ (12.1%)	0.574
SCWS	9	25.4±8.79	9	21±11.92	-4.4 ↓ (-17.3%)	0.458

Cognitive function test	Pre		Post		Difference (Post-Pre)	P
	n	(Mean±SD)	n	(Mean±SD)		
SDMT	15	20.1±10.91	16	43.3±12.21	23.2↑ (115.4%)	<0.001***
SLCT	15	23.4±11.54	17	27.6±10.81	4.2↑ (17.9%)	0.01**

**Legend:**

DSF= Digit Span Forward score  
DSB=Digit Span Backward score  
DSTot= Digit Span Total score  
SWS= Stroop Word score  
SCS = Stroop Colour Score  
SCWS = Stroop Colour-Word Score

SDMT = Symbol Digit Modulation Test score  
↑=Increased compared to pre (favorable)  
↓=Decreased compared to pre (not favorable)  
\*\*\*=Significant with p<0.001  
\*\*=Significant with p<0.01  
\*=Significant with p<0.05