SERUM AMYLASE AND PROTEIN VALUES IN HEALTHY MEDICAL STUDENTS

By

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The determination of serum amylase is of importance in the diagnosis of acute pancreatitis, gastritis, high intestinal obstruction, peptic ulcers, pneumonia and nephritis wherein high values may be obtained in the course of the disease. Low values of serum amylase are also reported in liver diseases and in pancreatic insufficiency. In order to assess the elevated or low values of amylase it is essential that normal values should be available to compare the results.

Attempts have been made by several investigators to establish the normal range of serum amylase in various age and sex groups and also in different races. A number of workers like Somogyi (1938), Kibrick *et al.*, (1951), Malinowski (1952) and Andersch (1946) abroad and Sachdev *et al.*, (1959) in India have determined the serum amylase values in normal healthy human beings but they show a wide range of variation. The present investigation was, therefore, under taken with a view to find out the normal range of serum amylase in normal healthy medical students between the age of 18 to 21 years belonging to this part of the country and consuming Gujarati type of diet. Total serum protein values have also simultaneously been determined on the sera of the same subjects, to determine the normal values for the same age group of subjects.

MATERIAL AND METHODS

One hundred normal healthy medical students, 65 males and 35 females, ranging between the age of 17 to 21 years formed the subjects for this study. Complete records regarding their age, sex, height, weight and dietetic habits were made. Most of the students were from Gujarat and Saurashtra and they were all accustomed to take Gujarati type of diet. They were all in normal health.

The blood samples were collected in morning between 10 and 11 A. M. in plain test tubes. The students did take their normal breakfast early morning. The serum amylase values were determined by Somogyi's method and the total proteins were estimated by biuret method as cited by King and Woolten (1956).

RESULTS

The results obtained for serum amylase and total protein determinations in 100 cases of normal healthy medical students are recorded together with the mathematical variations in Table 1. On further study it was observed that in 83 per cent of the males the serum amylase values ranged from 100-170 units while in case of 80 per cent of females the values fell within the range of 60 to 120 units. The total protein values of 6.8 to 7.7 gms. per 100 ml. of serum were observed in 86 per cent of males and 83 per cent of females.

TABLE 1.

Serum amylase and serum total protein values of 100 healthy medical students.

Subjects and Numbers.	.....65 Males.....		.....35 Females.....	
	Serum Amylase. Values in Somogyi Units.	Total proteins in Gms. per 100 ml.	Serum Amylase Values in Somogyi Units.	Total proteins in Gms. per 100 ml.
Maximum	220	8.0	126	7.7
Minimum	85	6.5	56	6.5
Mean	138	7.2	109	7.18
Standard deviation	28.5	0.35	14.75	0.375
Co-efficient of variation	20.5	4.86	13.53	5.2

In Table 2 the results of serum amylase calculated on the basis of their calculated blood volume from height and weight of the subjects according to Allen and associates (1956) and as given by Campbell *et al.* (1958) are recorded.

TABLE 2.

Serum amylase values of 65 male medical students and 36 female students according to their blood volume.

Blood Volume in ml.	No. of subjects	Serum Amylase values in Somogyi Units. Maximum.	Minimum.	Mean.
		.....65 Males.....		
3700-3900	9	155	100	130
4000-4200	13	170	85	132
4300-4500	18	200	120	138.5
4600-4800	18	220	85	145
4900-5100	6	170	110	140
5200-5400	1	125	—	125
		.....35 Females.....		
2600-2800	10	125	85	105
2900-3100	17	126	95	108
3200-3400	8	105	97	124

In Table 3 the serum amylase values have been compared with those of other workers in India and abroad. It was observed that the average serum amylase values of 138.0 units for males and 109 units for females are higher than those of all the workers cited.

TABLE 3.

Comparision of serum amylase values with those of other workers

Name of the workers.	Serum Amylase Values. Maximum.	Minimum.	Mean.
Somogyi (1938)	150	80	—
Kibrick *et al* (1951)	102	34	58
Malinowski (1952)	240	70	100
Andersch (1946)	135	30	58
Sachdev *et al* (1959)			
Males	177	69.5	112
Females	145	69.5	97.7
Cantarow and Trumper (1955)	180	60.0	—
Kolmar (1952)	110	40.0	60.0
Present Author			
Males :	220	85.0	138.0
Females :	126	56	109.0

DISCUSSION

The present series of investigations indicate that the values of serum amylase as obtained by me are higher than those of the other workers cited. Undoubtedly the range of normals in my series falls very near to the upper limit of Malinowski (1952), Somogyi (1938), Andersch (1946)and Sachdev *et al.* (1958). The results reported by Kolmar (1952) and Cantarow and Trumper (1955) are different from my normal figures. The reason for higher concentration of amylase being my subjects consumed purely Gujarati type of vegetarian diet and hence consumed large quantity of carbohydrates. Therefore the starch splitting enzyme, amylase, is in higher concentration in their blood. This is in confirmation with the view put forward by Grossman *et al.*, (1944 a and b), that the preponderance of carbohydrates in the diet elevates the concentration of serum amylase.

The plasma protein levels for both sexes are the normal values obtained on Gujarati type of diet containing more of carbohydrates. These values are in confirmation with those cited by Lloyed and Paul (1928), Josaph *et al.*, (1956), Satoskar and Lewis (1954), Mudaliyar *et al.*, (1955) and Best and Vaidya (1959). It can, therefore, be seen that the Gujarati type of diet as consumed by the students was sufficiently nutritive as far as total protein consumption was concerned.

From Table 2 it can be seen that in both males and females there is no correlationship between calculated blood volume and serum anylase values. Sachdev *et al.*, (1958) also did not find any relationship between the surface area of the subjects calculated from their height and weight and serum amylase values.

The chief clinical importance of serum amylase determination lies in the diagnosis of acute pancreatitis and other diseases connected with the pancreas. For elucidating the variations from normal such determinations of normal values for the same group of individuals consuming a particular type diet are bound to be of importance. The normal protein values as determined by me on the same group of subjects, are also conclusive of the normal functioning of pancreas and liver in the normal subjects examined.

SUMMARY

Estimation of serum amylase and total protein values in 100 normal healthy medical students, consuming Gujarati type of diet containing a large quantity of carbohydrates, was undertaken. The values ranged from 85 to 220 Units with an average of 138 Units in 65 males and from 56 to 126 units with an average of 109 units in case of 35 females. The average total protein values for males was 7.2 gms. per 100 ml. and for females 7.18 gms. per 100 ml. of serum.

Serum amylase values did not show any correlation with the calculated blood volume. However, amylase values found out by me are higher than the normal values cited. The preponderance of carbohydrates in Gujarati diet may be the cause of these elevated values.

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