

RESULTS

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Twenty cases diagnosed as kwashiorkor were included in our study they were 11 male and 9 female before treatment, they were classified according to the nutritional index of *Maclaren (1972)* into mild (n = 5) moderate (n = 11) and severe (n = 4) (table 3-1) the nutritional index of the mild cases ranged from 85-95% for moderate cases was 75-85% and severe cases was < 75%.

Follow up 17 case of them for one month as 2 cases died from gastroenteritis and one case died from severe chest infection.

Table (3-2): Represents a collective data of serum lipid patterns and liver span in kwashiorkor children before treatment :

The cases age ranged from 7-30 m while the weight ranged from 4.5-10kg.

Concerning serum total lipids, cholesterol, triglycerides, α -lipoprotien, beta lipoprotien cholesterol and liver span, the following results were obtained.

- Serum total lipids ranged from 308-526mg% with mean range 336.25 ± 60.04 mg/dl.
- Serum triglycerides ranged from 26-78mg% with mean range 40.55 ± 11.19 mg%.
- Serum cholesterol ranged from 45-1110.7mg% with mean range 83.59 ± 17.61 mg.
- Serum alpha liporotien cholesterol ranged from 22.4 - 34mg% with mean range 27.63 ± 3.43 mg%.
- Serum beta lipoprotien cholesterol ranged from 27.8-92.3mg% with mean range 64.07 ± 16.50 mg%.
- Liver span ranged from 5.9-13cm with mean range 8.44 ± 2.01 cm.

Table (3-3): Represents a collective data of serum lipid patterns and liver span in Kwashiorkor children after treatment. The children age ranged from 8-31m while the weight ranged from 5-10.8kg. Concerning serum total lipids, cholesterol, triglycerides, α lipoprotein, B-lipoprotein cholesterol and liver span, the following results were obtained.

- Serum total lipids ranged from 402-640mg% with mean range $530.52 \pm 67.63\text{mg}\%$.
- Serum triglycerides ranged from 62-90 mg% with mean range $79.11 \pm 9.86\text{mg}\%$.
- Serum cholesterol ranged from 94-177mg% with mean range $138.14 \pm 29.72\text{mg}\%$.
- Serum alpha lipoprotein cholesterol ranged from 31-47mg% with mean range $39.00 \pm 5.68\text{mg}\%$.
- Serum beta lipoprotein cholesterol ranged from 81-146mg% with mean range $114.97 \pm 26.23\text{mg}\%$.
- Liver span ranged from 5.9-10.9 cm with mean range $7.56 \pm 1.65\text{cm}$.

Table (3-4): and Figures (2-1,2-2,2-3,2-4,2-5,2-6) represents the statistical studies of serum lipid patterns and liver span in kwashiorkor children before and after nutritional treatment as follows.

- Serum total lipids its mean before treatment is $336.25 \pm 60.04\text{mg}\%$ and after treatment is $530.52 \pm 67.63\text{mg}\%$ which is highly significant at $P < 0.01$.
- Serum triglycerides its mean before treatment is $40.55 \pm 11.19\text{mg}\%$ and after treatment is $79.11 \pm 9.36 \text{mg}\%$ which is highly significant at $P < 0.01$.
- Serum cholesterol its mean before treatment is $83.59 \pm 17.61\text{mg}\%$ and after treatment is $138.14 \pm 29.72\text{mg}\%$. which is highly significant at $P < 0.01$.

- Serum α - lipoprotein cholesterol its mean is 27.63 ± 3.43 before treatment and after is $39.00 \pm 5.68\text{mg}\%$ which is highly significant at $P < 0.01$.
- Serum beta- lipoprotein its mean before treatment is 64.07 ± 16.50 and after is $114.97 \pm 26.23\text{mg}\%$ which is highly significant at $P < 0.01$.
- Liver span its mean before treatment is $8.44 \pm 2.01\text{cm}$ and after is 7.56 ± 1.65 which is highly significant at $P < 0.01$.

Table (3-5): Represents the improvement percentage in various lipid parameters and liver span which is 57.77% for total lipids, 95.09% for triglyceride, 65.25% for cholesterol, 41.15% for alpha lipoprotein 79.44% for beta lipoprotein and 10.42% for liver span. All of the previous were highly significant at $P < 0.01$.

Table (3-6): Represents the means and standard deviation of serum lipid patterns and liver span in kwashiorkor cases $n = 20$ before treatment where the difference between total lipid level in the mild, moderate and severe cases were highly significant at $P < 0.01$, the difference between triglyceride level in the mild, moderate and severe cases were non significant, the difference between cholesterol level in the mild, moderate and severe cases were highly significant at $P < 0.01$, the difference between α -lipoprotein cholesterol in the mild, moderate and severe cases were non significant, the difference between β -lipoprotein cholesterol in the mild, moderate and severe cases were non significant and the difference in the liver span between the mild, moderate and severe cases were significant at $P < 0.05$.

Serum lipid patterns and liver span in relation to the sex are non significant.

Table (3-7): Represents the statistical studies of serum lipid patterns and liver span in kwashiorkor cases $n = 17$ after treatment in relation to the degree of severity and sex, it had showed that the difference between the mild, moderate and sever groups in the (total lipids, triglyceride, cholesterol, α -lipoprotein and β -lipoprotein) is non significant. While the difference between the three groups in the liver span is highly significant at $P < 0.01$, and as regards the sex, the three groups had showed non significant results in serum lipid patterns and liver span.

Table (3-8) and Fig. (2-7A, 2-8A, 2-9A, 2-10A, 2-11A): Represents the correlation between liver span and various lipid patterns before treatment including total lipids, triglycerides, cholesterol, α -lipoprotein and β -lipoprotein cholesterol there was a significant $P < 0.05$ negative correlation between increase in liver span due to fatty infiltration and the various lipid patterns.

Table (3-9) and Fig. (2-7B, 2-8B, 2-9B, 2-10B, 2-11B): The regressive analysis between liver span and serum lipid patterns showed highly significant correlation $P < 0.01$ between improved liver span and increase in various lipid patterns after treatment.

Table (3-1): Classification of Kwashiorkor cases according to the severity and sex before and after treatment.

Degree of severity	Before		After	
	Total number n = 20	% from total number	Total number n = 17	% from total number
Mild	5	25%	5	29.4%
Moderat	11	55%	9	52.9%
Severe	4	20%	3	17.6%
<u>Sex :</u>				
Male	11		10	
Female	4		7	

Table (3-2): Collective data showing serum lipid patterns and liver span in all cases of kwashiorkor before treatment.

No.	Degree of severity	Sex	AGE month	W.T kg	LEN cm	T.L. mg%	TRI. mg%	CHO mg%	α -Lipo mg%	β -Lipo mg%	L.S.c m
1	++	2	24	85	76	420	35	85.0	28.0	64	8.5
2	++	2	17	70	75	415	39	82.0	26.3	63.5	8.7
3	+	1	30	100	80	500	50	100.0	32.0	78	6.5
4	+	1	17	85	75	490	43	97.0	30.0	75.6	7.5
5	+++	2	18	45	72	308	26	45.0	22.4	27.8	10.6
6	++	1	30	95	80	493	47	91.0	30.5	69.9	6.7
7	+	1	18	90	75	526	78	110.7	34.0	92.3	5.9
8	++	1	24	70	74	401	31	81.2	25.4	62	9.0
9	+++	2	28	60	70	337	29	52.0	23.0	34.8	12.0
10	+	2	24	90	76	449	48	100.0	32.0	77.6	8.7
11	++	1	10	60	56	420	41	83.7	27.0	64.9	7.2
12	++	1	17	80	57	465	43	96.3	29.0	75.9	7.0
13	+++	2	18	60	73	364	30	63.0	23.0	46	13.0
14	++	1	7	45	64	415	39	82.0	25.1	64.7	7.5
15	++	2	20	85	78	475	43	97.0	28.0	77.6	8.0
16	++	1	10	50	60	390	37	79.0	25.0	61.4	7.8
17	++	2	12	64	70	408	40	80.0	25.0	63	8.5
18	++	2	21	83	78	465	39	91.0	28.0	70.8	7.8
19	+++	2	23	60	74	352	28	56.0	26.0	35.6	12
20	+	2	18	90	75	500	45	100.0	33.0	76	6

+ mild ++ moderate +++ severe

1 = male 2 = female

Table (3-3): Collective data showing serum lipid patterns and liver span in 17 case of kwashiorkor after treatment.

No.	Sex	AGE month	W.T. kg	T.L. mg%	TRI. mg%	CHO mg%	α -Lipo. mg%	β -Lipo mg%	L.S. cm
1	2	25	92	494	62	125.0	39.0	98.4	7.6
2	2	18	77	501	84	142.0	37.0	121.8	8.0
3	1	31	108	612	90	175.0	47.0	14.6	6.5
4	1	18	90	583	87	156.0	42.0	131.4	7.0
5 •	2	0	0	0	0		0	0	0
6	1	31	104	576	85	0	45.0	136	6.5
7	1	19	98	601	88	164.0	47.0	147.6	5.9
8	1	25	79	523	68	177.0	35.0	147.1	8.0
9	2	29	63	402	63	168.5	31.0	75.6	10.9
10	2	25	98	640	90	94.0	46.0	146	6.6
11	1	11	65	494	75	174.0	33.0	87	6.9
12	1	18	88	567	86	105.0	40.0	124.2	6.5
13	2	19	62	450	66	147.0	32.0	81.2	11.0
14	1	8	50	500	80	100.0	36.0	95	6.5
15	2	21	90	560	81	115.0	38.0	108.2	7.0
16 •	1	0	0	0	0	130.0	0	0	0
17	2	13	69	490	80		35.0	94	7.2
18 •	2	0	0	0	0	0	0	0	0
19	2	24	64	433	70	113.0	62.0	81	10.5
20	2	19	96	593	90		98.0	134	6.0
						0			
						100.0			
						163.0			

• Dead cases

Table (3-4): Statistical studies of serum lipid patterns and liver span in kwashiorkor cases before and after one month of nutritional treatment.

	Before n = 20		After n = 17		Sig. P.
	Mean	S.D.	Mean	S.D.	
Total lipids /mg%	336.25	60.04	530.52	67.63	**
Triglyceride /mg%	40.55	11.19	79.11	9.86	**
Cholesterol /mg%	83.59	17.61	138.14	29.72	**
Alpha lipoprotein /mg%	27.63	3.43	39.00	5.68	**
Beta lipoprotein /mg%	64.07	16.50	114.97	26.23	**
liver span /cm	8.44	2.01	7.56	1.65	**

** Highly significant at $P < 0.01$

Table (3-5) :

	% of improvement	
Total lipids	57.77%	**
Triglyceride	95.09%	**
Cholesterol	65.25%	**
Alpha lipoprotein	41.15%	**
Beta lipoprotein	79.44%	**
Liver span	10.42%	**

** Highly significant $P < 0.01$

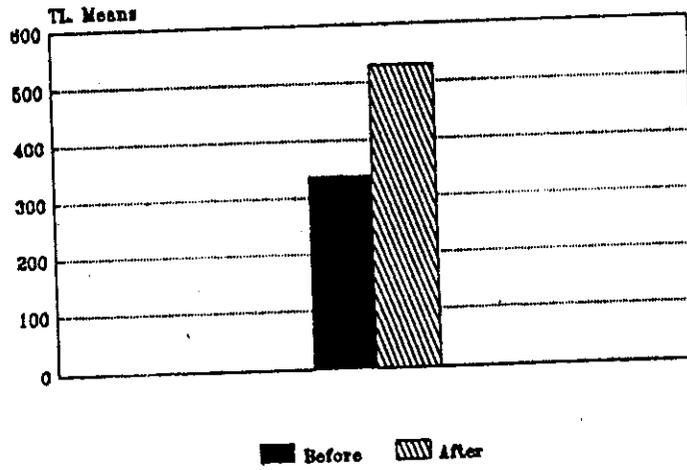


Fig. (2-1): Total Lipids (TL) before and after treatment.

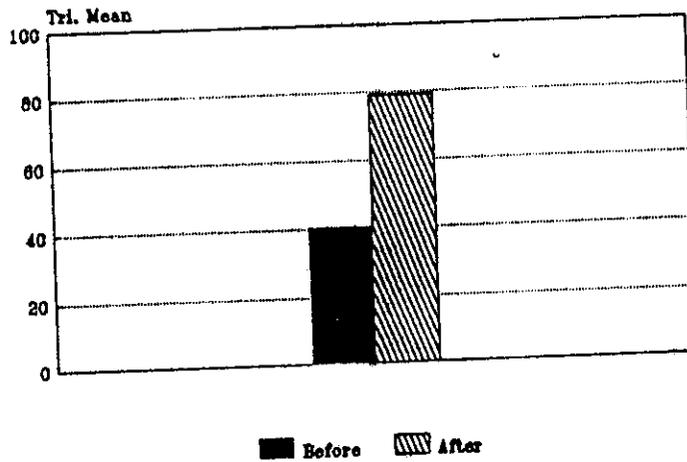


Fig. (2-2): Triglycerid (Tri) before and after treatment.

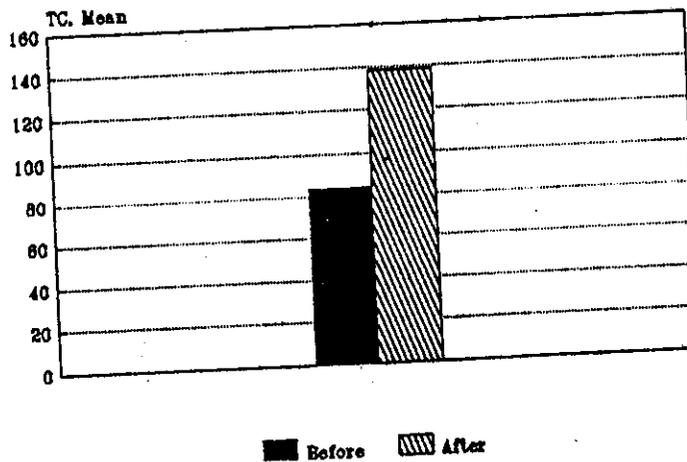


Fig. (2-3): Total Cholesterol (TC) before and after treatment.

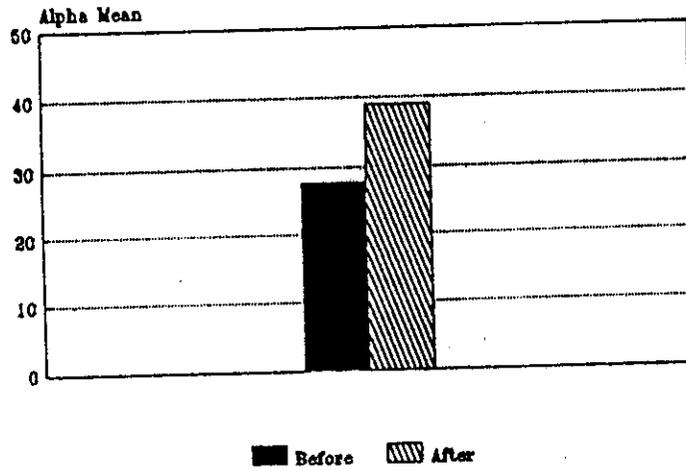


Fig. (2-4): Alpha Lipoprotien (Alpha) before and after treatment.

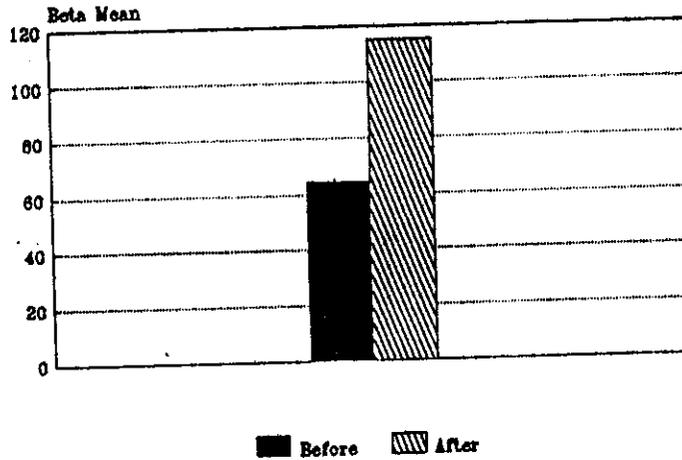


Fig. (2-5): Beta Lipoprotien (Beta) before and after treatment.

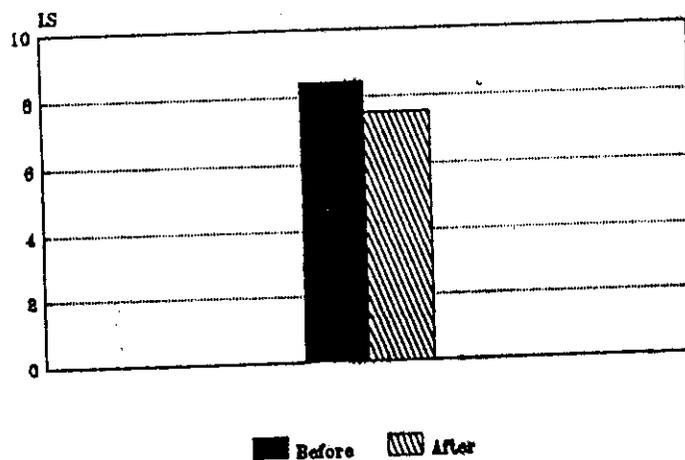


Fig. (2-6): Liver Span (LS) before and after treatment.

Table (3-6): Statistical studies of serum lipid patterns and liver span in kwashiorkor cases n = 20 before treatment in relation to the degree of severity and sex.

Severity	No.	T.L.mg%	Tri.mg%	Cho.mg%	α -Lipo mg%	β -Lipo mg%	L.S. cm
		Mean \pm S.D	Mean \pm S.D.	Mean \pm S.D	Mean \pm S.D	Mean \pm S.D	Mean \pm S.D
Mild	5	366.9 \pm 29.9	45.89 \pm 10	95.91 \pm 8.06	29.91 \pm 1.77	75.17 \pm 8.47	7.65 \pm 1.08
Moderat	11	353.6 \pm 27	42.62 \pm 9	87.86 \pm 7.27	27.94 \pm 1.60	68.43 \pm 7.64	7.51 \pm 0.98
Severe	4	247.7 \pm 63.1	29.45 \pm 21.08	59.11 \pm 16.99	26.53 \pm 3.74	38.47 \pm 17.86	10.90 \pm 2.29
P		**	N.S.	**	N.S.	**	*
<u>Sex :</u>							
Male	11	332.4 \pm 32.4	42.63 \pm 10.8	82.66 \pm 8.73	28.28 \pm 1.42	62.90 \pm 9.17	8.26 \pm 1.18
Female	9	313.1 \pm 48.1	36 \pm 16.08	79.26 \pm 12.96	27.98 \pm 2.85	58.49 \pm 13.62	9.12 \pm 1.74
P		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

** = Highly significant at $p < 0.01$.

* = Significant at $p < 0.05$.

N.S. = Non significant

Table (3-7): Statistical studies of serum lipid patterns and liver span in kwashiorkor cases N = 17 after treatment in relation to the degree of severity and sex.

Severity	No	T.L. mg%	Tri. mg%	Cho. mg%	α -Lipo mg%	β -Lipo mg%	L.S. cm
		Mean \pm S.D	Mean \pm S.D	Mean \pm S.D	Mean \pm S.D	Mean \pm S.D	Mean \pm S.D
Mild	5	571.15 \pm 39.35	82.14 \pm 8.03	146.24 \pm 15.22	41.23 \pm 2.5	121.43 \pm 16.66	6.74 \pm 0.58
Moderat	9	532.96 \pm 33.54	80.67 \pm 6.84	135.81 \pm 12.99	38.97 \pm 2.13	112.97 \pm 14.19	6.85 \pm 0.51
Severe	3	473.97 \pm 72.95	92.82 \pm 14.91	136.77 \pm 28.25	39.73 \pm 4.68	115.60 \pm 30.90	10.40 \pm 1.11
P		N.S	N.S.	N.S.	N.S.	N.S.	**
<u>Sex :</u>							
Male	10	532.52 \pm 41.55	85.28 \pm 8.49	147.21 \pm 16.07	40.15 \pm 2.66	124.11 \pm 17.59	7.86 \pm 0.62
Female	7	519.53 \pm 57.39	85.14 \pm 11.73	132.00 \pm 22.2	39.80 \pm 3.66	109.22 \pm 24.30	8.13 \pm 0.87
P		N.S	N.S.	N.S	N.S.	N.S.	N.S.

** Highly significant P < 0.01.

N.S. = Nonsignificant.

Table (3-8): Correlation between liver span and serum lipid patterns before treatment.

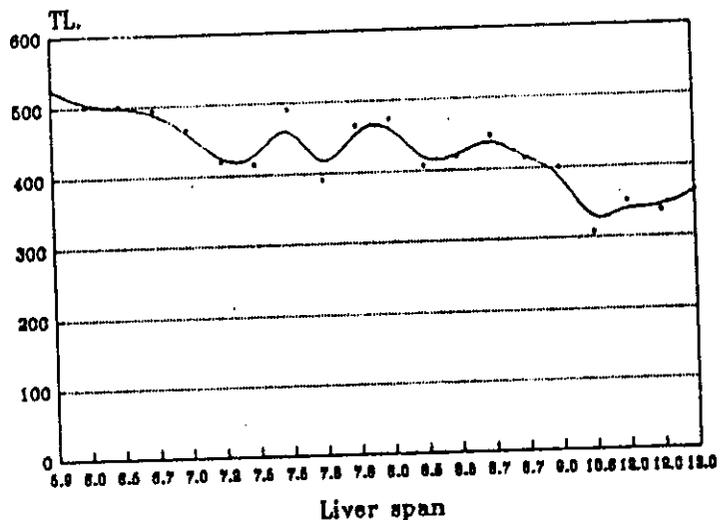
Liver span	T.L	Tri	Cho	α -lipo	β -lipo
r	-.8570	-.7193	-.8566	-.7454	-.8566
p	*	*	*	*	*
	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

* Significant at P < 0.05

Table (3-9) : Correlation between liver span and serum lipid patterns after treatment.

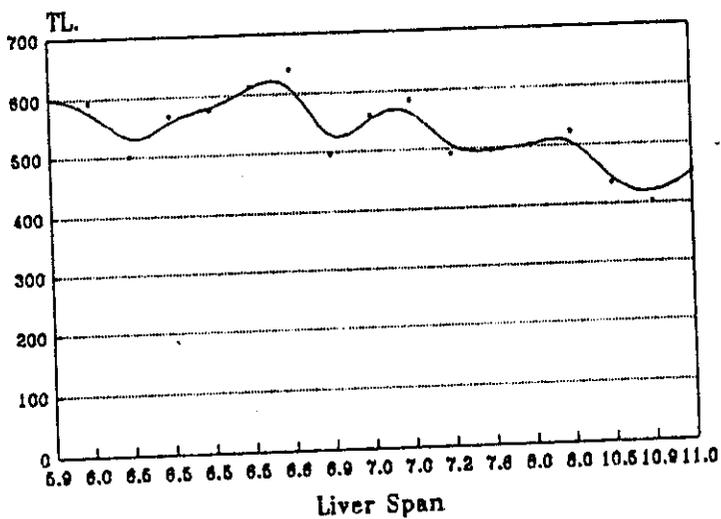
Liver span	T.L	Tri	Cho	α -lipo	β -lipo
r	-.8255	-.6413	-.6313	-.6996	-.6117
p	** < 0.01	** < 0.01	** < 0.01	** < 0.01	** < 0.01

** Highly significant at $P < 0.01$



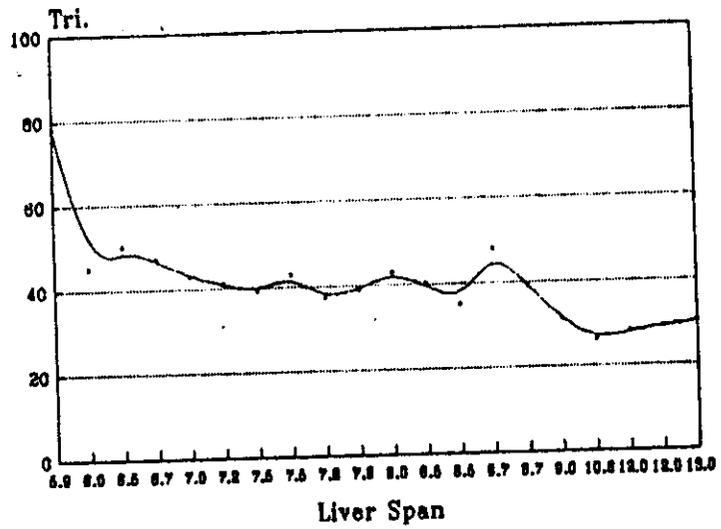
A

Fig. (2-7-A) Correlation between Total Lipids (TL.) and liver span, before treatment.



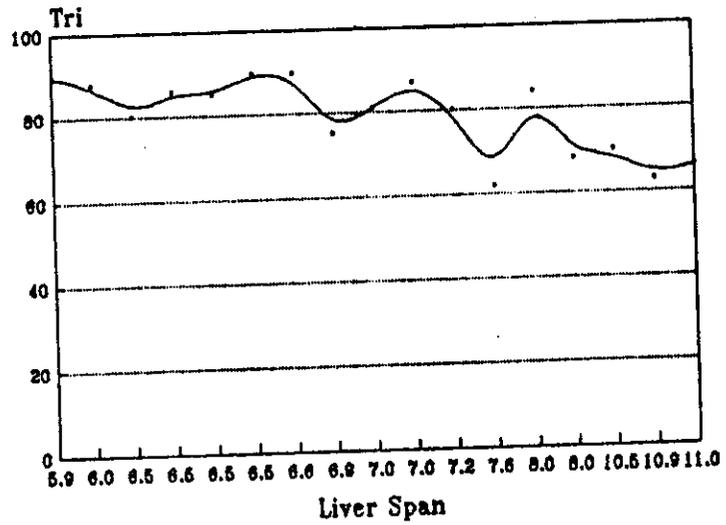
B

Fig. (2-7-B) Correlation between Total Lipids (TL.) and liver span, after treatment.



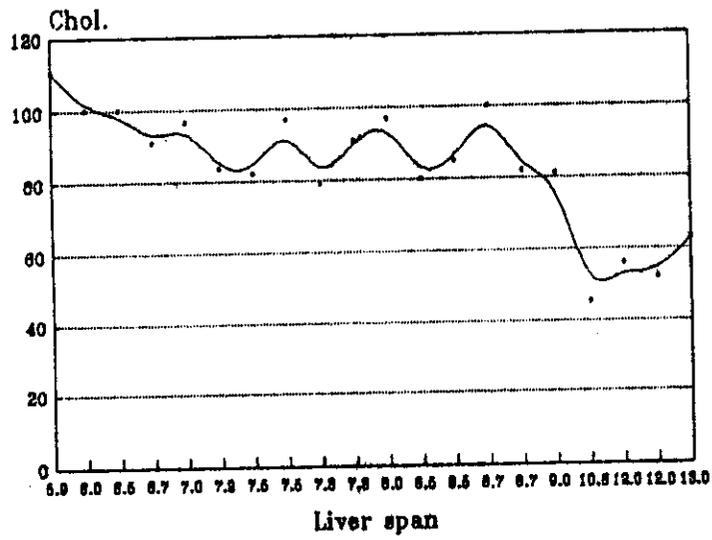
A

Fig. (2-8-A) Correlation between Triglyceride (Tri.) and liver span, before treatment.



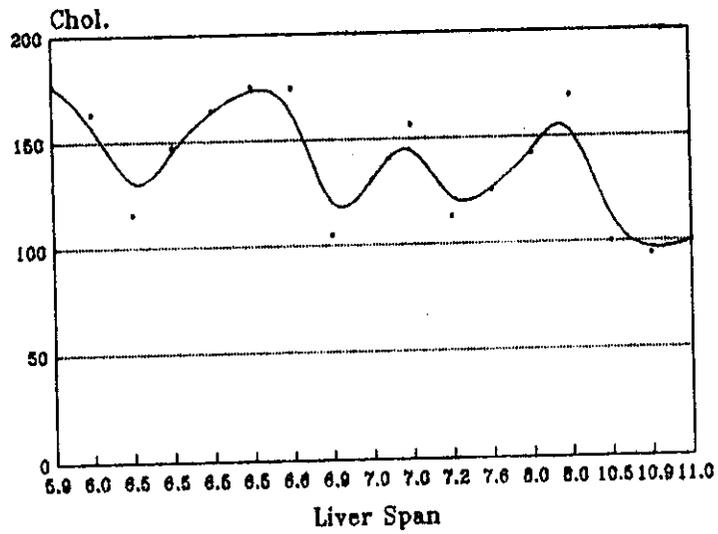
B

Fig. (2-8-B) Correlation between Triglyceride (Tri.) and liver span, after treatment.



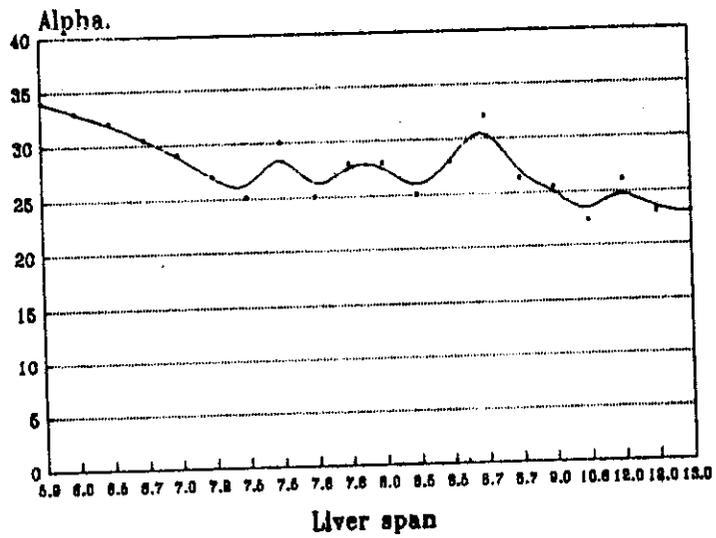
A

Fig. (2-9-A) Correlation between total Cholesterol (Chol.) and liver span, before treatment.



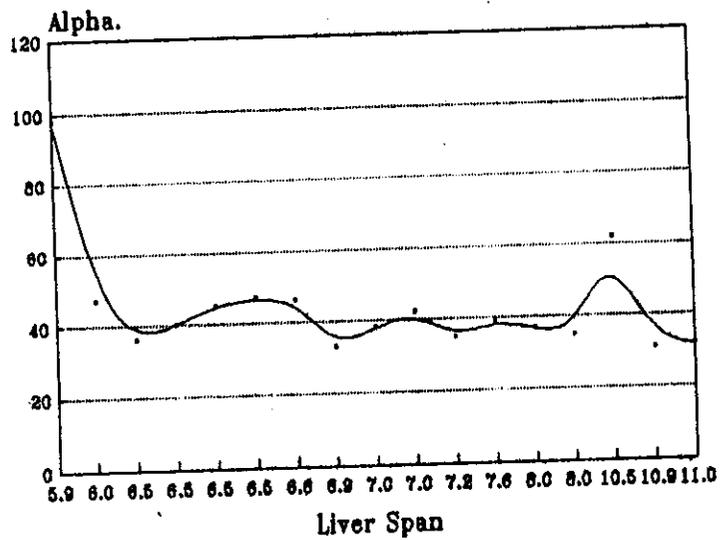
B

Fig. (2-9-B) Correlation between total Cholesterol (Chol.) and liver span, after treatment.



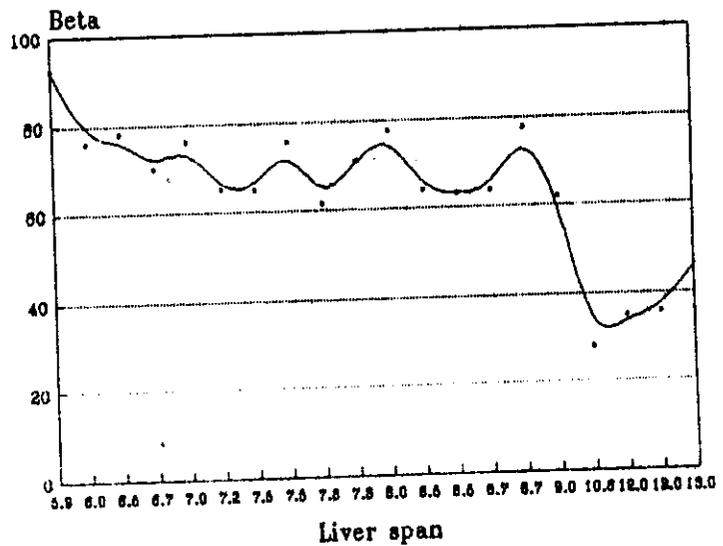
A

Fig. (2-10-A) Correlation between Alpha Lipoprotien (Alpha.) and liver span, before treatment.



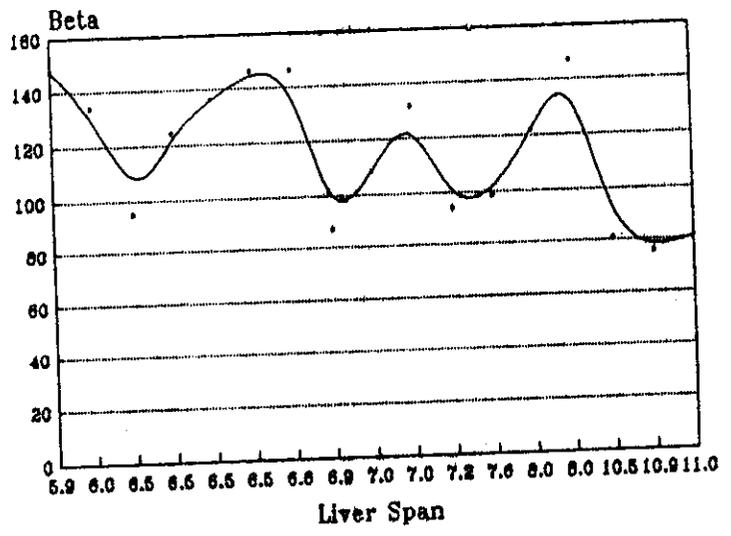
B

Fig. (2-10-B) Correlation between Alpha Lipoprotien (Alpha.) and liver span, after treatment.



A

Fig. (2-11-A) Correlation between Beta Lipoprotien (Beta.) and liver span, before treatment.



B

Fig. (2-11-B) Correlation between Beta Lipoprotien (Beta.) and liver span, after treatment.