Results

Our study was carried out on a total of 40 marasmic children including three groups.

* The first group included 12 children suffering from mild malnutrition (1st degree marasmus).

* The second group included 14 children suffering from moderate malnutrition (2nd degree marasmus).

* The third group included 14 children suffering from severe malnutrition (3rd degree marasmus).

* The three groups were compared to 20 apparantly normal subjects who served as a control group. Careful clinical history, physical examination, laboratory investigations in the form of total protein, albumin, glucose, creatinine, pancreatic amylase and lipase.

* Also pancreatic hormones in the form of glucagon and insulin was assayed.

* Also some selected anthropometric measurments were taken.

Table (1) shows age and sex distribution among the studied groups:-

* Mild malnutrition

- Age, the mean ± S.D. is 8.833 ± 5.982 months

- Sex 7 subjects were male and 5 were female.

* Moderate malnutrition.

- Age, the mean ± S.D. is 13.6428 ± 6.957 months.

- Sex, 6 subjects were male and 8 were female.

* Severe malnutrition.

    - Age, the mean ± S.D. is 15.4 ± 6.219 months.

    - Sex, 8 subjects were male and 6 were female.

* Control group:-

    - Age, the mean ± S.D. is 10.33 ± 6.243 months.

    - Sex, 11 subjects were male and 9 were female.

By statistical analysis there was no significant difference detected between males and females in all groups.

Table (2) Shows mean and standard deviation of duration of illness among the studied groups.

By statistical analysis, there was no significant difference between the groups (P > 0.05).

The degree of malnutrion in our study seems not to depend on the duration of food deprivation as a sole factor or as a main effector.

Table (3) shows mean and standard deviation of insulin level among the studied groups.

    * Control group.

    Insulin level, the mean ± S.D. is 17.026 ± 7.109 Ulu/ml.

    * Mild malnutrition.

    The mean ± S.D. of insulin level is 6.25 ± 3.086 Ulu/ml.

    * moderate malnutrition.

    The mean ± S.D. of insulin level is 6.75 ± 4.441 Ulu/ml.

* Severe malnutrition.

The mean ± S.D. of insulin level is 7.25 ± 2.819 UIu/ml.

As regards insulin, by statistical analysis there was significant decrease of insulin level in all degrees of malnutrition as compared to the control group (P<0.001). but there were no significant changes between the groups.

Table (4) shows mean and standard deviation of glucagon among the studied groups.

* Mild malnutrition, the mean ± S.D. of glucagon level is 104.583 ± 14.687 pg/ml.

* moderate malnutrition the mean ± S.D. of glucagon level is 104.571 ± 14.802 pg/ml.

* Severe malnutrition, the mean ± S.D. of glucagon level is 104.286 ± 11.579 pg/ml.

* Control group, the mean ± S.D. of glucagon level is 116.8 ± 19.033 pg/ml.

As regards glucagon, by statistical analysis there is no significant changes between mild, moderate cases and the control group (p > 0.05). but there is significant decrease between the severe case as compared to the control group (P<0.05).

Table (5) shows mean and standard deviation of lipase among the studied groups.

As regards lipase, by statistical analysis these was significant decrease between mild, moderate and severe cases when compared to the control group, as lipase decreased in all types of malnutrition but there was no significant changes between the groups.

Table (6) shows mean and standard deviation of amylase among the studied groups.

As regards amylase, by statistical analysis there was no significant difference between mild cases compared to the control group, but there was significant decrease in moderate and severe cases compared to the control group.

Also there is significant decrease in moderate cases compared to the mild and severe case but there was no significant changes between moderate and severe cases.

Table (7) Shows mean and standard deviation of total protein, albumin, glucose and creatinine among the studied groups.

* As regards total protein.

Total protein is decreased in all groups, but there is no significant changes between mild cases compared to the control.

There was significant decrease in moderate and severe cases compared to the control group.

* As regards albumin by statistical analysis, significant decrease in all groups compared to control.

* As regards creatinine, by statistical analysis there are significant decrease in mild, moderate and severe cases and the control group, but creatinine within the normal range.

* As regards blood glucose by statistical analysis, there are significant decrease in all types of malnutrition as compared to the control group, but there are no significant changes between the groups.

Table (8) Shows mean and standard deviation of weight, height, head circumference, chest circumference and midarm circumference among the studied groups.

* As regards weight, there was significant decrease in weight in all groups as compared to the control group.

* As regards height, significant decrease in height in all groups as compared to the control group.

* As regards head circumference, significant decrease in all groups as compared to the control group.

* As regards chest circumference, significant decrease in alll groups as compared to the control group.

* As regards midarm circumference, significant decrease in all groups as compared to the control group.

Table (9) Shows correlation between lipase and other variables among the studied groups.

* There was significant +ve correlation between lipase enzyme and albumin in moderate and severe cases of malnutrition.

Table (10) Shows correlation between amylase and other variables among the studied groups.

* There was significant +ve correlation between amylase enzyme and albumin in moderate and severe cases of malnutrition.

Table (11) Shows correlation between insulin level and other variables among the studied groups.

* By statistical analysis, there was no significant correlation between insulin in all degrees of malnutrition and age, sex, total protein, height, head, chest and midarm circumferences.

* There was non significant correlation between insulin level and duration of the disease in the three degrees of malnutrition.

* Also there was significant +ve correlation between insulin level in moderate and severe cases of malnutrition and albumin level.

* Also there was significant +ve correlation between insulin level in all degrees of malnutrition and weight of the patient.

Table (12) Shows correlation between glucagon level and other variables.

By statistical analysis there was no significant correlation between glucagon in all degrees of malnutrition and age, sex, total protein, height, head circumference, chest circumference and midarm circumference.

* These was non significant correlation between glucagon level and duration of the disease in the three degrees of PEM.

* Also there was siginficant +ve correlation between glucagon level in all degrees of malnutrition and albumin level.

* Also these was significant +ve correlation between glucagon level and weight of the patient.

table (1) Age and sex distribution among the studied groups

Age in months / studied group	$\bar{x}$		±S.D.		t	P
* Mild	8.833		± 5.982		0.674	> 0.05
* Moderate	13.6428		± 6.957		1.425	> 0.05
* Severe	15.4		± 6.219		2.336	< 0.05
* control	10.33		± 6.243		-	-
Sex / studied gps.	Male		Female		Z	P
	No.	%	No.	%		
* Mild	7	21.88	5	17.86	0.173	> 0.05
* Moderate	6	18.75	8	28.57	0.435	> 0.05
* Severe	8	25.0	6	21.43	0.113	> 0.05
* control	11	34.37	9	32.14	0.105	> 0.05

(Significant ———→   P < 0.05)

table (2) Mean and standard deviation of duration of illness among the studied groups

duration of illness in month	$\bar{x}$	$\pm$ S.D.
Studied groups		
* Mild	2.104	$\pm$ 2.02
* Moderate	2.482	$\pm$ 2.686
* Severe	2.839	$\pm$ 1.580
* t 0.411	& P1 > 0.05	
* t 1.019	& P2 > 0.05	
* t 0.428	& P3 > 0.05	

(Significant $\longrightarrow$ P< 0.05)

* P1   between mild   & moderate.
* P2   between mild   & severe.
* P3   between moderate & severe

table (3) Mean and standared deviation of insulin among the studied groups

Insulin / Studied groups		$\bar{x}$	± S.D.	Significant ver . control	
				t	p
* Mild		6.25	± 3.086	4.481	• < 0.001
* Moderate		6.75	± 4.441	5.179	• < 0.001
* Severe		7.25	± 2.819	5.557	• < 0.001
* control		17.026	± 7.109		
* t	0.337	& P1> 0.05			
* t	0.857	& P2> 0.05			
* t	0.356	& P3> 0.05			

(P< 0.001 ⟶ Highly sign.)

Table (4) Mean and standard deviation of glucagon among the studied groups

glucagon / Studied groups	x	± S.D.	Significant ver. control	
			t	P
* Mild	104.583	± 14.687	2.034	>0.05
* Moderate	104.571	± 14.802	2.523	>0.05
* Severe	104.286	± 11.579	2.378	• <0.05
* control	116.800	± 19.033		
* t 2.219	& P1> 0.05			
* t 0.057	& P2> 0.05			
* t 2.468	& P3< 0.05			

(Significant ⟶ P< 0.05)

Table (6) Mean and standard deviation of amylase among the studied groups

Amylase / Studied groups	x	± S.D.	Significant ver . control	
			t	P
* Mild	135.167	± 103.053	0.729	> 0.05
* Moderate	69.385	± 31.242	2.915	• < 0.05
* Severe	65.429	± 60.498	2.804	• < 0.05
* control	167.316	± 145.530		
* t 2.129	& P1> 0.05			
* t 2.060	& P2> 0.05			
* t 0.216	& P3< 0.05			

(Significant ⟶ P< 0.05)

Table (7) Mean and standard deviation of total protein, albumin, creatinine and glucose among the studied groups

Studied groups	x	± S.D.	Significant ver . control	
			t	P
total protein				
* Mild	8.483	± 1.597	1.314	> 0.05
* Moderate	6.992	± 0.975	3.293	● < 0.01
* Severe	7.086	± 1.365	3.030	● < 0.01
* control	9.659	± 3.429		
Albumin				
* Mild	3.733	± 0.542	3.403	● < 0.01
* moderate	3.638	± 0.734	3.472	● < 0.01
* severe	3.521	± 0.459	4.255	● < 0.001
* control	4.833	± 1.265		
creatinine				
* Mild	0.483	± 0.119	2.396	● < 0.05
* Moderate	0.477	± 0.059	3.357	● < 0.01
* Severe	0.479	± 0.080	3.048	● < 0.01
* control	0.594	± 0.139		
glucose				
* Mild	81.333	± 13.425	2.295	● < 0.05
* Moderate	83.143	± 12.877	2.092	● < 0.05
* Severe	81.500	± 14.769	2.252	● < 0.05
* control	95.689	± 21.952		

Table (8) Mean and standard deviation of weight, height, head circumference, chest circumf., midarm circumf. among the studied groups

Studied groups	$\bar{x}$	± S.D.	Significant ver . control	
			t	P
weight * Mild * Moderate * Severe * control	6.242 6.371 6.386 10.284	± 1.889 ± 1.249 ± 1.331 ± 3.874	4.397 4.717 4.670	• < 0.05 • < 0.05 • < 0.05
height * Mild * moderate * severe * control	65.25 70.214 69.929 78.150	± 7.021 ± 6.117 ± 8.147 ± 12.841	3.079 2.251 2.097	• < 0.001 • < 0.001 • < 0.001
head circumference * Mild * Moderate * Severe * control	41.375 42.786 43.360 45.925	± 3.331 ± 3.179 ± 2.724 ± 3.577	3.036 2.261 2.429	• < 0.001 • < 0.001 • < 0.001
chest circomference * Mild * Moderate * Severe * control	41.125 42.107 41.367 45.025	± 4.558 ± 3.804 ± 2.581 ± 5.886	3.029 2.904 3.407	• < 0.05 • < 0.05 • < 0.05
midarm circumference * Mild * Moderate * Severe * control	11.375 11.214 11.071 13.725	± 1.583 ± 1.051 ± 1.072 ± 1.464	5.738 8.458 9.470	• < 0.05 • < 0.05 • < 0.05

Table (9) Correlation between lipase and other variables among the studied gorups

groups / other variables	mild		moderate		severe	
	r	p	r	p	r	p
* Age	0.162	> 0.05	0.1342	> 0.05	0.2153	> 0.05
* Sex	0.1787	> 0.05	0.2116	> 0.05	0.1334	> 0.05
* duration of disease	0.0159	> 0.05	0.0244	> 0.05	0.1153	> 0.05
* Total protein	0.3338	> 0.05	6.2356	> 0.05	0.3118	> 0.05
* Albumin	0.4169	> 0.05	0.5603	• < 0.05	0.4993	• <0.05
* weight	0.3818	> 0.05	0.4053	> 0.05	0.4113	> 0.05
* height	0.1351	> 0.05	0.2243	> 0.05	0.3166	> 0.05
* head circumference	0.2644	> 0.05	0.2115	> 0.05	0.1397	> 0.05
* chest circumf.	0.1135	> 0.05	0.0493	> 0.05	0.1755	> 0.05
* Midarm circumf	0.2133	> 0.05	0.2047	> 0.05	0.1399	> 0.05

(Significant $\longrightarrow$ P< 0.05)

Table (10) Correlation between amylase and other variables among the studied gorups

other variables \ groups	mild		moderate		severe	
	r	p	r	p	r	p
* Age	0.2145	> 0.05	0.2137	> 0.05	0.2557	> 0.05
* Sex	0.1139	> 0.05	0.1215	> 0.05	0.1336	> 0.05
* duration of disease	0.1044	> 0.05	0.1223	> 0.05	0.1643	> 0.05
* Total protein	0.0160	> 0.05	0.0380	> 0.05	0.1135	> 0.05
* Albumin	0.4169	> 0.05	0.5603	● < 0.05	0.4993	● < 0.05
* weight	0.2133	> 0.05	0.2141	> 0.05	0.3115	> 0.05
* height	0.1388	> 0.05	0.1297	> 0.05	0.1137	> 0.05
* head circumference	0.2441	> 0.05	0.2553	> 0.05	0.2371	> 0.05
* chest circumf.	0.3318	> 0.05	0.2356	> 0.05	0.3192	> 0.05
* Midarm circumf	0.0117	> 0.05	0.1153	> 0.05	0.1224	> 0.05

(Significant $\longrightarrow$ P< 0.05)

Table (12) Correlation between glucagon and other variables

| groups other variables	mild		moderate		severe	
	r	p	r	p	r	p
* Age	0.1132	> 0.05	0.1225	> 0.05	0.2451	> 0.05
* Sex	0.0380	> 0.05	0.1173	> 0.05	0.1568	> 0.05
* duration of disease	0.117	> 0.05	0.018	> 0.05	0.045	> 0.05
* Total protein	0.2366	> 0.05	0.3781	> 0.05	0.3664	> 0.05
* Albumin	0.4668	• < 0.05	0.4737	• < 0.05	0.4996	• < 0.05
* weight	0.4661	• < 0.05	0.5633	• < 0.05	0.5117	• < 0.05
* height	0.1164	> 0.05	0.1073	> 0.05	0.1398	> 0.05
* head circumference	0.2241	> 0.05	0.1688	> 0.05	0.1593	> 0.05
* chest circumf.	0.1177	> 0.05	0.2115	> 0.05	0.2214	> 0.05
* Midarm circumf	0.0163	> 0.05	0.0321	> 0.05	0.1153	> 0.05

(Significant $\longrightarrow$ $P < 0.05$)
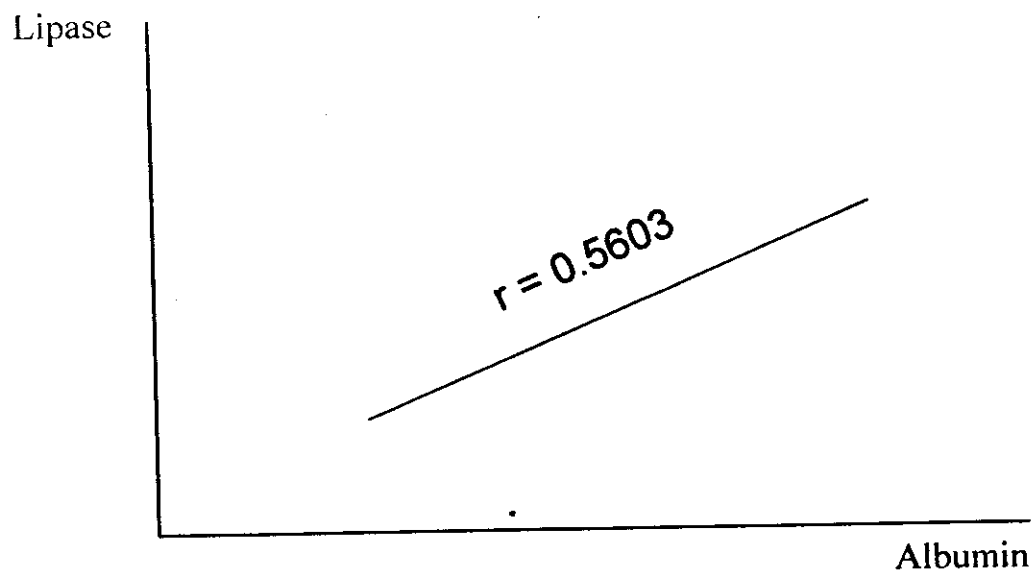
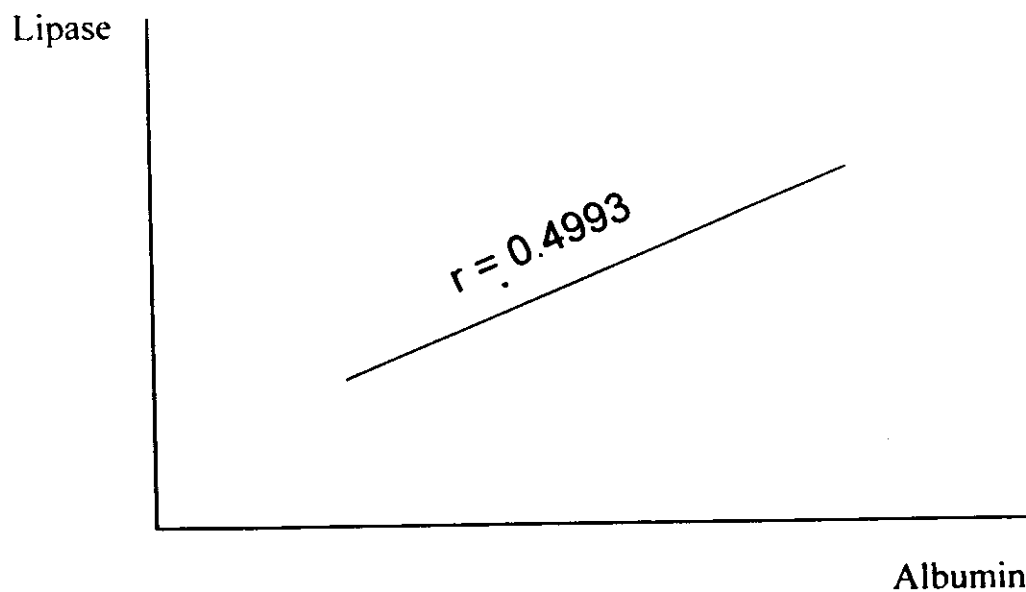Figure (1): correlation between lipase & albumin in moderatly malnourished group.

Figure (2): correlation between lipase & albumin in severely malnourished group.