

MATERNO-FOETAL SERUM GLOBULINS, INCLUDING IMMUNO-GLOBULINS, IN TWIN PREGNANCY

by

GAURI BAZAZ MALIK,* M.D., F.R.C. (Path.)

During the past decade many reports on the immunoglobulin levels of newborns have appeared in the medical literature and have been reviewed (Gitlin, 1971; Wood 1971-72; Adinolfi and Lessof, 1972 and Raghvan, Bazaz-Malik *et al*, 1976). Some studies in reference to immunoglobulin levels in mother and newborn in multiple pregnancy have also been reported (McFarlane and Udeozo, 1968; Makay *et al*, 1968; Yeung and Hobbs, 1968 and Hautala and Kunnas, 1970). This report is based on investigations on newborns and mothers with twin full term pregnancy and the results have been compared with mothers and singletons of comparable birth weight and gestational age.

Material and Method

Three unselected healthy young mothers carrying full term twin pregnancy and their newborns and 3 full term mothers carrying singleton pregnancies and their newborns of comparable gestational age and birth weight were investigated for total serum globulins, gamma globulins and immunoglobulin G, M, and A. Venous umbilical blood was collected immediately after delivery of the placenta and from the antecubital vein of the mother just before the delivery of the placenta. Serum proteins were fractionat-

ed by paper electrophoresis method and serum immunoglobulins determined by the radical immuno-diffusion method of Manicini *et al* (1965). All the samples were measured in the duplicate and corresponding maternal and newborn sera diffused on the same plate.

Observations

Table I, indicates the birth weight, serum globulin and gamma globulin levels of newborns and corresponding mother. Total serum globulin and gamma globulin levels of the mothers were between 4.43-4.64 and 1.79-1.90 gm% respectively. The corresponding levels in twins was between 2.10-3.27 and 1.44-1.70 gm% respectively and in singleton 3.13-3.74 and 1.48-1.70 gm% respectively.

Immunoglobulin levels are shown in Table II. Immunoglobulin G levels were between 218-285 I.U./ml in the pregnant mothers of both twins and singletons and corresponded to the observations in full term mothers (Raghvan, *et al*, 1977). Immunoglobulin G was present at birth in all the twins and singletons, the levels being between 113-146 IU/ml in the former and 113-161 IU/ml in the latter. Immunoglobulin M was detected in all the newborns at birth levels falling between 5.75-15.6 IU/ml in both twins and singletons. Immunoglobulin A was detected only in 33% of newborns twins as well as singletons, the levels falling between 0-3.5 IU/ml.

*Professor & Head, Department of Pathology, Lady Hardinge Medical College, New Delhi.

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TABLE I

Total Plasma Globulin and Gamma Globulin Fraction in Mother and Corresponding Newborn Twins and Singletons of Comparable Age Given in Gm%

	Birth-weight	Total globulin	Gamma globulin
Mother I	—	4.43	1.88
Twin I ₁	1600	2.40	1.48
Twin I ₂	1500	3.27	1.44
Mother II	—	4.64	1.79
Twin II ₁	1800	2.10	1.60
Twin II ₂	1650	3.10	1.70
Mother III	—	4.40	1.80
Twin III ₁	1600	2.40	1.48
Twin III ₂	1800	3.20	1.66
Mother IV	—	4.53	1.90
Singleton IV	1600	3.74	1.48
Mother V	—	4.54	1.88
Singleton V	1800	3.13	1.70
Mother VI	—	4.40	1.88
Singleton VI	1500	3.20	1.46

TABLE II

Immunoglobulins G.M. and A. levels in the Mother and Corresponding New born Twins and Singletons of Comparable Age Given in International Units per ml.

	IgG	IgM	IgA
Mother I	218.5	2.66	23.4
Newborn I ₁	113	6.50	3.5
Newborn I ₂	114	5.75	—
Mother II	285	1040	168
Newborn II ₁	145	15.6	—
Newborn II ₂	135.2	13.0	—
Mother III	220	270	24
Twin III ₁	115	6.50	3.0
Twin III ₂	146	15.6	—
Mother IV	226	366.70	140.5
Singleton IV	113	12.30	—
Mother V	247	176	141
Singleton V	161.50	12.0	—
Mother VI	220	270	24
Singleton VI	115	7.0	3.0

Discussion

It was observed that serum globulins in 50% of newborns as twins are lower than the corresponding pair mate and singleton of the comparable age. The lower level of globulins does not effect the levels of gamma globulin in the same newborn. However, the gamma globulin levels of

twins as well as singletons of the present study are significantly lower than those observed in the full-term mature neonate (Raghvan, *et al*, 1976). Actually, the levels in the neonates of the present series are in the range observed in the premature neonates earlier (Raghvan, *et al*, 1977).

The immunoglobulin G levels in twins and singletons ranged between 131-161.5 IU/ml which is about half of the levels observed in the corresponding mothers, being significantly less than those observed in the full term mature neonates in whom more than 88% showed same level or more than that of the corresponding mother. This was considered to be due to active transplacental transfer of this immunoglobulin from the mother to the foetus (Raghvan, *et al*, 1976).

The levels of immunoglobulin G in the neonates of the present study were even lower than those observed in the premature neonates (Raghvan, *et al*, 1977). These levels, therefore, appear to be related to birth-weight rather than the gestational period. Similar conclusions have been drawn by other Workers (Jones, 1969; Hanlata and Kannas, 1970; Papadetos *et al*, 1970). In infants with low birth weights a correlation between birth weight and Ig G levels has been demonstrated (Berg, 1968 and Papadetos *et al*, 1970). Hobbs and Davis (1967) were able to show a direct correlation between the Ig G levels and birth weight in premature babies. Hanlata and Kannas (1970) have related maternal Ig G levels to the birth weight and gestational age of various groups. Present study indicates that Ig G levels are directly correlated with birth weight rather than the gestational period whether the newborn is a twin or a singleton. Therefore, the capacity of a newborn to combat an infection would depend directly on weight rather than the gestational age. Thus the immunological status of a low weight full-term newborn is poor as compared to normal weight full term newborn.

Immunoglobulin M was present in all the newborn twins and singletons of low birth weight indicating that at birth

the neonates are immunologically competent. The levels were same as observed in full term normal weight and premature low weight newborns (Raghvan, *et al*, 1976, 1977). It has been stated that Ig M levels of the twin born first are significantly higher because of its encountering the antigen stimuli from the organism in the lower genital tract of the mother (Benirschke and Driscoll, 1967 and Bryan *et al*, 1976 and Bryan and Slavin, 1974). No such difference between the 1st and 2nd born twin was observed in the present study.

Immunoglobulin A was observed in 33% of twins and singletons. The levels on the frequency was the same as observed in the normal full term neonates.

This study, therefore, indicates that twins are immunologically competent at birth like mature full term neonates but their immunological status vis-a-vis combating infection is poor and is like any other low weight newborn. This incapacity is directly related to the birth weight.

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