

IMMUNOGLOBULIN ESTIMATION IN ANAEMIC MOTHERS AND THEIR NEO-NATES

by

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Several types of immunoglobulins are present in the human sera. Research works are being carried out in the field of immunology to detect the different immunoglobulins and its influence on human foetus.

Broadly speaking, there are three major classes of proteins viz. IgG, IgA and IgM in human sera which have antibody activity. IgG passes through the placental barrier from the mother to the foetus and the newborn entirely depends upon its protection against infection during early post-natal period or its stock of IgG received through placenta.

The purpose of the present study is to assess the immunoglobulin concentration in maternal and neo-natal sera in anaemic patients, anaemia being still a major problem in developing countries.

Material and Methods

The present work was carried out in the post-graduate laboratory of department of Obstetrics & Gynaecology, Patna Medical College, Patna.

The present series included 50 cases of

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anaemia of pregnancy and 25 control cases.

The cases were selected from Labour-room of Patna Medical College.

Method of Estimation of Immunoglobulins

Tripartigen immunodiffusion plates were used for quantitative determination of immunoglobulin IgG, IgA and IgM obtained from Behring Institute Chemic-export Kontor GM, BH, Frankfurt through Courtesy of M/s. Hoeschest Pharmaceuticals Ltd., Bombay.

The samples of respective sera from the mother at the time of delivery and cord blood of the babies were placed in the partigen well. Antigen antibody precipitation rings were formed in a concentric manner around the antigen wells. The precipitate ring diameter of the immunodiffusion plates of IgG, IgA were measured after a minimum of 50 hours and IgM after 80 hour. The immunoglobulin concentration related to measured diameters were read directly from Table of reference values supplied by Behring Institute.

The cases were analysed according to age, parity, severity of anaemia, gestational age and mode of delivery.

Results

The results are expressed in Table I-VII.

TABLE I
Serum Immunoglobuline (IgG, IgA and IgM) of Anaemic Patients in Relation to Age

Maternal age in years	No. of cases	IgG Mg/100 ml. serum	IgA Mg/100 ml. serum	IgM Mg/100 ml. serum
		Mean \pm S.D.	Mean \pm S.D.	Mean \pm S.D.
Under 20	10	2214.9 \pm 322.23	343.1 \pm 82.05	214.2 \pm 92.85
21-25	20	2389.5 \pm 497.69	326.15 \pm 78.54	222.9 \pm 94.98
26-30	10	2434.4 \pm 405.78	310.2 \pm 35.08	147.6 \pm 59.88
31-35	10	2444.6 \pm 365.08	373.6 \pm 79.27	248.6 \pm 87.32

(S.D. = Standard Deviation)

TABLE II
Serum Immunoglobulin (IgG, IgA and IgM) in Relation to Parity

Gravida	No. of cases	IgG mg/100 ml. serum	IgA mg/100 ml. serum	IgM mg/100 ml. serum
		Mean \pm S.D.	Mean \pm S.D.	Mean \pm S.D.
Primi.	20	2476.68 \pm 534.54	325.52 \pm 78.71	228.2 \pm 101.51
Multi.	30	2354.6 \pm 438.93	352.73 \pm 65.83	221.0 \pm 93.87
Remarks		Not Significant	Not Significant	Not Significant

Not significant at the ($P = 0.05$) level. Table II shows no variation in different immunoglobulin levels in relation to parity.

IgG level increased as the age advanced there was, however, no change in IgA and IgM level in relation to age.

It is obvious from Table IV that immunoglobulin levels were higher in women having 50-55% haemoglobin.

Immunoglobulin IgG level was elevated in the neo-nates in vaginal and forceps delivery group compared to elective caesarean section.

It is obvious from Table VI that IgG levels of mother and neo-nates rose with increasing gestational age. There was no statistically significant difference in the mean IgA and IgM levels in various gestational age group.

IgG level was high with 8-10 Apgar Score. IgA and IgM were not detected in the Cord Blood.

Discussion

Immunoglobulin IgG, IgA and IgM

were assessed in 50 anaemic patients and their neonates at the time of delivery.

It was observed that IgG level was raised as the age of the patients advanced. There was, however, no statistically significant difference in IgA and IgM levels in relation to age. According to Nicholas (1973) IgG level was higher in patients above the age of 25 years in toxæmic cases, though age had no significant influence on IgA and IgM levels.

Parity, had no significant influence on immunoglobulin level (IgG, IgM and IgA) in maternal sera and neonatal cord blood.

According to Benster and Wood (1970) parity had no influence on serum immunoglobulin levels in hypertensive patients.

In the present series, IgG, IgA and IgM were detected in all the maternal sera of anaemic patients. As regards the neonates

TABLE III
Average Level of Maternal Neo-natal Immunoglobulin in Anaemia Patients

Type of Immunoglobulins	Types of samples	No. of Anaemic cases and neo-nates	Average quantity in mg/100 ml. Serum	S.D.	No. of cases	Average quantity in mg/100 ml. serum	S.D.	'T'	P.	Remarks
IgG	Maternal	50	2452.15	1195.94	25	1384.8	205.82	3.8	.005	H.S.
	Neo-natal	50	1680.56	328.37	25	1036.91	141.26	7.5	.005	H.S.
IgA	Maternal	50	487.7	170.55	25	193.4	37.18	6.72	.005	H.S.
	Neo-natal	50	—	—	25	—	—	—	—	—
IgM	Maternal	50	221.8	29.85	25	168.4	61.83	12.86	.005	H.S.
	Neo-natal	50	—	—	25	—	—	—	—	—

H.S. = Highly Significant

IgG, IgA and IgM levels in anaemic patients were higher than normal. IgA and IgM were not detected in normal babies and babies of anaemic patients.

TABLE IV
Immunoglobulin (IgG, IgA and IgM) Levels of Anaemic Patients in Relation to Severity of Anaemia

Haemo-globin Percentage	No. of cases	Type of samples	IgG mg/100 ml serum	IgA mg/10 ml. serum	IgM mg/100 ml. serum
			Mean \pm S.D.	Mean \pm S.D.	Mean \pm S.D.
50-55%	10	Maternal	2614.9 \pm 622.2	343.1 \pm 82.05	214.2 \pm 92.84
		Neonatal	1622.8 \pm 348.18	—	—
55-60%	30	Maternal	2389.5 \pm 497.69	326.15 \pm 78.54	237.45 \pm 95.03
		Neonatal	1477.2 \pm 241.54	—	—
Above 60%	10	Maternal	1341.4 \pm 70.32	197.4 \pm 88.52	144.3 \pm 28.07
		Neonatal	1441.3 \pm 128.81	—	—

TABLE V

Serum Immunoglobulins IgG, IgA and IgM of Anaemic Mothers and Their Neo-nates in Relation to Mode of Delivery

Mode of delivery	No. of cases	Types of samples	IgG mg/100 ml. serum	IgA mg/100 ml. serum	IgM mg/100 ml. serum
			Mean \pm S.D.	Mean \pm S.D.	Mean \pm S.D.
Vaginal	30	Maternal	2456.68 \pm 524.37	325.52 \pm 78.71	226.8 \pm 92.67
		Neonatal	1529.04 \pm 290.30	—	—
Forceps	10	Maternal	2404.6 \pm 642.11	363.2 \pm 79.21	244.2 \pm 106.57
		Neonatal	1509.2 \pm 281.38	—	—
L.S.C.S.	10	Maternal	2319.4 \pm 338.26	343.7 \pm 66.70	198.9 \pm 87.87
		Neonatal	1441.3 \pm 128.01	—	—

TABLE VI

Serum Immunoglobulins IgG, IgA and IgM of Anaemic Mothers and Their Neo-nates According to Gestational Age

Gestational age in week	No. of cases	Types of samples	IgG mg/100 ml. serum	IgA mg/100 ml. serum	IgM mg/100 ml. serum
			Mean \pm S.D.	Mean \pm S.D.	Mean \pm S.D.
32 - 36	10	Maternal	2239.5 \pm 323.71	341.4 \pm 66.71	287.4 \pm 83.98
		Neonatal	1441.3 \pm 121.44	—	—
37 - 38	10	Maternal	2268.06 \pm 354.55	340.06 \pm 89.98	216.75 \pm 94.98
		Neonatal	1496.26 \pm 301.44	—	—
39 - 40	30	Maternal	2294.6 \pm 363.89	333.53 \pm 71.57	242.53 \pm 87.19
		Neonatal	1455.6 \pm 234.76	—	—

TABLE VII

Cord Blood Serum Immunoglobulin Levels According to Apgar Score

No. of cases	Apgar scoring	IgG level mg/ml. serum	IgM mg/100 ml. serum	IgA mg/100 ml. serum
		Mean \pm S.D.	Mean \pm S.D.	Mean \pm S.D.
20	5 - 6	1457.2 \pm 231.12	—	—
15	6 - 8	1463 \pm 185.15	—	—
15	8 - 10	1622 \pm 348.18	—	—

only IgG was detected, IgA and IgM were absent.

It was further noted that Immunoglobulins IgG, IgA and IgM levels were increased in anaemic patients compared to the normal control. It was observed that women having 50-55% haemoglobin had IgG 2614.9 \pm 622.2, IgA 343.1 \pm 82.05 and IgM 219.2 \pm 9284. IgG level was higher than in women having 55-60% of haemoglobin.

The possible explanation for the high maternal immunoglobulin levels in anaemic patients is hypoxia of the tissues which are more susceptible to injurious agents. Moreover, worm infestations in the anaemic patients may give rise to high immunoglobulin levels. Most probably, as a means of defence mechanism, body keeps in its ready stock more immunoglobulins in anaemic patient.

Jones and Payne (1967) and Cochran

(1972) have observed that mode of delivery also has got some role in active and selective transfer of IgG from mother to foetus via placental barrier.

IgG level was elevated in the foetuses at the time of delivery in all the cases of vaginal deliveries and caesarean section, however, no significant difference in the maternal and cord blood immunoglobulins levels were observed. This may be due to absence of uterine contractions.

In the present series also IgG level was elevated in the neo-nates born vaginally. Modes of delivery and uterine contractions also play a definite role in the selective as well as active transfer of Immunoglobulins from the mother to the foetus.

Serum immunoglobulin levels were studied according to gestational age. It is important to note that according to period of gestation the immunoglobulin levels (IgG, IgA and IgM) varied and it was higher with increasing period of gestation.

According to Salimonu *et al* (1978) the mean IgG level rises with increasing gestational age until it reaches a maximum of 41 weeks.

As regards the immunoglobulin level in cord blood according to Apgar Score, IgG level was higher with the Apgar Score of 8-10. It appears that transient anoxia caused lowering of immunoglobulin level in the neonates.

The estimation of IgG, IgA and IgM in foetus at birth is very helpful in detecting the subclinical and clinical types of congenital and acquired infection. Thus immune deficient state in the newborn can be diagnosed early and specific immunotherapy can be instituted to prevent permanent damage in the infant.

Summary

Immunoglobulins IgG, IgA and IgM were estimated in fifty cases of anaemics

of pregnancy at the time of delivery and their neo-nates at Patna Medical College Hospital, Patna.

The purpose of this study was to know the status of immunoglobulins in anaemic mothers and their neo-nates.

Serum Immunoglobulins concentration of the anaemic mothers and their neonates were compared with those of normal pregnant women and their neonates at the time of delivery.

Observations were made regarding immunoglobulin concentrations in relation to age, parity, severity of anaemia, gestational age and mode of delivery.

IgG level was elevated as the age advanced, parity, however, did not alter the immunoglobulin concentrations.

As regards the severity of anaemia, immunoglobulin levels were higher in women with haemoglobin 50-55%.

IgG level was higher as the gestational age advanced, both in the mothers and neonates. There was, however, no statistically significant differences in the mean IgA and IgM levels in the various gestational age groups in the mothers and their neonates.

IgG level of the cord blood was higher in the neonates in normal vaginal and forceps deliveries compared to caesarean section.

IgG level increased in the neonates with Apgar score of 8 to 10.

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