

# **R E S U L T S**

## RESULTS

This cross sectional study included a total of 50 infants with ages ranging from 2 to 18 months. Of these children, 35 cases were suffering from various types of P.E.M., and the remaining were age-matched healthy controls.

The cases were divided into three groups, according to the classification of Wellcome (1970), and the fourth group was control (Table 3).

The distribution of malnourished children according to the anthropometric measures (age, weight, height, chest circumference, mid-arm circumference, and head circumference) is shown in Tables (4) to (9).

Our results showed that the changes in anthropometric measures were statistically highly significant when compared to the control group ( $P < 0.01$ ).

The mean serum selenium level of the marasmic group was  $14.887 \mu\text{g}/100 \text{ ml}$  (with a range of 6.1-33.2). In the Kwashiorkor group, the mean serum selenium level was  $30.56 \mu\text{g}/100 \text{ ml}$  (with a range of 23.5-36.3). In the marasmus-Kwashiorkor group, the mean serum selenium level was  $23.45 \mu\text{g}/100 \text{ ml}$  (with a range of 16.3-34.3). In the control group, the mean serum selenium level was  $40.133 \mu\text{g}/100 \text{ ml}$  (with a range of 27.8-50.1). These results show that the mean serum selenium level was significantly lower in the different types of malnourished groups, compared to the healthy control group (Table 10; Figure 2).

The correlation between the serum selenium and the different parameters in each malnourished group is shown in Tables (11) to (14).

In Table (11), no significant correlation was found between the parameters of the marasmic group and the selenium concentration in serum, except in the

level of milk selenium where a positive significant correlation (i.e. decreasing level of milk selenium of the mother was accompanied by a decrease in the level of serum selenium of the infant.

In Tables (12) and (14), no significant correlation was found in the parameters of the marasmus-Kwashiorkor and control groups concerning the selenium serum concentration.

In Figures (3) to (8), there was a positive significant correlation between the various parameters and the level of serum selenium concentration in the various studied groups, except concerning age (Figure 3).

A relation was found between the level of selenium in infant serum and the selenium level in mother's milk, where the increase in the level of milk selenium of the mother was accompanied by an increase in the level of selenium in serum of the infants (Figures 9 and 10).

TABLE (3)  
Distribution of malnourished groups according to types and sex

| Group                | Males  |       | Females |       | TOTAL  |        |
|----------------------|--------|-------|---------|-------|--------|--------|
|                      | Number | (%)   | Number  | (%)   | Number | (%)    |
| Marasmus ..          | 10     | 66.67 | 5       | 33.33 | 15     | 100.00 |
| Kwashiorkor ..       | 5      | 50.00 | 5       | 50.00 | 10     | 100.00 |
| Marasmus-Kwashiorkor | 5      | 50.00 | 5       | 50.00 | 10     | 100.00 |
| Control ..           | 7      | 46.67 | 8       | 53.33 | 15     | 100.00 |
| TOTAL ..             | 27     | 54.00 | 23      | 46.00 | 50     | 100.00 |

TABLE (4)  
Analysis of variance of the studied groups in relation to age (months)

| Group                 | Number of cases | Range (months) | Mean   | Standard deviation |
|-----------------------|-----------------|----------------|--------|--------------------|
| Maramus .. ..         | 15              | 2-8            | 8.400  | 4.501              |
| Kwashiorkor .. ..     | 10              | 11-18          | 14.600 | 2.221              |
| Marassmus-Kwarhioskor | 10              | 12-18          | 15.300 | 2.406              |
| Control .. ..         | 15              | 12-18          | 9.667  | 4.082              |

P = 10.862                      P < 0.01 \*                      (\* = significant)

TABLE (5)  
Analysis of variance of the studied groups in relation to weight (kg)

| Group                |    | Number of cases | Range    | Mean  | Standard deviation |
|----------------------|----|-----------------|----------|-------|--------------------|
| Maramus ..           | .. | 15              | 3.0-8.5  | 5.213 | 1.508              |
| Kwashiorkor ..       | .. | 10              | 7.2-9.4  | 8.620 | 0.637              |
| Marasmus-Kwashiorkor |    | 10              | 7.7-9.7  | 8.140 | 0.709              |
| Control              |    | 15              | 4.5-10.9 | 9.020 | 1.856              |

P = 22.418      P < 0.01 \*      (\* = significant)

TABLE ( 6 )  
Analysis of variance of the studied groups in relation to height (cm)

| Group                | Number of cases | Range (cm) | Mean | Standard deviation |
|----------------------|-----------------|------------|------|--------------------|
| Marasmus .. ..       | 15              | 50-75      | 63.0 | 8.742              |
| Kwashiorkor .. ..    | 10              | 70-80      | 72.7 | 3.683              |
| Marasmus-Kwashiorkor | 10              | 68-80      | 76.4 | 3.406              |
| Control .. ..        | 15              | 56-81      | 70.0 | 6.336              |

P = 10.012      P < 0.01 \*      (\* = Significant)

TABLE (7)  
Analysis of variance of the studied groups in relation to the mid-arm circumference (cm)

| Group                | Number of cases | Range (cm) | Mean | Standard deviation |
|----------------------|-----------------|------------|------|--------------------|
| Marasmus ..          | 15              | 8-12       | 41.2 | 2.833              |
| Kwashiorkor ..       | 10              | 9-13       | 45.1 | 1.287              |
| Marasmus-Kwashiorkor | 10              | 12-14      | 46.0 | 2.357              |
| Control ..           | 15              | 9-14       | 43.8 | 2.513              |

P = 9.03                      P < 0.01 \*                      (\* = Significant)

T A B L E ( 8 )

Analysis of variance of the studied groups in relation to the chest circumference (cm)

| Group                | Number of cases | Range (cm) | Mean | Standard deviation |
|----------------------|-----------------|------------|------|--------------------|
| Marasmus ..          | 15              | 36-47      | 41.2 | 2.833              |
| Kwashiorkor ..       | 10              | 43-51      | 45.1 | 1.287              |
| Marasmus-Kwashiorkor | 10              | 43-47      | 46.0 | 2.357              |
| Control ..           | 15              | 38-47      | 43.8 | 2.513              |

P = 9.602      P < 0.01 \*      (\* = Significant)

TABLE (9)  
Analysis of variance of the studied groups in relation to head circumference (cm)

| Group                | Number of cases | Range (cm) | Mean   | Standard deviation |
|----------------------|-----------------|------------|--------|--------------------|
| Marasmus ..          | 15              | 38-47      | 42.333 | 3.155              |
| Kwashiorkor ..       | 10              | 44-47      | 45.100 | 1.101              |
| Marasmus-Kwashiorkor | 10              | 44-47      | 45.200 | 1.229              |
| Control ..           | 15              | 38-47      | 44.467 | 2.669              |

P = 4.127      P < 0.05 \*      (\* = Significant)

TABLE ( 10 )  
Analysis of variance of the studied groups in relation to serum selenium (ug/100 ml)

| Group                | Number of cases | Range (ug/100 ml) | Mean   | Standard deviation |
|----------------------|-----------------|-------------------|--------|--------------------|
| Marasmus .. ..       | 15              | 6.1-33.2          | 14.887 | 9.497              |
| Kwashiorkor .. ..    | 10              | 23.5-36.3         | 30.560 | 5.458              |
| Marasmus-Kwashiorkor | 10              | 16.3-34.3         | 23.450 | 6.216              |
| Control .. ..        | 15              | 27.8-50.1         | 40.133 | 6.411              |

P = 31.469      P < 0.01 \*      (\* = Significant)

TABLE ( 11 )  
Correlation between serum selenium and the different studied parameters  
in the marasmus group (n = 15)

| P a r a m e t e r       | Covariance | Correlation<br>coefficient | P<br>value |
|-------------------------|------------|----------------------------|------------|
| - Age .. ..             | 11.270     | 0.264                      | >0.05      |
| - Weight .. ..          | 3.960      | 0.277                      | >0.05      |
| - Height .. ..          | 34.460     | 0.415                      | >0.05      |
| - Head circumference    | 4.630      | 0.154                      | >0.05      |
| - Chest circumference   | 10.150     | 0.377                      | >0.05      |
| - Mid-arm circumference | 0.629      | 0.049                      | >0.05      |
| - Selenium in milk ..   | 65.020     | 0.071                      | <0.05*     |

P <0.05 \* (\* = Significant)

TABLE (12)  
Correlation between serum selenium and the different studied parameters  
in the marasmus-Kwashiorkor Group (n = 10)

| Parameter               | Covariance | Correlation coefficient | P value |
|-------------------------|------------|-------------------------|---------|
| - Age ..                | 7.05       | 0.471                   | >0.05   |
| - Weight ..             | - 0.08     | 0.017                   | >0.05   |
| - Height ..             | 11.51      | 0.544                   | >0.05   |
| - Head circumference    | 2.80       | 0.366                   | >0.05   |
| - Chest circumference   | 4.98       | 0.340                   | >0.05   |
| - Mid-arm circumference | 2.02       | 0.243                   | >0.05   |

TABLE (13)  
Correlation between serum selenium and the different studied parameters  
in the Kwashiorkor group (n = 10)

| Parameter               | Covariance | Correlation coefficient | P value |
|-------------------------|------------|-------------------------|---------|
| - Age .. ..             | -5.24      | -0.432                  | >0.05   |
| - Weight .. ..          | -2.56      | -0.735                  | <0.05*  |
| - Height .. ..          | -13.89     | -0.690                  | <0.05*  |
| - Head circumference    | -2.17      | -0.360                  | >0.05   |
| - Chest circumference.. | 1.25       | 0.178                   | >0.05   |
| - Mid-arm circumference | 2.33       | 0.641                   | >0.05   |

(\*) = Significant (positive correlation)

TABLE (14)  
Correlation between serum selenium and the different studied parameters  
in the control group (n = 15)

| P a r a m e t e r       | Covariance | Correlation<br>coefficient | P<br>value |
|-------------------------|------------|----------------------------|------------|
| - Age ..                | 2.330      | 0.890                      | >0.05      |
| - Weight ..             | 1.110      | 0.093                      | >0.05      |
| - Height ..             | 3.740      | 0.092                      | >0.05      |
| - Head circumference    | 0.426      | 0.025                      | >0.05      |
| - Chest circumference   | -1.690     | -0.105                     | >0.05      |
| - Mid-arm circumference | -0.686     | 0.085                      | >0.05      |
| - Selenium in milk ..   | -12.010    | 0.220                      | >0.05      |

Selenium in serum  
( $\mu\text{g}/100\text{ml}$ )

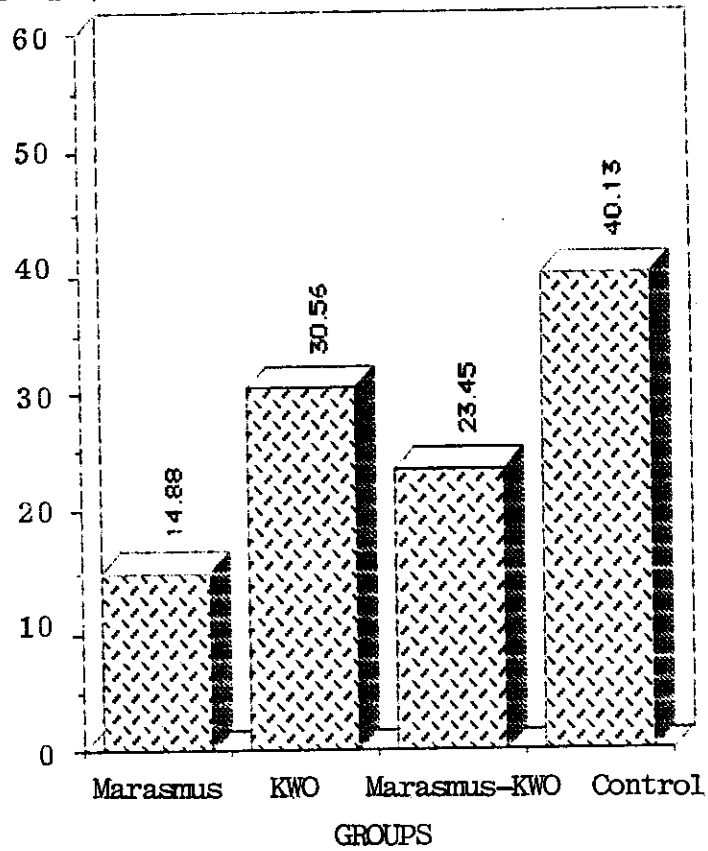


FIGURE ( 2 )

SERUM CONCENTRATIONS OF SELENIUM IN THE  
DIFFERENT GROUPS STUDIED

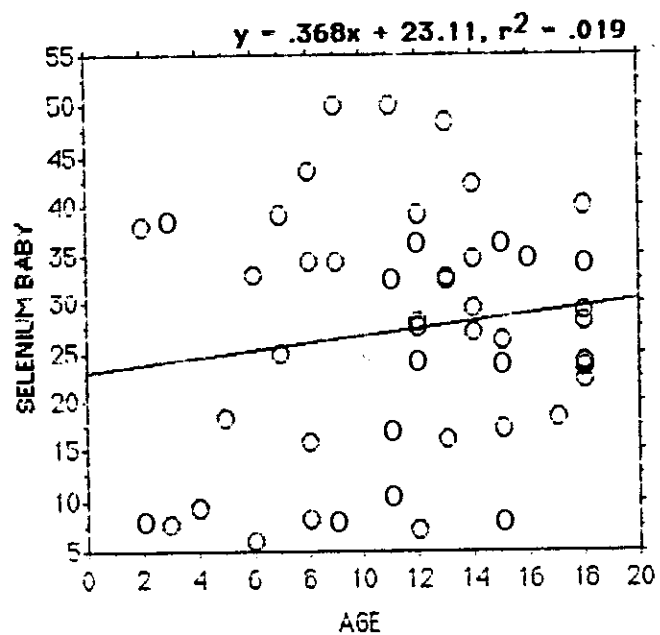


FIGURE ( 3 )

DISTRIBUTION OF THE SERUM SELENIUM CONCENTRATION  
IN THE VARIOUS STUDIED CHILDREN  
ACCORDING TO AGE

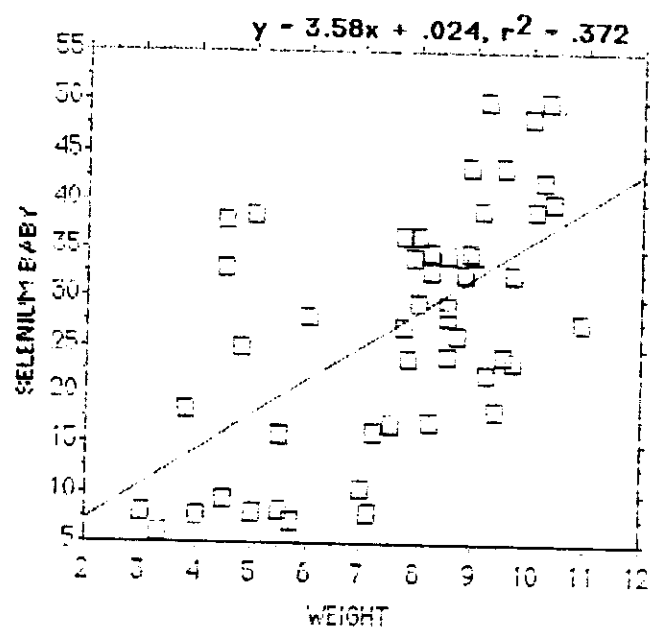


FIGURE ( 4 )  
 DISTRIBUTION OF THE SERUM SELENIUM  
 CONCENTRATION IN THE VARIOUS STUDIED CHILDREN  
 ACCORDING TO WEIGHT

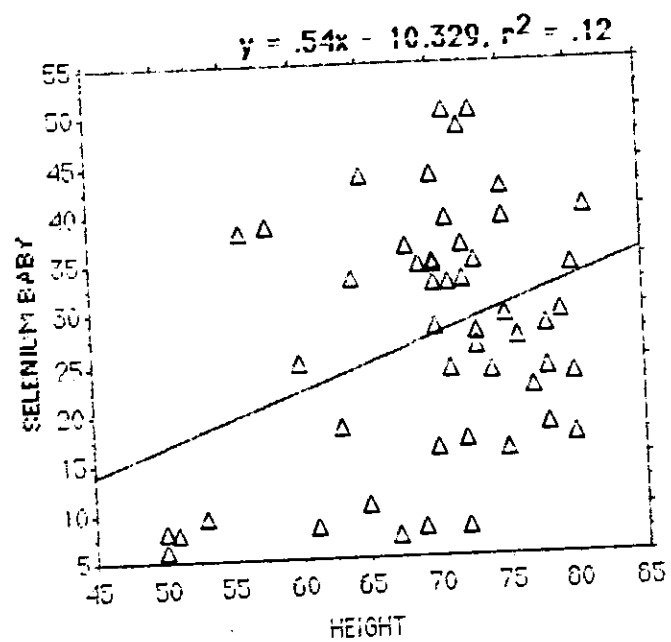


FIGURE ( 5 )

DISTRIBUTION OF THE SERUM SELENIUM CONCENTRATION  
IN THE VARIOUS STUDIED CHILDREN ACCORDING  
TO HEIGHT

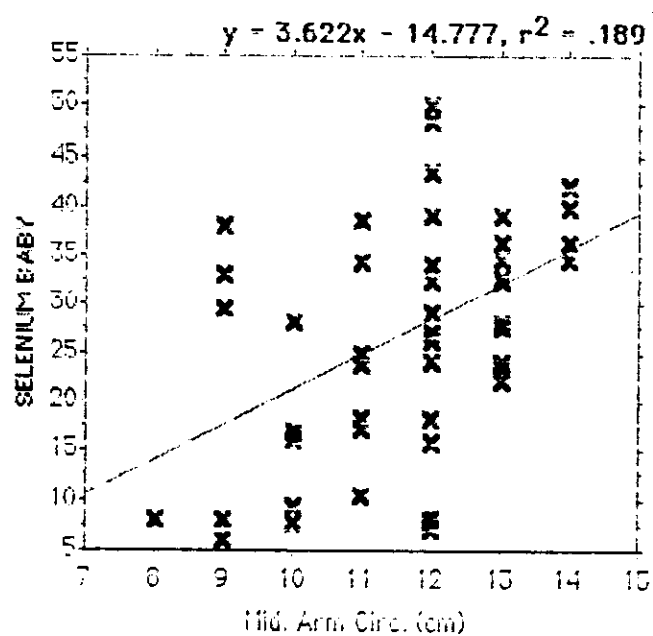


FIGURE ( 6 )

DISTRIBUTION OF THE SERUM SELENIUM CONCENTRATION  
IN THE VARIOUS STUDIED CHILDREN ACCORDING  
TO THE MID-ARM CIRCUMFERENCE

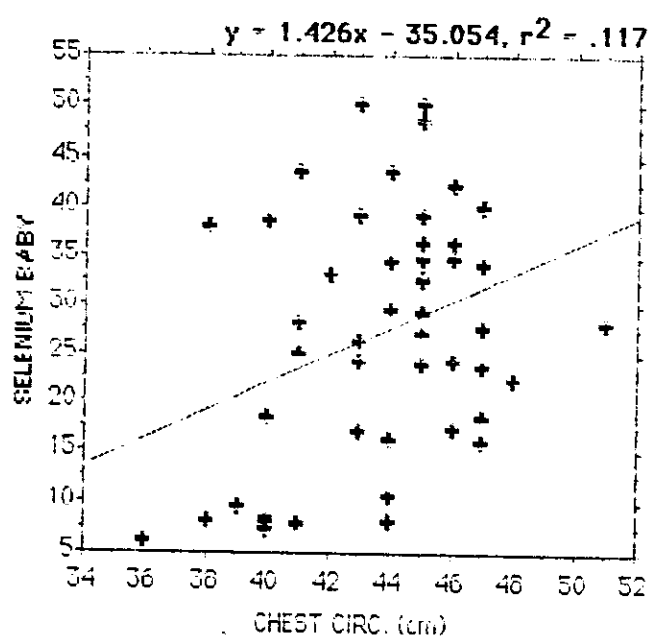


FIGURE ( 7 )

DISTRIBUTION OF THE SERUM SELENIUM CONCENTRATION  
 IN THE VARIOUS STUDIED CHILDREN ACCORDING  
 TO THE CHEST CIRCUMFERENCE

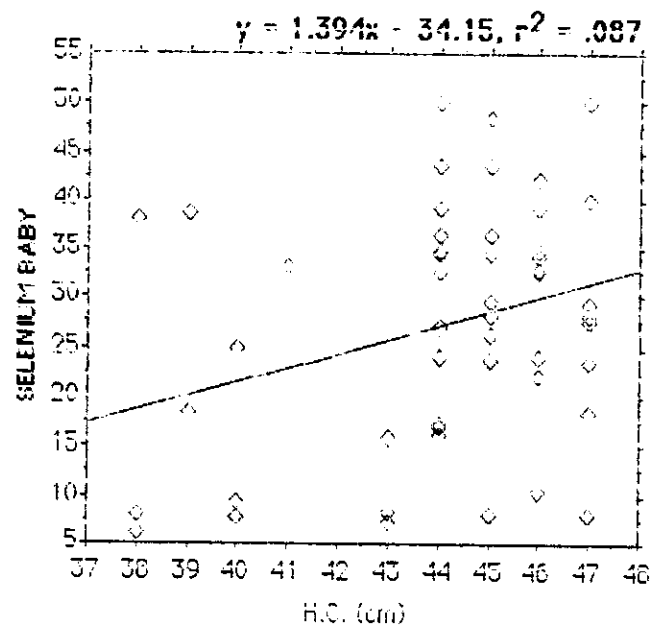


FIGURE (18)

DISTRIBUTION OF THE SERUM SELENIUM CONCENTRATION  
IN THE VARIOUS STUDIED CHILDREN ACCORDING  
TO THE HEAD CIRCUMFERENCE

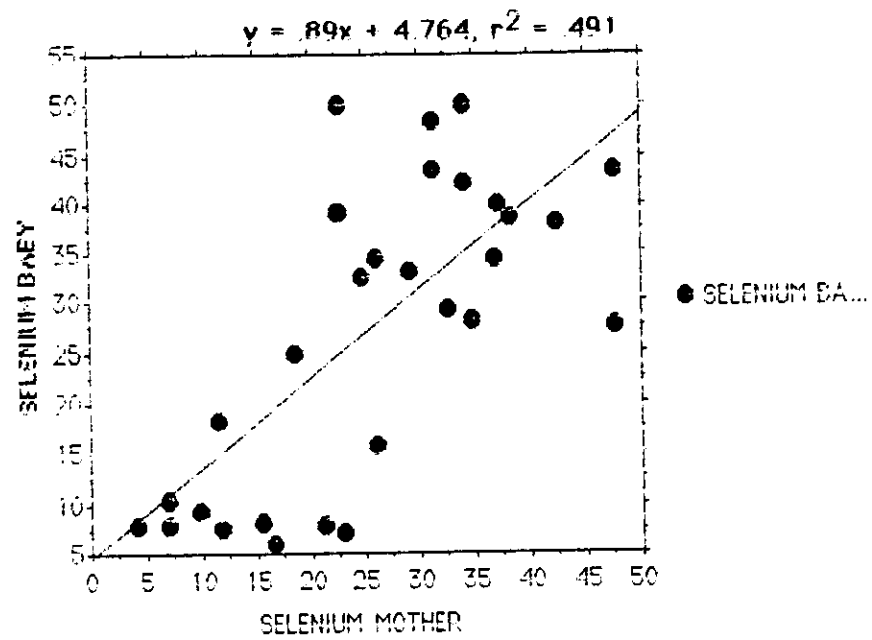


FIGURE ( 9 )

RELATION BETWEEN SELENIUM CONCENTRATION IN SERUM AND MILK IN THE MARASMIC AND CONTROL GROUPS OF STUDIED INFANTS

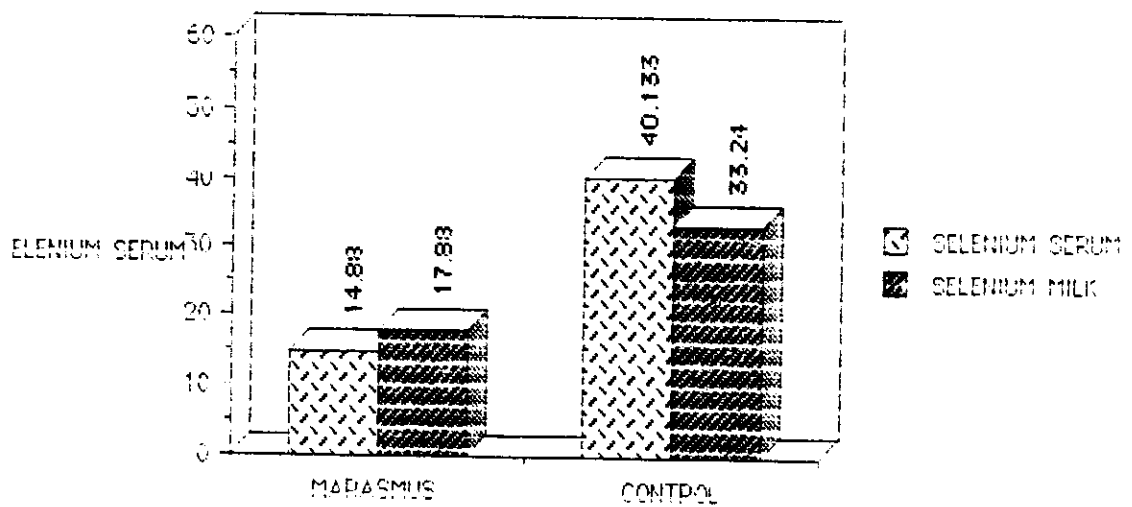


FIGURE ( 10 )

SELENIUM CONCENTRATION IN SERUM AND MILK IN THE MARASMIC AND CONTROL GROUPS OF STUDIED INFANTS