

RESULTS

In this study, we measured the levels of the cytokines :IL-2 & IFN- γ , of all cases (diseased and control). Giving importance to the results of the “Active schistosoma mansoni group after treatment by Praziquantel” , the results showed:

The levels of cytokines showed a great increase and it reached levels close of that of the “Control group” and not the “Inactive S. mansoni group” (Table 5 a).

This was confirmed by the results in (Table 5 b), where there was a : “Non- significant” difference statistically between the levels of IL- 2, between the “ Control group”& “Active S. group after treatment”, while the difference was : “Highly Significant” between the Inactive S.group & Active gp. after treatment .

Also in (Table 5c) ,there was a : “Non - significant” difference between the “ Control & Active S.after treatment groups”, while there was a : “Highly significant difference” between the “Inactive S.& Active after treatment S. groups” , regarding the levels of IFN- γ .

As regards sex; there was a : “Non - significant “ difference in the levels of IL-2 , whether before or after treatment by Praziquantel , and also in the” Control & Inactive S.groups”.

The females showed higher levels in the "Active S. group after treatment", while among the "Control" cases the levels of IL-2 were higher in males, (Table 6).

As regards sex distribution, there was a "Non- significant" difference between males and females in the studied groups, except the "Control group" that showed a "Significant difference".

The males showed higher levels of IL-2, in both the "Control & Active S. after treatment" groups (table 7).

As for age and its relation to IL-2, there was a " Significant difference" between - the (below 40 years) and (over 40 years of age) divided groups in the studied cases, with only the "Active S. group after treatment" that showed a " Highly significant" difference and the (below 40 years of age group) showing higher IL-2 levels .

This group showed higher levels also in the " Control group", (Table 8)

As for the relationship between age & IFN- γ ; there was a "Non-significant" difference between the 2 divided age groups, in the studied cases . Except , the " Active S. group after treatment" that showed a " Significant difference", and the (over 40 years of age) showed higher IFN- γ levels .

The (below 40 years group) showed higher levels in the “Control group”, (Table 9).

Table 10 & Figure 14, showed the “ Active S.mansoni group after treatment” had divided into 2 groups :

- Cases that responded to ttt by PZQ, they were called: “Responders” or “cases with (-ve) Rectal snips” to viable shistosoma ova , after 3 months follow- up (they were 11 out of 15 cases= 73.3% of the total percentage).
- Cases that did not resppond to ttt, they were called : “ Non - responders” or “cases with (+ve) Rectal snips “ that showed living S.mansoni ova , after 3 months follow - up (they were only 4 cases of 15 = 26 .7% of the total percentage).

The comparison between the “ Responders” to treatment by PZQ & “Non - responders”, regarding the levels of IL-2 showed : a “Non-significant” difference statistically, while there was a : “Highly significant” difference between the 2 groups , regarding IFN- γ .

This may lead to the thinking that : IFN- γ might have played a more important role in potentiation of the immune system in patients who received PZQ , than did the IL-2 (Table 11 , 12), though it increased after treatment and came

close to the levels of the healthy individuals (Control group), as was shown earlier by table 5a,b.

Inspite of the “ Highly significant” correlation between IL -2 & IFN- γ levels in the “Active S. group after treatment by PZQ” (Table 15) and also (Table 13), where there was a “ Non significant” difference in the levels of IL-2 & IFN- γ - between the “Responders” to PZQ treatment and “ Control” groups (*levels got closer to the healthy individuals levels*).

Table 14, points again to the fact that the levels of IL-2& IFN- γ were closer- in “Responders” group -to the levels of the “Control” group, while it showed a “ Significant & Highly significant” difference between this group and the :“Inactive S.mansoni group” (levels were higher than in cases that did not receive treatment by PZQ (Tabel 14) .

Table (5a): Levels of IL-2 and IFN- γ in different age and sex groups (pg/ml)

		Control	Schistosomiasis		
			Inactive	Active before treatment	Active after treatment
Sex	M	5	8	10	10
	F	5	7	5	5
	n	10	15	15	15
Age	Range	25-49	23-50	24-47	24-47
	Mean	35.4	36.3	35.5	35.5
	\pm SD	7.9	8.1	7.6	7.6
IL-2	Range	90-150	29-84	25-65	81-130
	Mean	126.7	56.7	43.9	112.9
	\pm SD	20.2	16.1	10.4	17.2
IFN- γ	Range	100-180	44-100	26-65	36-150
	Mean	144	74.2	42.3	114.5
	\pm SD	25.7	14.8	10.3	14.31

Table (5b): Comparison between Active after PZQ treatment group, versus Control and Inactive S. groups regarding IL-2, after 3 months follow-up

	Control	Active S. group after PZQ ttt	Inactive S. group
Range	90-150	81-130	29-84
Mean	126.7	112.9	56.7
SD	20.2	17.2	16.1
	t= 1.76		t= 8.90
	P= 0.078 (NS)		P= 0 (NS)

Table (5c): Comparison between Active S. after PZQ treatment group, versus Control and Inactive S. groups regarding IFN- γ , after 3 months follow-up

	Control	Active S. group after PZQ ttt	Inactive S. group
Range	100-180	36-150	44-100
Mean	144	114.5	74.2
SD	25.7	14.31	14.8
	t= 1.6		t= 4.24
	P= 0.089 (NS)		P= 0 (HS)

Fig. (8): Mean values of IL-2 in different studied groups: Control, Inactive S. mansoni, Active S. mansoni before and after 3 months of PZQ treatment

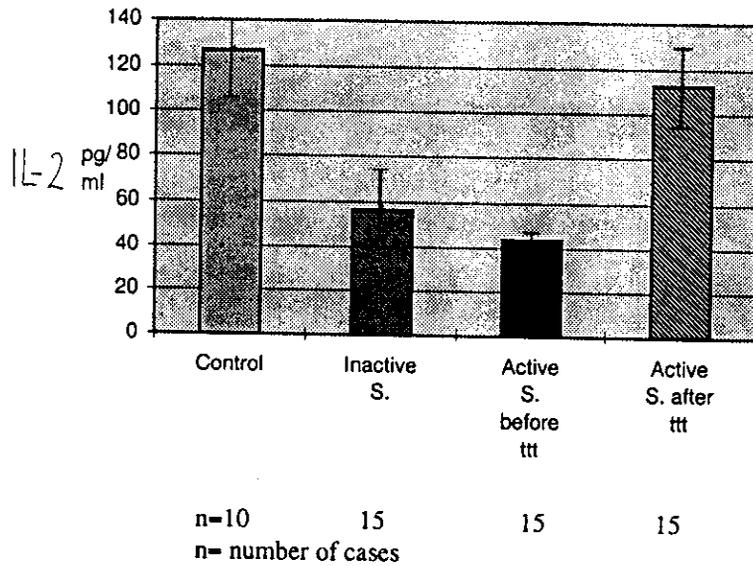


Fig.(9): Mean values of IFN- γ in different studied groups: Control, Inactive S. mansoni, Active S. mansoni before and after 3 months of PZQ treatment

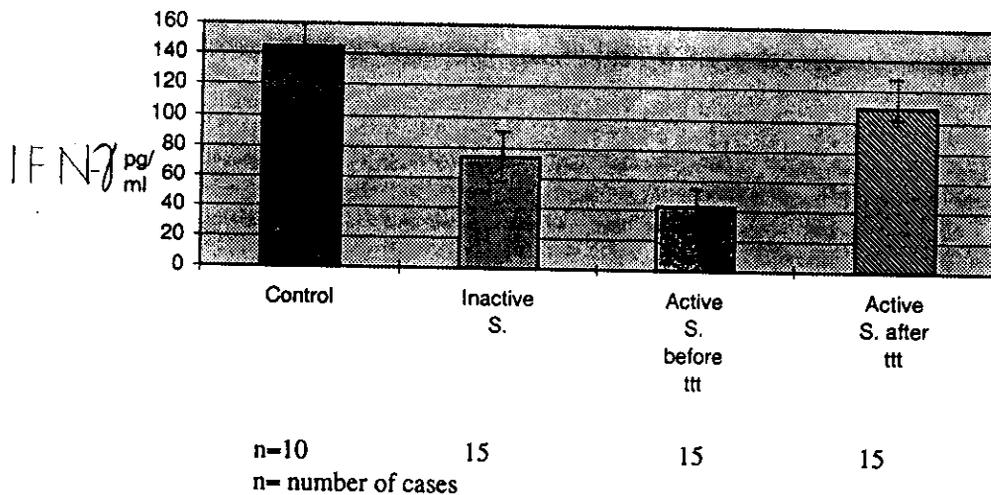


Table (6): Levels of IL-2 in different sex groups (in pg/ml)

	Control		Schistosomiasis					
			Inactive		Active before treatment		Active after treatment	
No. of cases	5	5	7	8	5	10	5	10
Sex	F	M	F	M	F	M	F	M
	90	122	29	35	45	47	124	130
	100	150	65	47	49	55	125	121
	123	147	66	37	50	57	127	127
	131	135	59	56	38	38	91	81
	149	120	41	73	40	30	116	117
			57	59		42		114
			68	75		65		136
				84		37		96
						25		88
						39		100
Range	90-149	120-150	29-68	35-84	38-50	25-65	91-127	81-136
Mean	118.6	134.8	55	58.25	44.4	43.5	116.6	113
S.D	23.8	13.8	14.6	18.1	5.3	12.5	14.9	21.8
t =	1.17		0.35		0.23		0.56	
p =	0.09 (NS)		0.43 (NS)		0.55 (NS)		0.78 (NS)	

Fig. (10): Mean values of IL-2 in different sex groups.

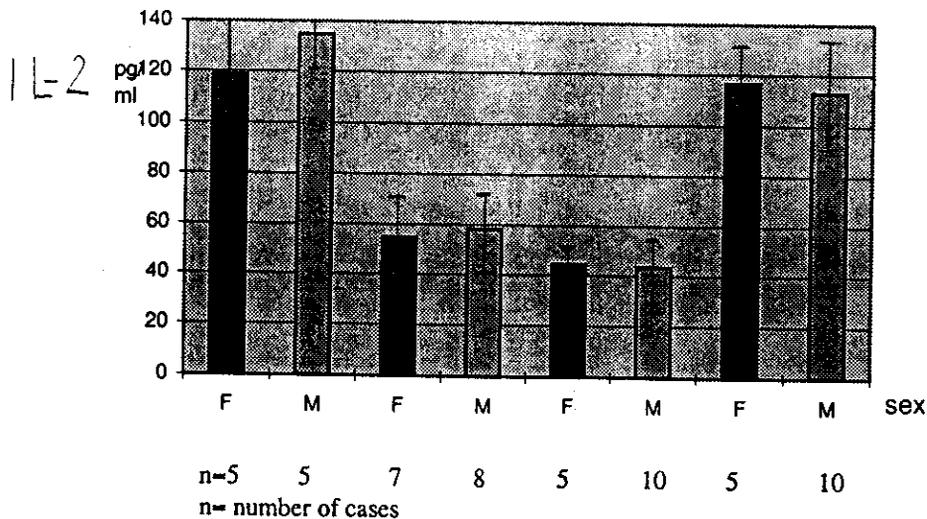


Table (7): Levels of IFN- γ in different sex groups (in pg/ml)

	Control		Schistosomiasis					
			Inactive		Active before treatment		Active after treatment	
No. of cases	5	5	7	8	5	10	5	10
Sex	F	M	F	M	F	M	F	M
	170	153	55	88	40	38	91	120
	142	180	84	80	43	39	124	118
	127	145	70	79	37	62	80	95
	100	147	69	59	47	36	125	128
	110	166	100	67	65	26	119	36
			82	81		42		100
			44	65		46		115
				90		40		109
						44		150
						29		129
Range	100-170	145-180	44-100	59-90	37-65	26-62	80-125	36-150
Mean	129.8	158.2	72	76.1	46.4	40.2	107.8	110
S.D	27.6	14.7	18.8	11.2	11	9.9	20.8	30.3
t =	2.3		0.82		1.03		0.63	
p =	0.05 (Sig.)		0.89 (NS)		0.53 (NS)		0.82 (NS)	

Fig.(11): Mean values of IFN- γ in different sex groups.

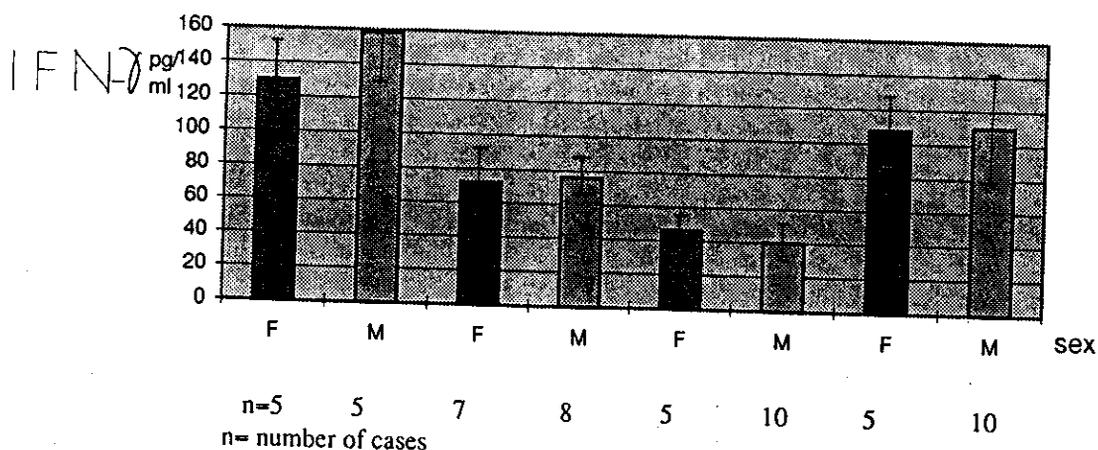


Table (8): Levels of IL-2 in different age groups (pg/ml)

	Control		Schistosomiasis					
			Inactive		Active before treatment		Active after treatment	
No. of cases	6	4	9	6	10	5	10	5
Years	< 40	> 40	< 40	> 40	< 40	> 40	< 40	> 40
	150	90	29	35	47	38	130	81
	123	122	65	47	55	38	121	91
	147	100	66	37	57	39	127	96
	135	131	57	56	45	25	124	88
	120		68	59	49	39	125	100
	149		73	41	50		127	
			59		30		117	
			75		42		114	
			84		65		136	
					40		116	
Range	120-150	90-131	29-84	35-59	30-65	25-39	114-136	81-100
Mean	137.3	110.8	64	49.2	48	35.8	123.7	91.2
S.D	13.4	19	15.5	8.9	9.8	6.1	6.8	7.3
t =	2.62		2.11		2.53		8.49	
p =	0.031 (Sig.)		0.055 (Sig.)		0.025 (Sig.)		0 (HS)	

Fig.(12): Mean levels of IL-2 in different age groups

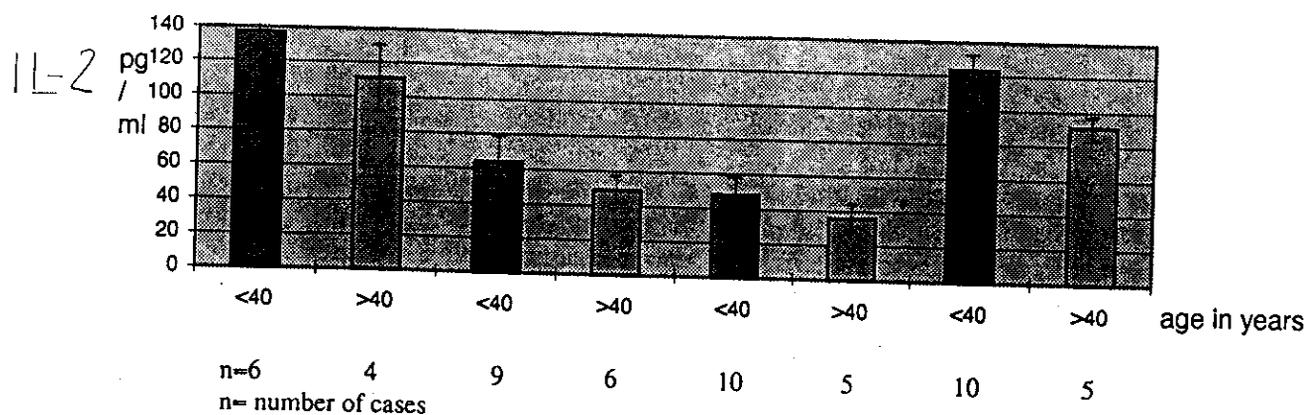


Table (9): Levels of IFN- γ in different age groups (in pg/ml)

	Control		Schistosomiasis					
			Inactive		Active before treatment		Active after treatment	
No. of cases	6	4	9	6	10	5	10	5
Years	< 40	> 40	< 40	> 40	< 40	> 40	< 40	> 40
	180	170	55	88	38	36	120	128
	127	153	84	80	39	47	118	125
	145	142	70	79	62	40	95	109
	147	100	82	59	40	44	91	150
	166		44	69	43	29	124	129
	110		67	100	37		80	
			81		26		36	
			65		42		100	
			90		46		115	
					65		119	
Range	110-180	100-170	44-90	59-100	26-65	29-47	36-124	109-150
Mean	145.8	141.3	70.8	79.2	43.8	39.2	99.5	128.2
S.D	25.4	29.8	14.9	14.3	11.7	7.1	26.6	14.6
t =	0.26		1.7		0.8		2.7	
p =	0.8	(NS)	0.3	(NS)	0.44	(NS)	0.019	(Sig.)

Fig.(13): Mean values of IFN- γ in different age groups

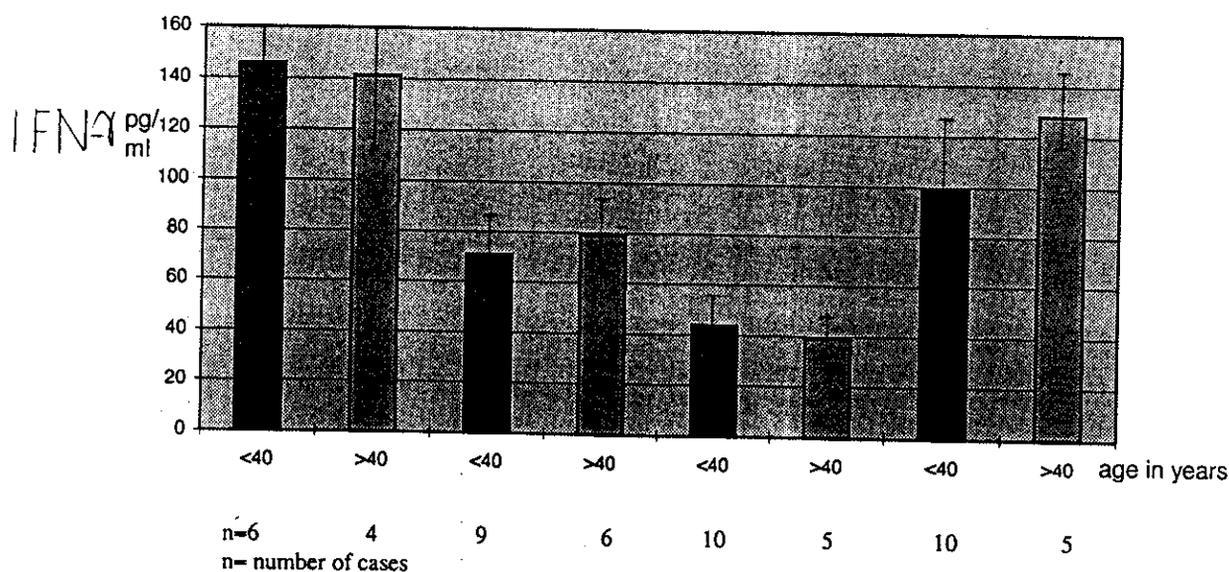


Table (10): Response to PZQ treatment among Active S. mansoni cases (+ve and -ve rectal snip groups)

Rectal snip	Number	%
(1) positive	4	26.7
(2) Negative	11	73.3
Total	15	100

Fig (14): Percentage of response (+ve and -ve rectal snip groups) in Active after treatment group, by PZQ

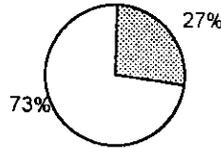


Table (11): Comparison between IL-2 and IFN-γ in +ve and -ve patients (Active S. group after treatment)

	Positive R.S.	Negative R.S.	Positive R.S.	Negative R.S.
No. of cases	4	11	4	11
	IL-2	IL-2	IFN-γ	IFN-γ
	124	130	91	120
	117	121	36	112
	136	127	115	95
	88	125	150	124
		114		100
		91		125
		116		119
		96		109
		100		129
		81		128
		127		80
Range	88-136	81-130	36-150	80-129
Mean	116.25	111.6	88	112.8
S.D.	20.4	16.9	14.9	15.6
	t=0.3 P=0.77 (NS)		t=2.9 P=0.008 (HS)	

R.S.= Rectal snips

+ve, -ve= to treatment by PZQ.

IL-2, IFN-γ = measured in pg/mL.

Table (12): Comparison between Responders and Non-Responders to treatment regarding IL-2 & IFN- γ in different age and sex groups (pg/ml)

	IL -2	IFN- γ	Age	Sex		No. of cases
				M	F	
Non - Responders	116.25 \pm 20.4	88.0 \pm 14.9	32.5 \pm 3.2	3	1	4
Responders	111.6 \pm 16.9	112.8 \pm 15.6	38.2 \pm 4.1	7	4	11
t =	0.3	2.80				
P =	0.67	0.006				
S =	(NS)	(HS)				

Fig. (15): Mean values of IL-2& IFN- γ in Responders and Non-Responders to PZQ treatment

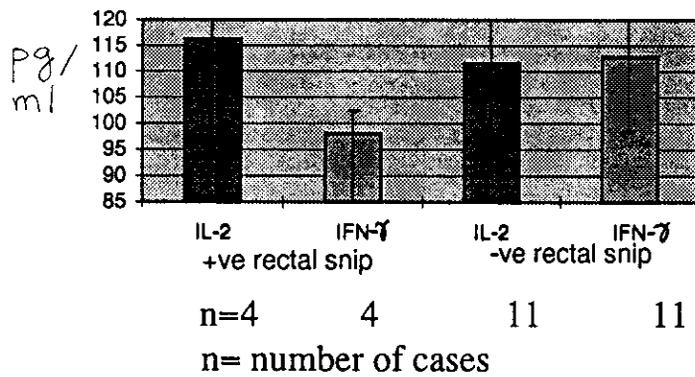


Table (13): Comparison between Responders to treatment versus Control group and Non - Responders versus Control group , regarding IL-2 & IFN- γ

	IL -2 (pg/ml)		IFN- γ (pg/ml)	
Non-Resp. n = 4	116.25 \pm 20.4	t = 1.81 p = 0.087 (N.S)	88.0 \pm 14.9	t = 3.37 p = 0.003 (Sig.)
Control n = 10	126.2 \pm 20.2		144.0 \pm 25.7	
Responders n=11	111.6 \pm 16.9	t = 0.86 p = 0.23 (NS)	122.8 \pm 15.6	t = 1.01 p = 0.22 (NS)

Table (14) : Comparison between Responders to treatment versus Inactive group and Non- Responders versus Inactive group , regarding IL-2 & IFN- γ

	IL-2 (pg/ml)		(IFN - γ (pg/ml)	
Non - Resp. n = 4	116.25 \pm 20.4	t = 8.7 p = 0 (HS)	88.0 \pm 14.9	t = 7.9 p = 0 (HS)
Inactive n = 15	56.7 \pm 16.1		74.2 \pm 14.8	
Responders n = 11	111.6 \pm 16.9	t = 2.13 p = 0.049 (Sig.)	122.8 \pm 15.6	t = 3.3 p = 0.002 (HS)

Table (15): Correlation Coefficient ® between levels of IL-2 and IFN- γ in different studied groups.

Group	R	P
Control	Negative - 0.234	Not Sig. 0.12
Inactive S. cases	Negative - 0.139	Not Sig. 0.32
Active S. cases before PZQ treatment	Positive + 0.299	Not Sig. 0.11
Active S. cases after PZQ treatment	Positive - 0.586	Highly Sig. 0.008

Fig.(16): Line showing IL-2 levels in active schistosomiasis patients before and after treatment

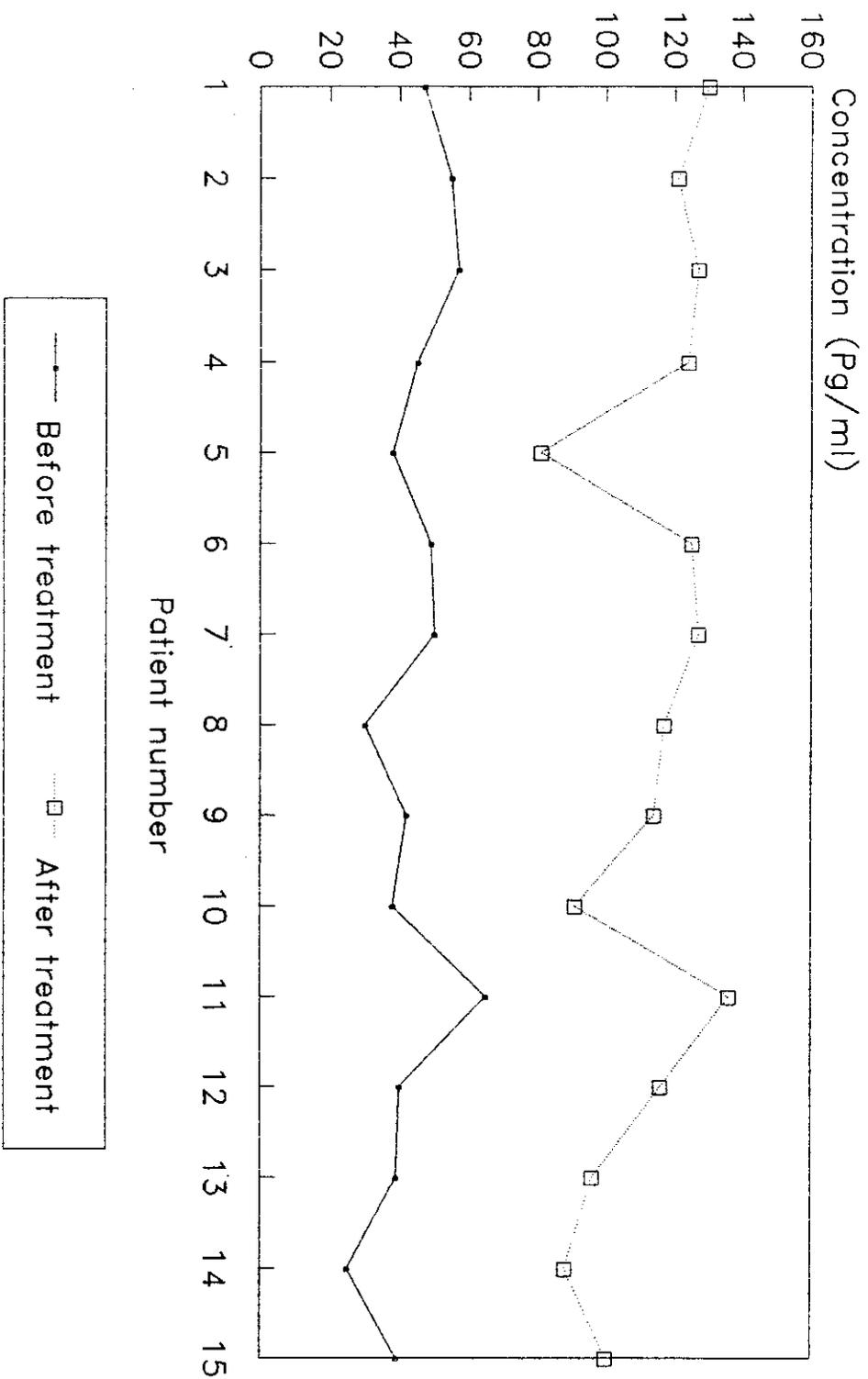


Fig.(17): Line showing INF- γ levels in active schistosomiasis patients before and after treatment

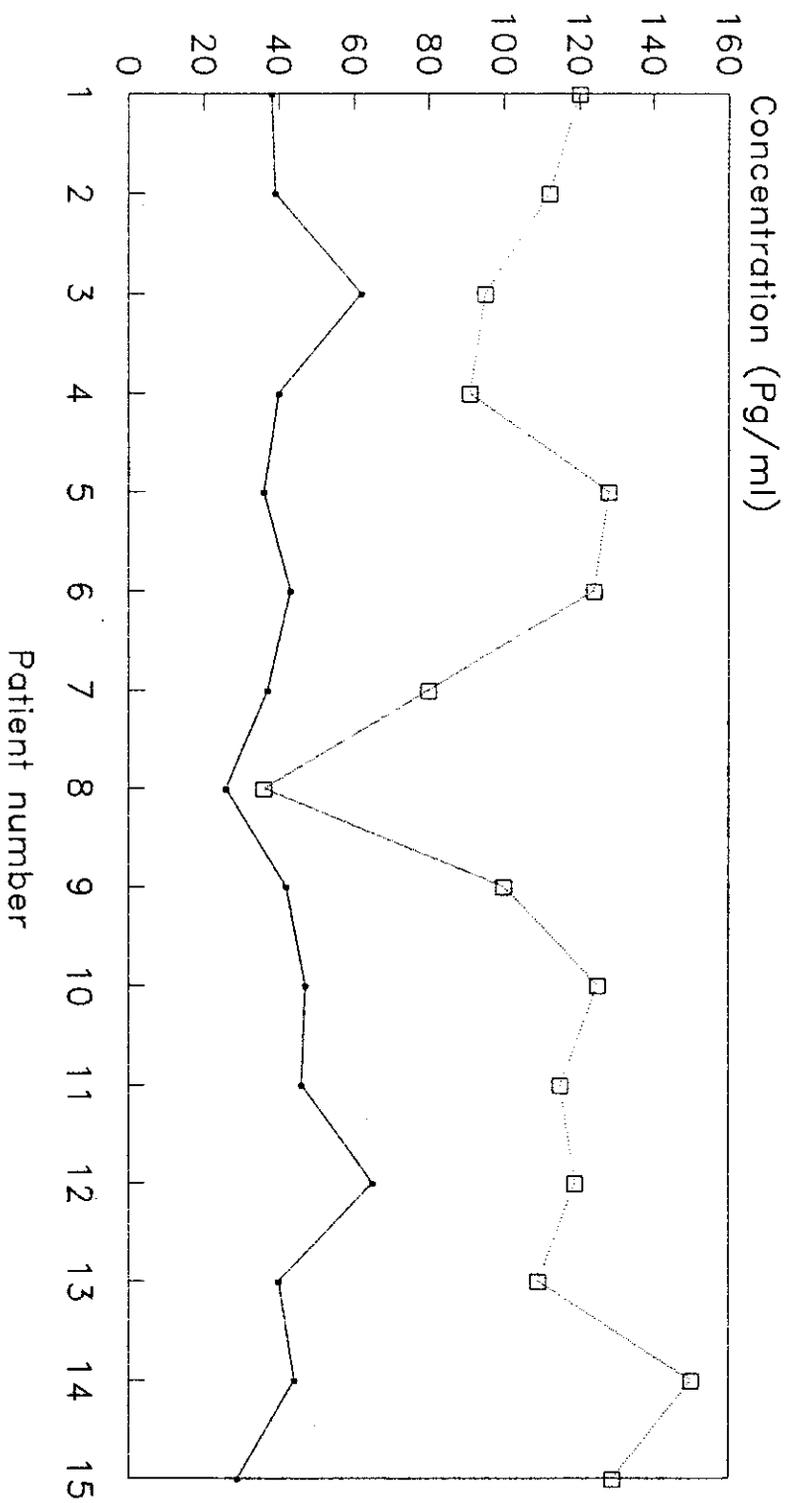


Fig.(18): Comparison between IL-2 and
INF- γ in active schistosomiasis patients
before treatment

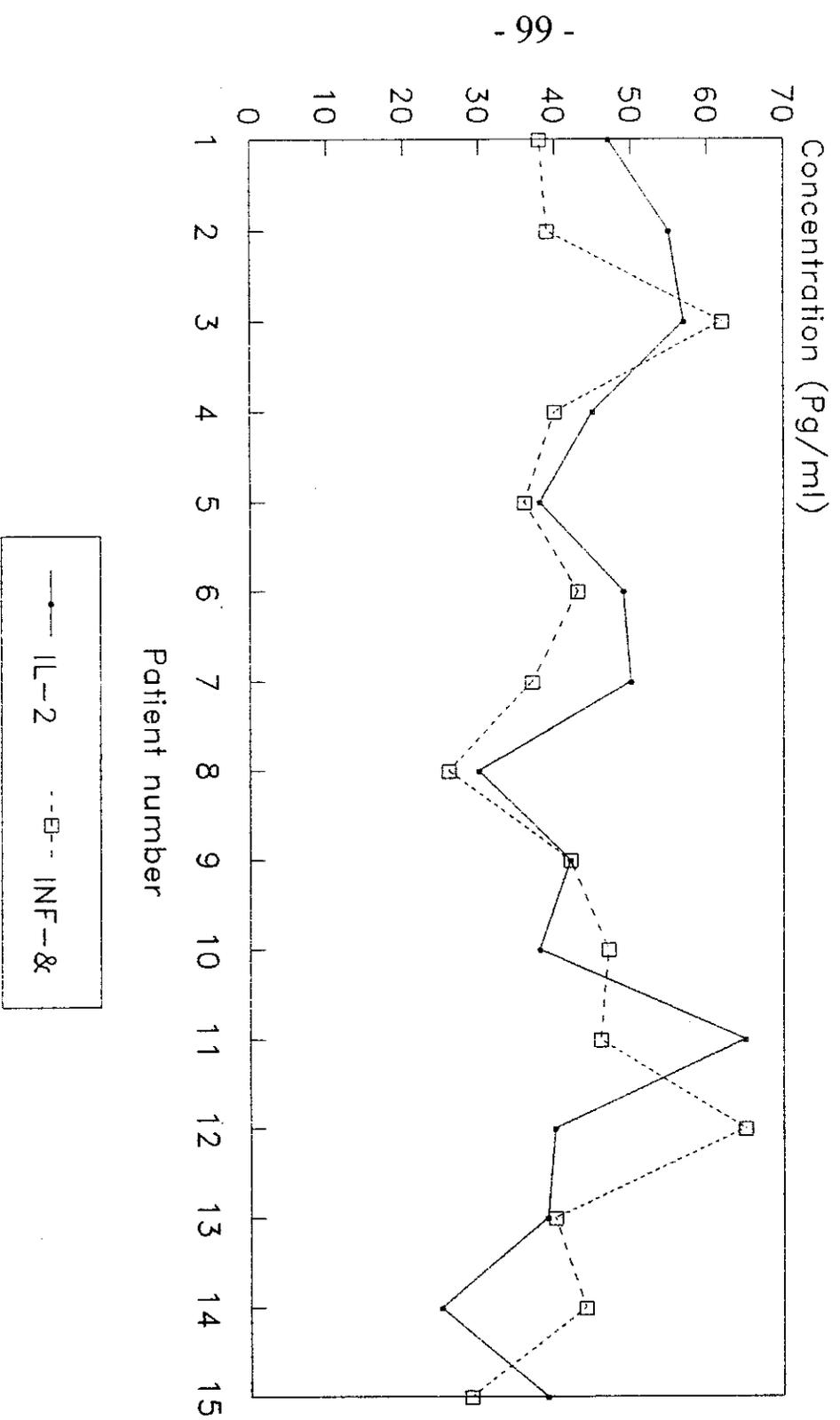
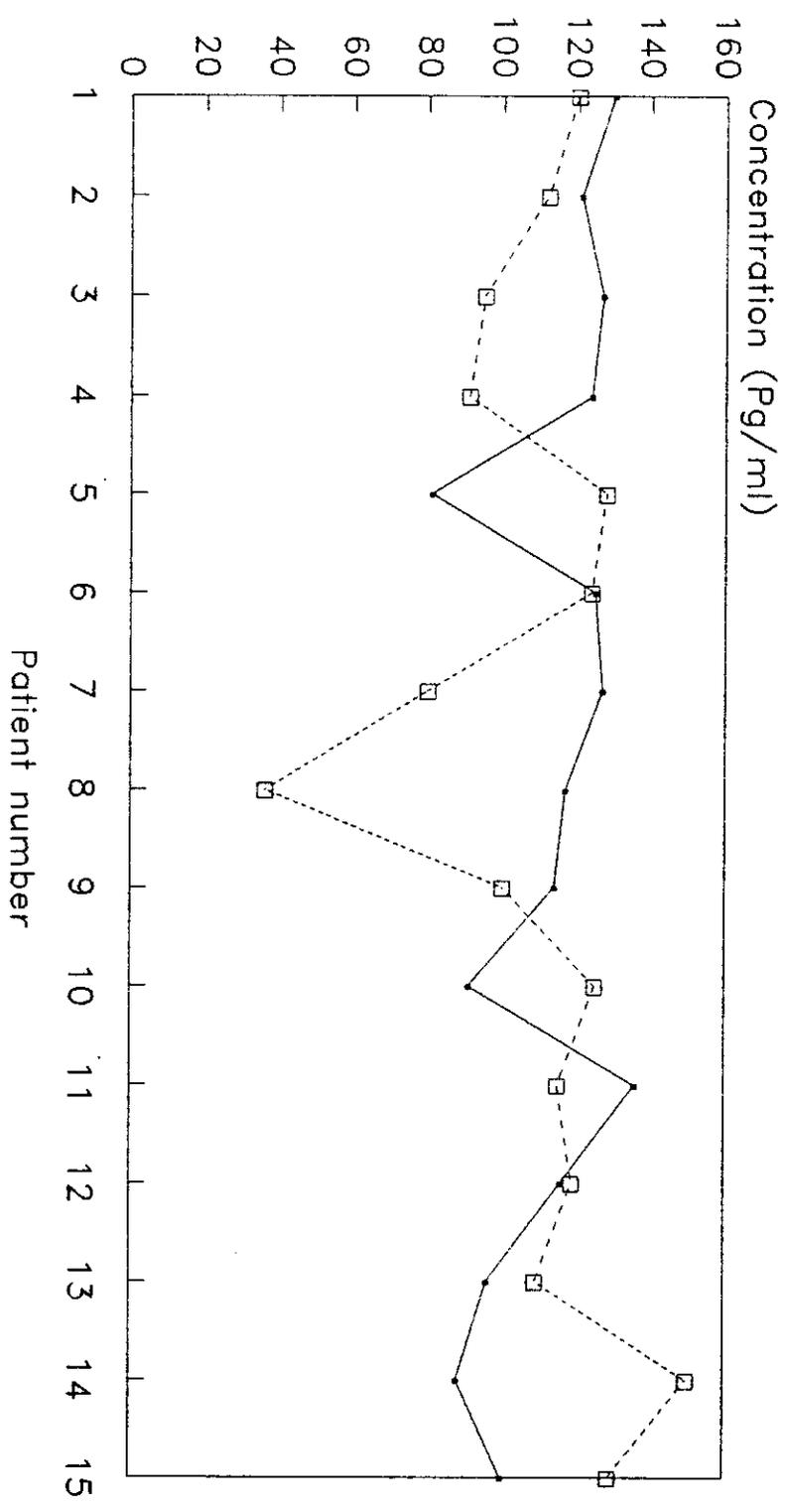


Fig.(19): Comparison between IL-2 and INF- γ in active schistosomiasis patients after treatment



—●— IL-2
 - - □ - - INF- γ

Fig.(20): Comparison between IL-2 and INF- γ in control group

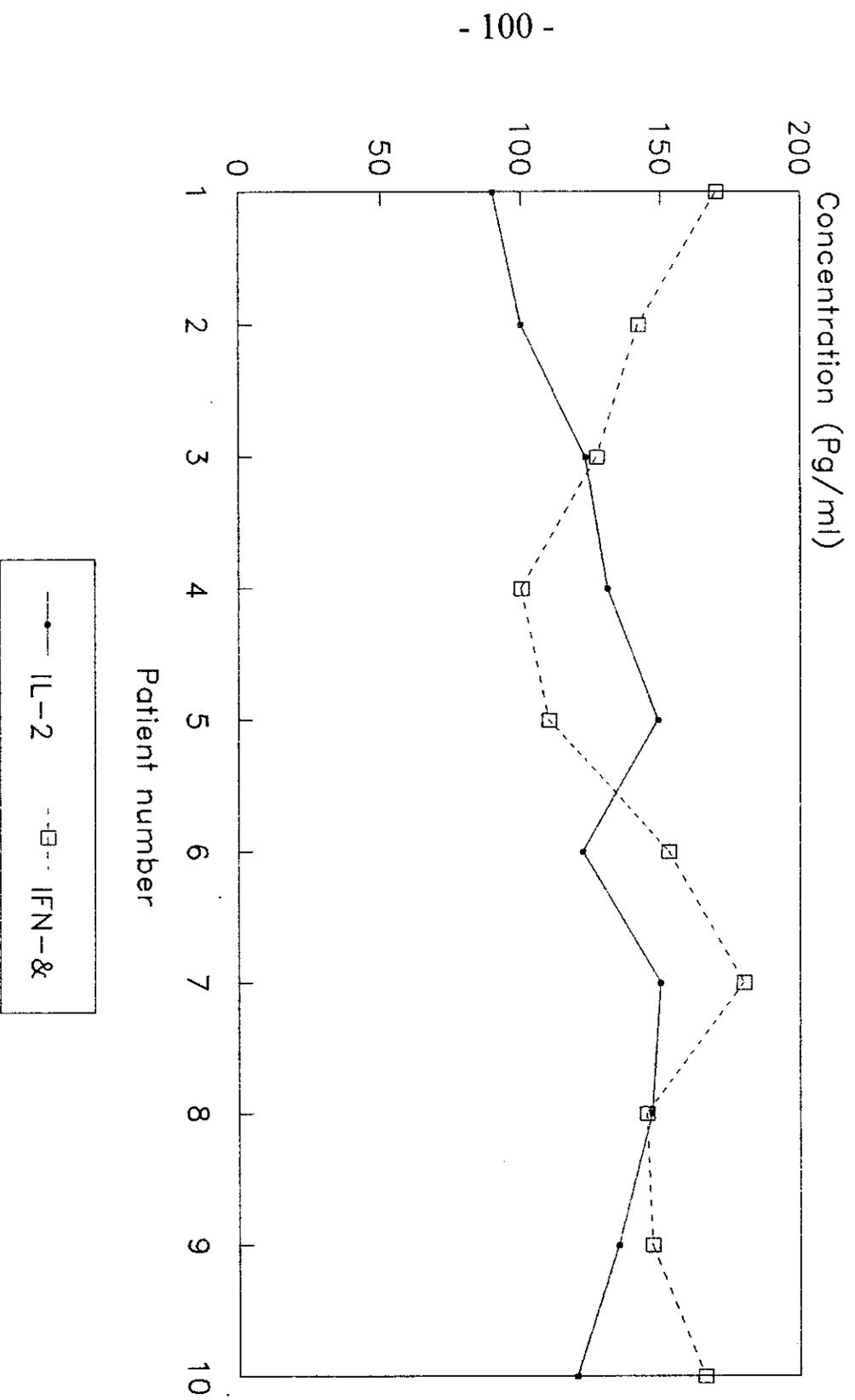


Fig.(21): Comparison between IL-2 and
INF- γ in inactive schistosomiasis
patients

