A QUANTITATIVE ASSAY OF FAECAL PROTOPORPHYRIN
(A spectrophotometric study)

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Summary

A quantitative assay of faecal protoporphyrin was done in 100 normal Punjabis by Spectrophotometric method of Rimington. Faecal protoporphyrin ranged from 1.05 to 14.91 ug/G dry weight and the mean was 4.77 ug/G dry weight.

A quantitative estimation of faecal protoporphyrin was done in 100 normal Punjabis of varying ages and of both sexes. The aim of the present study was to find out any correlation between age, sex, body weight, diet and the excretion of protoporphyrins.

Material and Methods

A quantitative assay of faecal protoporphyrins was undertaken in 100 normal persons. Rimington's method had been used. Protoporphyrins was extracted in 5% HCl using different solvents and determined spectrophotometrically.

Observations

A : Effect of Age :

Observations are tabulated in Table I.

The mean protoporphyrins excretion for the age groups 0-14 ; 15-40 and 41-60 years were 1.40, 2.50 and 3.20 ug/G dry weight, respectively. The mean protoporphyrins excretion in ug/G dry weight was highest in the age grup (41-60) and least in the age group (0-14).

The difference of mean between the age group (0-14) and the age group (15-40) was statistically significant. (Table value of t for 65 D.F. at P = .01 is 2.65. Since the calculated value, 3.47 is more than 2.65, the difference is statistically significant).

Similarly the difference of mean between the age groups (15-40) and (41-60) is highly significant. (Table value of t for 64 D.F. at P = .01 is 2.65. Since the calculated value 10.23 is more than 2.65, the difference is highly significant).

From the above, it is concluded that faecal protoporphyrin excretion increases with age. The correlation is positive and is statistically significant.

B : Effect of Sex :

The effect of sex on excretion of faecal protoporphyrin observed in the study is shown in Tabe 2.

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TABLE 1

Showing the effect of age on faecal protoporphyrin excretion in ug/G dry weight.

S. No.	Age group in years.	No. of cases.	Mean	Range	S.D.±	S.E.±
1.	0–14	33	2.58	1.05–8.16	1.40	0.25
2.	15–40	34	4.30	1.15–13.68	2.50	0.43
3.	41–60	33	6.55	2.43–14.91	3.20	0.55

TBALE 2

Showing the effect of sex on faecal protoporphyrin excretion in ug/G dry weight.

S. No.	Sex	No. of cases.	Mean	Range	S.D.±	S.E.±
1.	Male	50	4.88	1.15–14.91	3.30	0.5
2.	Female	50	4.07	1.05–13.68	2.53	0.36

Table 2 shows that the mean protoporphyrin excretion for male was 4.88 ug/G dry weight and for female was 4.07 ug/G dry weight. The range of values were, for male, 1.15–14.91 and for female, 1.05–13.68 ug/G dry weight.

The mean protoporphyrin excretion per G dry weight of faeces was more in male than in female. This difference of mean was statistically insignificant. (Table value of t for 98 D.F. at P=.05 is 1.98. Since .03 is less than 1.98, the difference is insignificant).

C: Effect of Body Weight

The effect of body weight on faecal protoporphyrin excretion was also analysed and the results are given in Table 3.

Evaluation of Table 3 shows that the mean faecal protoporphyrin excretion in ug/G dry weight of faeces was lowest (2.21) in the weight group 21-30 and was highest (7.16) in the weight group above 70 with a fairly gradual increase from lowest to highest values, except that in the weight groups 11-20 and 41-50, the mean values were higher than the next group.

The correlation between the body weight and protoporphyrin excretion was positive and was also found to be statistically significant.

D: Effect of Diet

The effect of diet on excretion of faecal protoporphyrin was studied and the results are shown in Table 4.

TABLE 3

Showing effects of body weight on faecal protoporphyrin excretion.

S. No.	Weight in Kg.	No. of cases.	Mean	Range	S.D.±	S.E.±
1.	1–10	5	2.66	1.33–5.79	2.71	1.23
2.	11–20	18	2.85	1.33–4.27	2.33	0.55
3.	21–30	7	2.21	1.05–3.21	0.65	0.25
4.	31–40	3	4.29	2.18–8.16	2.73	1.58
5.	41–50	10	4.93	2.12–13.68	3.19	1.04
6.	51–60	23	4.26	1.15–10.89	2.20	0.46
7.	61–70	19	5.65	2.29–12.86	8.70	0.67
8.	Above 70	15	7.16	3.13–14.91	3.44	0.88

TABLE 4

Showing the effect of diet on faecal protoporphyrin excretion in ug/G dry weight.

S. No.	Vegetarian/ Non-vegetarian.	No. of cases.	Mean	Range	S.D.±	S.E.±
1.	Non-vegetarian	50	5.64	1.05–14.91	3.57	0.57
2.	Vegetarian	50	3.31	1.15–7.47	1.56	0.22

TABLE 5

Showing the levels of faecal protoporphyrin by various authors in ug/G dry weight of faeces.

S. No.	Author		No. of cases.	Details of the case.	Range	Mean	S.D.±
1.	Barnes, H.D.	(1956)[2]	18	Bantu	0.11	7	—
2.	Holti et al	(1958)[3]	—	—	30 (upper limit)	—	—
3.	Watson	(1959)[4]	—	—	Traces	—	—
4.	Eales	(1960)[5]	—	S. African white	2–99	29.4	—
5.	Rimington	(1961)[1]	—	White English	0–30	—	—
6.	Aronson, B.	(1962)[6]	50	Presumably white.	—	15	—
7.	Gantarow	(1962)[7]	—	—	Traces	—	—
8.	Eales	(1962)[8]	36	Bantu	1–105	22	—
9.	Eales	(1961)[9]	44	Coloured	1–113	21	—
10.	Eales	(1963)[10]	44	White	0–99	28	—
11.	Haeger-Aronson	(1962)[11]	50	—	—	15	12
12.	Sweeney & Eales	(1962)[12]	—	—	—	70	—
13.	Gazdos	(1963)[13]	10	Presumably white.	6–41	17	—
14.	Goldberg	(1963)[14]	10	Presumably white.	2–47	23	—
15.	Rimington et al	(1963)[15]	21	Presumably white 9 male, 12 female. Age 4-45 Yrs.	1.4–67.7	23.5	15.3
16.	Barnes et al	(1965)[16]	—	—	—	50	—
17.	Lynch & Meidler	(1965)[17]	—	—	—	300	—
18.	El-Mofty et al	(1967)[18]	30	Egyptian 21 Male, 9 Female. Age 15–50 Yrs.	0–13	4.7	3.606
19.	Present study		100	Indian (Punjabi) Male 50, Female 50. Age 2–60.	1.05–14.91	4.47	2.99

The mean protoporphyrin excretion for non-vegetarian group was 5.64 ug/G dry weight and for vegetarian group was 3.31 ug/G dry weight. The range of its value for non-vegetarian group was 1.05 to 14.91 and for vegetarian group was 1.15 to 4.47 ug/G dry weight.

The mean protoporphyrin excretion in ug/G dry weight was higher in non-vegetarian group than in vegetarian group and is statistically significant. (Table value of t for 98 D. F. at P = .05 is 1.98. The calculated value 4.31 is more than 1.98 and so the difference of mean is significant).

Comments

There is wide range of individual variation in the level of faecal protoporphyrin. The results of the present study are compared with those of other workers. The mean protoporphyrin excretion was 4.47 ug/G dry weight and

the levels varied from 1.05 to 14.91 ug/G dry weight (Table 5).

The following conclusions were drawn from the present study :-

(i) The amount of protoporphyrin excretion in 100 normal and healthy subjects ranged from 1.05 to 14.91 ug/G dry weight of faeces, the mean being 4.47 ug/G dry weight.

(ii) The amount of faecal protoporphyrin in 50 male subjects varied from 1.15 to 14.91 and in 50 females the range was 1.05 to 13.68, their mean values being 4.88 and 4.07 respectively. Thus the value was more in male than in female but was statistically insignificant.

(iii) The faecal protoporphyrin level in 50 subjects in non-vegetarian group varied from 1.05 to 14.91 ug/G dry weight, whereas the same in 50 subjects of vegetarian group was 1.15 to 4.47 ug/G dry weight, their mean values being 5.64 and 3.31 respectively. Thus the protoporphyrin excretion was more in non-vegetarian group and the difference was statistically significant.

(iv) The mean faecal protoporphyrin levels in age group 0-14, 15-40 and 41-60 were 2.58, 4.30 and 6.55 respectively. Thus, the faecal protoporphyrin excretion increased with age and the difference between any two groups was statistically significant.

(v) The correlation between the age and excretion of faecal protoporphyrin was positive, and statistically significant.

(vi) The correlation between the weight and excretion of faecal protoporphyrin was found to be positive and also statistically significant.

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