

A STUDY OF LIQUOR UREA IN RELATION TO FOETAL AND PLACENTAL WEIGHT IN TOXAEMIA OF PREGNANCY

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The study of variations of biochemical constituents of amniotic fluid has been a matter of interest as their alteration may be an index of placental damage, thus resulting in retarded growth of the foetus. Though the urea is the end product of protein metabolism, little work is done on liquor urea estimation in toxæmia cases where protein metabolism is expected to be deranged. Saxena and Kharoliwal (1971) have reported raised values of liquor urea in cases of toxæmia and have shown an excess of liquor urea over blood urea.

Material and Methods

The present study consists of 107 cases admitted in U.I.S.E. hospital, Kanpur during the period of January 1972 to

April 1973. The cases were grouped as non-pregnant 25, normal pregnant 25, and toxæmia of pregnancy 57 (period of gestation 37-40 weeks). The toxæmia cases were further grouped in three classes as:

I. Mild P.E.T. (21 cases). In this group the blood pressure range was 130-146/86-96 mm. of Hg. with oedema and no albuminuria.

II. Moderate and Severe P.E.T. (20 cases). In this group the blood pressure range was 150-180/100-110 mm. of Hg. with marked oedema and albuminuria.

III. Eclampsia 16 cases. All cases in this group were emergency admissions and had many fits before coming to hospital. The blood pressure in all these cases was above 170/110 mm. of Hg. with massive oedema and albuminuria.

The blood and liquor amnii were collected for urea estimation in all the cases during labour. Baby weight and placental weight was also recorded in all the cases. The liquor amnii was collected during labour by following methods avoiding any contamination with blood.

(i) By aspiration of fore water under vision using a dry syringe and thick bore needle.

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(ii) During caesarean section.

Observations

The urea estimation of blood & liquor was done by Nesslerization method described by Wooton (1964).

The statistical analysis of observations made during the present study are given in tabular form below:

TABLE I

Comparison of Mean Blood Urea Level of Non-pregnant and Normal Pregnant Cases With Different Degrees of Toxaemia and Comparison Between the Different Degrees of Toxaemia

Sl. No.	Group of cases	No. of cases	Mean blood urea in mg%	S.D.	S.E.
1.	Non-pregnant	25	28.44	2.50	0.50
2.	Normal pregnant	25	18.52	1.78	0.35
3.	Mild P.E.T.	21	20.14	2.07	0.45
4.	Moderate & severe P.E.T.	20	28.30	2.41	0.54
5.	Eclampsia	16	32.56	2.42	0.61
6.	Total cases of toxaemia	57	26.49	-	-

Comparison between the groups of cases	Value of 't'	Degree of freedom (d.f.)	Comparison between the group of cases	Value d.f. of 't'
t (1,2)	16.34**	48	t (3,4)	11.91** 39
t (2,3)	2.97**	44	t (3,5)	5.42** 35
t (2,4)	15.67**	43	t (4,5)	17.26** 34
t (2,5)	66.85**	39	t (1,5)	5.19** 39

S.D. = Standard Deviation, S.E. = Standard Error.

*Significant (5% level). ** Highly significant (1% level).

t = Comparison between the groups made by testing the difference of means with the help of Fisher 't'.

d.f. = Degree of freedom. P.E.T. = Pre eclamptic toxaemia.

TABLE II

Comparison of Mean Liquor Urea in Normal Pregnant Cases Against Different Degrees of Toxaemias as Well as Between Three Different Degrees of Toxaemia

Sl. No.	Group of cases	No. of cases	Mean L.U. in mg%	S.D.	S.E.
1.	Normal pregnancy	25	25.88	1.33	0.27
2.	Mild P.E.T.	21	28.90	2.38	0.52
3.	Moderate & severe P.E.T.	20	48.90	4.30	0.96
4.	Eclampsia	16	56.75	3.76	0.94
5.	Total cases of toxaemia	57	43.74	-	-

Comparison between the groups	Value of 't'	d.f.	Comparison between the groups	Value of 't'	d.f.
t (1,2)	5.53**	44	t (2,3)	18.53**	39
t (1,3)	25.41**	43	t (2,4)	27.46**	35
t (1,4)	37.68**	39	t (3,4)	6.19**	34

TABLE III (a)

Comparison of Mean Difference Between Liquor Urea and Blood Urea in Normal Pregnancy as Compared to Different Degrees of Toxaemia of Pregnancy as Well as Between Different Degrees of Toxaemia

S. No.	Groups of cases	No. of cases	Mean of LU-BU in mg%	S.D.	S.E.
1.	Normal pregnancy	25	7.36	0.95	0.19
2.	Mild P.E.T.	21	8.85	1.15	0.25
3.	Moderate & severe P.E.T.	20	20.6	2.56	0.57
4.	Eclampsia	16	24.18	4.85	1.21
5.	Total cases of toxaemia	57	17.25	-	-

Comparison between the groups	Value of 't'	d.f.	Comparison between the groups	Value of 't'	d.f.
t (1,2)	4.96*	44	t (2,3)	19.24**	39
t (1,3)	23.8**	43	t (2,4)	14.19**	35
t (1,4)	17.01**	39	t (3,4)	2.77*	34

LU = Liquor urea. BU = Blood Urea.

TABLE III (b)

Ratio Between Blood Urea Value and Liquor Urea Value in Normal Pregnancy and Toxaemia of Pregnancy

Groups of cases	Blood urea	Liquor urea	Ratio of BU & LU
Normal pregnant	18.52	25.88	1 : 1.39
Mild P.E.T.	20.14	28.90	1 : 1.43
Moderate & severe P.E.T.	28.30	48.90	1 : 1.73
Eclampsia	32.56	56.76	1 : 1.74
Toxaemia (Total cases)	26.49	43.74	1 : 1.66

TABLE IV

Comparison of Mean Birth Weight (in kg.) Between Normal Pregnancy and Different Degrees of Toxaemia as Well as Between Different Degrees of Toxaemia

Sl. No.	Groups of cases	No. of cases	Mean in Kg.	S.D.	S.E.
1.	Normal pregnant	25	2.88	0.80	0.17
2.	Mild P.E.T.	21	2.69	0.24	0.09
3.	Moderate & severe P.E.T.	20	2.69	0.18	0.04
4.	Eclampsia	16	2.02	0.31	0.08
5.	Total cases of toxaemia	57	2.36	-	-

Comparison between the groups	Value of 't'	d.f.	Comparison between the groups	Value of 't'	d.f.
t (1, 2)	1.01 (N.S.)	44	t (2,3)	2.08*	39
t (1, 3)	3.13**	43	t (2,4)	2.53*	34
t (1, 4)	3.52**	39	t (3,4)	1.05 (N.S.)	34

N.S. = Not significant.

TABLE V

Comparison of Mean placental Weight (in kg.) Between Normal Pregnancy and Different Degrees of Toxaemia as Well as Between Different Degrees of Toxaemia

Sl No.	Groups of cases	No. of cases	Mean Placental weight (gms)	S.D.	S.E.
1.	Normal pregnant	25	447.60	22.20	4.44
2.	Mild P.E.T.	21	421.42	18.16	3.96
3.	Moderate & severe P.E.T.	20	399.50	24.80	0.54
4.	Eclampsia	16	365.62	36.60	9.15
5.	Total cases of toxaemia	57	398.07	-	-

Comparison between the groups	Value of 't'	d.f.	Comparison between the groups	Value of 't'	d.f.
t (1,2)	4.43**	44	t (2,3)	3.27**	39
t (1,3)	6.88**	43	t (2,4)	6.13**	35
t (1,4)	10.01**	39	t (3,4)	3.37**	34

TABLE VI

Figs. I to VI & Fig. IX.

Correlation Co-efficient in Mild, Moderate and Severe, preeclampsia and Eclampsia Cases Between Liquor Urea and Placental Weight, L.U. and Baby Weight, Difference Between LU-BU and Placental and Baby Weight and Between Baby Weight and Placental Weight in Eclampsia cases.

Mild P.E.T.	Liquor Urea mg%	Placental weight -0.32 (21) N.S.	Baby weight -0.205 (21) N.S.
Moderate & severe P.E.T.	Liquor urea	-0.444* (20)	-0.461* (20)
Eclampsia	Liquor urea	-0.592* (16)	-0.747** (16)
	Diff. LU-BU	-0.224 (16) N.S.	-0.216 (16) N.S.
	Pl Wt.	-	+0.890* (16)

Figs. Within brackets shows number of cases (N).

d.f. = N-2.

TABLE VII
Regression Co-efficient of Y on X in cases of Eclampsia

Y	X	byx
Pl. Wt. (gm)	Liquor urea (mg%)	- 5.762 gms
Baby Wt (gm)	Liquor urea (mg%)	- 0.061 gms
Pl Wt (gm)	Baby Wt (1 gm)	+ 0.107 gms

Discussion

The study of end products of protein metabolism is drawing attention of various workers in toxæmia of pregnancy. In the present study an attempt has been made to evaluate a relationship of liquor urea (the end product of protein metabolism) with foetal and placental weight.

Table I, shows the mean blood urea level in non-pregnant patients which is 28.44 mg%. There is significant alteration of this level when compared to normal pregnant level (18.52 mg%). Kishore & Tandon (1965) did not find a significant alteration in blood urea level in normal pregnancy as compared to non-pregnant level. However, the values of present study in normal pregnant cases is similar to those of Sinha *et al*, (1967), 18.62 mg.% and Gillibrand (1969), 18.3 mg.% Saxena and Kharoliwal (1971) have obtained the corresponding value as 27.466 mg%. In the present study when comparison was made between normal pregnant cases and different degrees of toxæmia it was found to be highly significant. However similar finding was obtained while comparison was made between different degrees of toxæmia. The values obtained in the present study are 20.14 mg% in mild P.E.T., 28.3 mg% in moderate and severe P.E.T. while 32.56 mg% in eclampsia cases. The values reported by Saxena and Kharoliwal (1971) are 30.28 mg% in mild P.E.T. 28.50 mg% in severe P.E.T. and 33.27 mg% in eclampsia. This shows that values in the present

study are similar to those of above workers in moderate—severe P.E.T. and eclampsia but are lower than their in cases of mild P.E.T.

When the comparison of values of toxæmic group was made with non-pregnant level it was found that only the values of eclampsia group (32.56 mg%) is higher than non-pregnant group which is statistically significant. In other groups values are either low or same and when mean value of total cases of toxæmia was taken it was also found to be less than non-pregnant level. This clearly shows that blood urea level is only significantly higher than non-pregnant level in eclampsia cases only. However, Kishore & Tandon (1965) reported a decrease of blood urea in normal pregnancy and increase in toxæmia, but it was not statistically significant. Saxena and Kharoliwal (1971) however, did not compare the values with non-pregnant level.

It will be observed from Table II, that the mean liquor urea value in normal pregnancy cases was 25.88 mg%. However, the values reported by other workers are, 22.1 mg% by Sinha *et al* (1967), 31.0 mg% by Gillibrand (1969—For 38-44 weeks period of gestation), 33.22 mg% by Saxena and Kharoliwal (1971) and 35 mg% by Mc Gaughey *et al* (1959). In the present study it was found that there is significant rise of liquor urea level in different degrees of toxæmia when compared to normal pregnant level and this is statistically significant. This also cor-

responds with the increase in severity of toxæmia. The mean values in present study are, 28.30 mg.% in mild P.E.T., 48.90 mg.% in moderate and severe P.E.T., while 56.75 mg.% in eclampsia. The values reported by Saxena and Kharoliwal (1971) are 38.21 mg.% in mild P.E.T., 42.18 mg.% in severe P.E.T. and 45.66 mg.% in eclampsia. When the mean value of total cases of toxæmia is taken, it is observed to be similar to that of Saxena and Kharoliwal (1971), i.e. 43.49 mg.% in present study and 42.35 mg.% in Saxena and Kharoliwal study (1971).

In Table-III, are shown the mean values of difference between liquor urea and blood urea. It is evident from this table that there is significant increase in the difference in liquor urea—blood urea in all degrees of toxæmia as compared to normal pregnancy. This increase in difference is also seen with severity of toxæmia which is statistically significant. The values in the present study are, 7.36 mg.% in normal pregnant cases, 8.85 mg.% in mild P.E.T., 20.6 mg.% in moderate and severe P.E.T. group and 24.18 mg.% in eclampsia group. When mean difference between liquor urea and blood urea of total cases of toxæmia was taken the values are, 17.25 mg.%. The values obtained by Saxena and Kharoliwal (1971) are 6 mg.% in normal pregnant cases, 8 mg.% in mild P.E.T., 13.7 mg.% in severe P.E.T. and 12.4 mg.% in eclampsia. However, Guthmann and May (1930), Sozanskii (1961) have reported an excess of 12.5 mg.% of liquor urea over maternal blood urea levels in normal pregnancy.

In the present study the ratio between blood urea-liquor urea in normal pregnant cases was 1:1.39, in mild P.E.T. 1:1.43, moderate and severe P.E.T. 1:1.73, eclampsia 1:1.74 and in total cases of toxæmia 1:1.66. The ratio reported by Saxena

and Kharoliwal (1971) is 1:1.21 in normal pregnant cases and 1:1.35 in total cases of toxæmia.

It will be seen from Table IV that the mean birth weight of babies of normal pregnancy was 2.28 kg. (For 36-40 wks. of gestation), while Sinha *et al* (1973) reported values as 3 kg at term pregnancy in their study of protein content of liquor amnii and birth weight in toxæmia of pregnancy. However, Halder *et al* (1973) reported values as 3.1 kg in their study of plasma oestriol. In the present study it was seen that there is lowering of mean baby weight in all degrees of toxæmia. This lowering was only significant in cases of moderate-severe toxæmia group and eclampsia. The lowering of baby weight was not significant in mild toxæmia when compared to normal pregnant cases and also in eclampsia when compared against moderate—severe toxæmia group. However, Sinha *et al* (1973) have reported a significant lowering in all groups of toxæmia but they combined the mild and moderate cases, while in the present study the cases of moderate and severe toxæmia were combined. The values in present study, are, 2.69 kg. in mild P.E.T., 2.29 kg. in moderate—severe P.E.T. and 2.018 kg. in eclampsia. The values obtained by Sinha *et al* (1973) are 2.66 kg. in mild and moderate group as well as in severe P.E.T. group. In eclampsia group, however, it was 2.64 kg. When total cases of toxæmia are taken, the mean birth weight of babies was 2.363 kg. in the present study, while that reported by Halder *et al* (1973) is 2.450 kg.

It will be observed from Table V, that normal mean placental weight is 447.6 gms. There is significant lowering of placental weight in all degrees of toxæmia as compared to normal cases and this fall in placental weight increases with severity

SCATTER DIAGRAM SHOWING RELATION BETWEEN L.U. AND BABY WEIGHT IN MILD P.E.T.

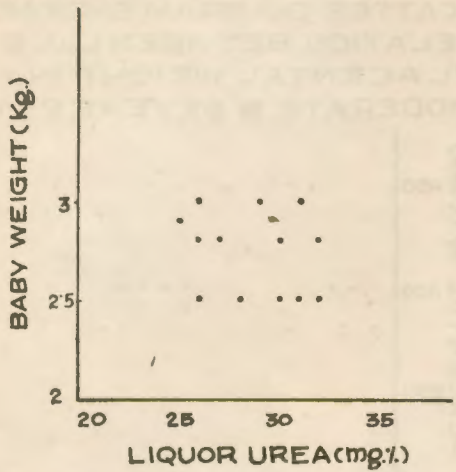


Fig. 4

SCATTER DIAGRAM SHOWING RELATION BETWEEN L.U. AND BABY WEIGHT IN MODERATE & SEVERE P.E.T.

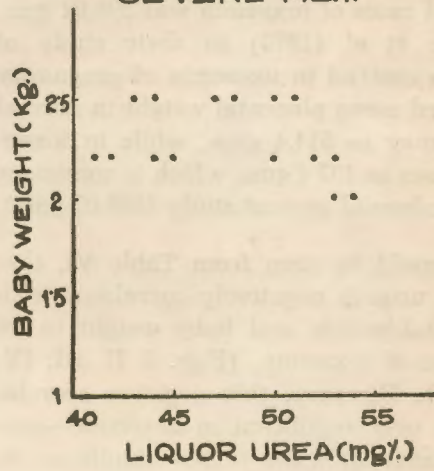


Fig. 5

SCATTER DIAGRAM SHOWING RELATION BETWEEN L.U. AND BABY WEIGHT IN ECLAMPSIA.

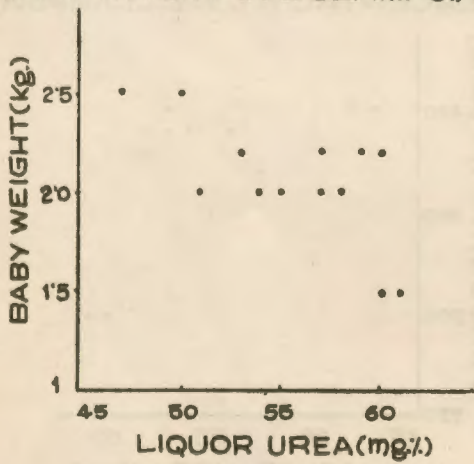


Fig. 6

SCATTER DIAGRAM SHOWING RELATION BETWEEN BABY WEIGHT & PL. WT. IN MILD P.E.T.

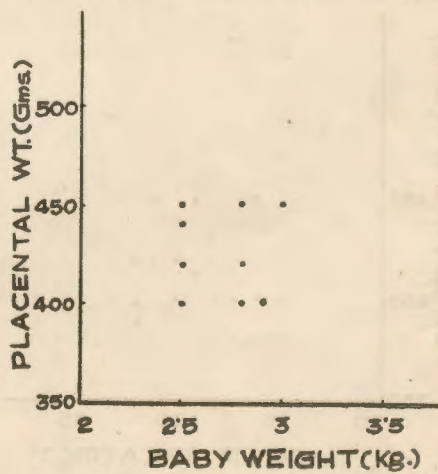


Fig. 7

SCATTER DIAGRAM SHOWING
RELATION BETWEEN BABY-WT.
& PL. WT. IN MODERATE AND -
SEVERE P.E.T.

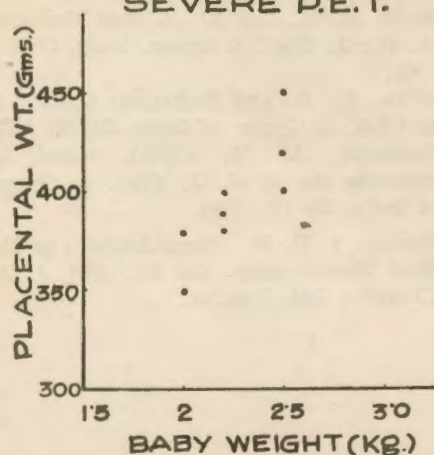


Fig. 8

SCATTER DIAGRAM SHOWING-
RELATION BETWEEN BABY WT.
& PLACENTA WT. IN ECLAMPSIA

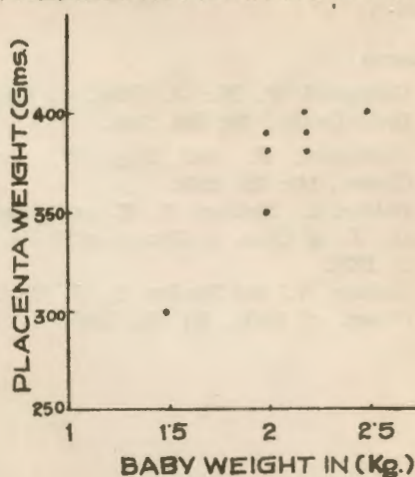


Fig. 9

It would be observed from the regression co-efficients given in Table VII, that under eclamptic conditions per unit increase in liquor urea represents damage of 5.762 gms. of placenta and lowering of baby weight by .061 gm. However increase in placental weight by 0.107 gm represents increase of baby weight by 1 gm.

It is evident from the present study that the increase in liquor urea may be an index of placental damage and that it further results in lowering of baby weight. Rise of liquor urea is important because this only shows significant correlation with placental weight and baby weight in moderate—severe toxæmia and eclampsia.

Summary and Conclusion

1. 107 cases, including 57 cases of toxæmia were studied, and statistically analysed.

2. The blood urea level was higher than non-pregnant level in eclampsia group only which is statistically significant.

3. The toxæmia cases showed significant rise in liquor urea level as compared to normal pregnant cases. There was a marked rise in moderate—severe toxæmia group and eclampsia cases where albuminuria and oedema is a marked feature along with hypertension.

4. There is increase of both blood urea and liquor urea in toxæmia cases, but liquor urea increases more as compared to blood urea.

5. The mean birth weight of babies showed a significant fall in moderate—severe P.E.T. group and eclampsia group.

6. Placental weight was significantly lowered in all the groups of toxæmia.

7. Correlation studies showed that increase of liquor urea is negatively correlated to placental and foetal weight in all the groups of toxæmia which is significant in moderate and severe toxæmia and highly significant in eclampsia.

8. The present study concludes that rise of liquor urea is indicative of placental damage, and due to placental da-

mage there might be lowering of foetal weight as well.

9. Further study is required in the matter.

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