

SERUM ASPARTATE AMINO TRANSFERASE AND ALANINE AMINO TRANSFERASE LEVELS IN APPARENTLY HEALTHY POPULATION IN KARACHI

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Abstract

The reference values for AST and ALT were determined at 37°C in 0.2 ml serum from 339 apparently healthy individuals (188 males and 151 females). The normal ranges for AST and ALT varied from 1-50 units in both groups irrespective of age. Males had significantly higher levels of enzymes than females.

Age had no effect on enzyme levels in males but levels were significantly higher in females above 15 years. Using the formula (mean \pm 2SD) most of the confidence intervals (JPMA 38: 325 1988).

INTRODUCTION

Enzyme activity is striking by constant in healthy subjects, varying only \pm 10 units, irrespective of diet, exercise and other physiological variations¹⁻², This study reports AST and ALT levels in apparently healthy individuals residing in Karachi.

SUBJECTS AND METHODS

Levels of AST and ALT were determined in 137 (74 males, 63 females) subjects under 15 and 202 (114 males and 88 females) over 15 years of age. They were selected from hospital personnel, MCH centres, primary and secondary schools, colleges and other organisations.

General information regarding health, anthropometric measurements, diet and socioeconomic groups were recorded on a precoded proforma.

Enzyme activity in the serum stored at 0-5°C was measured spectrophotometrically at 37°C on the second day of collection using commercially prepared Hyland Kit.³ The standard curve was prepared for AST and ALT and control was monitored with each batch.

Data was scrutinized before analysis. Subjects with abnormal lipids and enzymes were excluded from the study. Mean, standard deviation, standard error of the mean and coefficient variation were calculated. The significance of the difference between mean was determined using 't' test. The values of AST and ALT were also converted by logarithm in normal frequency distribution. The reference range (2.5th and 97.5th) percentiles were calculated by using parametric method mean \pm 2 standard deviations.

RESULTS

Three hundred and thirty-nine subjects (188 males, 151 females) included in this study were divided according to age into under 15 years (Group I) and over 15 years (Group II). The mean and observed ranges for ALT and AST in males and females are shown in Table I and II. There was no difference in enzyme levels in males in the two age groups but levels were significantly higher in older females. Males had significantly higher levels of AST and ALT as compared to females of the two groups.

Similar results were observed when AST and ALT values were converted into logarithm (Tables III and IV).

The upper and lower limits of normal, defined as the mean ± 2 SD, show that most of the values of two enzymes in both groups were in 95% confidence interval (Table I-IV).

TABLE – I. Normal ranges of Serum AST, Mean and Coefficient variation (%) in apparently Healthy Males and Females.

Parameters	<15 years		≥15 years	
	Males	Females	Males	Females
Nos	74	63	114	88
Mean \pm SD (1.U / lit)	22 \pm 13.44	8.5 \pm 8.3	23.4 \pm 12.07	18.2 \pm 1.35
Mean \pm SE (1.U / lit)	22 \pm 1.56	8.5 \pm 1.05	23.4 \pm 1.14	18.2 \pm 1.22
Range observed (1.U/lit)	(1–45)	(0.5 – 40)	(1–47)	(1–50)
95% confidence (± 2 S) interval	22.0 (18.9–25.1)	8.6 (6.4–10.6)	23.4 (21.1–25.7)	18.2(15.8–20.6)
CV%	61.1	97.6	51.6	62.4

P < 0.001 when the comparison was made between male and female <15 years.

P < 0.01 when the comparison was made between male and female ≥15 years.

Difference between female age group <15 years and ≥15 years significant

(P < 0.001).

N.S. P value insignificant between two groups of males.

TABLE –II. Normal Ranges of S. ALT, Mean and Coefficient variation (%) in apparently Healthy Males and Females.

Parameters	<15 years		>15 years	
	M	F	M	F
Nos.	74	57	112	85
Mean \pm SD (I.U./lit)	16.2 \pm 9.8	8.5 \pm 10.11	17.4 \pm 11.12	13.7 \pm 9.99
Mean \pm SE (I.U.)	16.2 \pm 1.34	8.5 \pm 1.34	17.4 \pm 1.05	13.7 \pm 1.08
Range observed	(0.5–41)	(0.5–44)	(1–48)	(1–50)
95% confidence Interval (± 2 S)	16.2 (13.9-18.5)	8.5 (5.8-11.2)	17.4 (15.3-19.5)	13.7(11.5-15.9)
CV%	60	119	64	77

*** P value < 0.001 when comparison was made between M & F ≤15 years.

* P value < 0.05 " " " >15 years.

P value insignificant between to Gp , 1&2.

Difference between female age group 1 & 2 is signified (P < 0.01).

TABLE – III. Normal Ranges of Serum AST Mean and Coefficient variation in apparently Healthy Males and Females (LOG Transmission).

Parameters	≤15 years		≥15 years	
	M	F	M	F
NOS	74	63	114	88
Mean ± SD	1.21 ± 0.41	0.72 ± 0.46**	1.27 ± 0.36	1.15 ± 0.34*
Mean ± SE	1.21 ± 0.05	0.72 ± 0.06	1.27 ± 0.03	1.15 ± 0.04
95 % confidence Interval ± 2S	1.21 (1.11-1.31)	0.72 (0.60-0.84)	1.27 (1.21-1.33)	1.15 (1.07-1.23)
Log AST				
CV%	34	64	28	30

* <0.05 between males and females over 15 years.

** <0.001 between males and females ≤ yrs of age.

P < ** 0.001 between 2 groups of females.

N.S. = P value insignificant between 2 groups of males.

TABLE – IV. Normal Ranges of Serum ALT Mean and Coefficient variation in apparently Healthy Males and Females (Log Transmission).

Parameters	≤15 yrs		≥15 years	
	M	F	M	F
NO	74	57	112	85
Mean ± S.D.	1.06 ± 0.47**	0.63 ± 0.53	1.13 ± 0.35*	0.99 ± 0.41
Mean ± S.E.	1.06 ± 0.05	0.63 ± 0.07	1.13 ± 0.33	0.99 ± 0.04
95% confidence inte(± 2S)	1.06 (0.96-1.16)	0.63(0.49-0.74)	1.13(1.07-1.19)	0.99 (0.91-1.07)
log ALT				
CV%	44	84	31	41

* P < 0.05 between males and females > 15 years.

** P < 0.001 between M & F ≤ 15 years.

* † P ≤ 0.001 between females ≤ years & > 15 years.

N.S. P value insignificant between M ≤ years > 15 years.

DISCUSSION

The values for AST and ALT in this study fall within the range observed in other studies¹⁻⁴⁻⁷. Some investigators stressed the clinical importance of a border line range of activity of AST and ALT.¹⁻⁸⁻¹² In this study, 2 SD deviation above the mean are considered to the upper limit of normal; therefore 2½ % of the apparently healthy subjects will appear above normal limits. Using this formula maximum mean activity of AST were 25.1 in males (range 18.9-25.1) and 10.6 (6.4—10.6) in females in Group I and in Group II, 25.7 in males (range 21.1-25.7) and 20.6 in females (range 15.8-20.6).

Significant difference in the enzyme levels reported earlier in males and females have also been observed in this study⁴⁻⁶ 'k Age had no effect on enzyme values in males⁴⁻⁶ but levels were significantly higher in older females.

The actual observed ranges in both groups were upto 50 units for AST and ALT. This may be either due

to excess intake of carbohydrates¹³⁻¹⁴ or due to subclinical liver disorders.
It is concluded that these values for AST and ALT may be used as reference values for our population.

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