IMMUNOGLOBULIN LEVELS IN DIFFERENT TRIMESTER OF NORMAL PREGNANCY

by

M. AGNIHOTRI*
S. KALA*
R. SHANKER**
P. ROHATGI†
and
K. TRIVEDI††

Introduction

The immune mechanism and its implications in clinical medicine have expanded rapidly in recent years. The immune reactions are mediated by cellular and humoral mechanisms. The cellular component is made up of lymphocytes sensitized to specific antigens and called as T lymphocytes, whereas the humoral factor consists of antibodies which are secreted by the plasma cells, the thymus independent B lymphocytes.

An altered immune responsiveness has been reported by various series (Finn *et al* 1972; Sterlkauskas *et al* 1975) in different trimesters of pregnancies. The data on cellular immunity in various trimesters is almost well established but that on humoral immunity is controversial. The present study has been undertaken to assess the various immunoglobulin profiles in different trimesters of pregnancy.

*Lecturer in Obstet. & Gynec.
**Lecturer in Pathology.
†Prof. and Head of Dept. Obstet. & Gynec.
††Registrar in Obstet. & Gynaec., G.S.V.M. Medical College, Kanpur (U.P.).
Accepted for publication on 4-9-1981.

Material and Method

The study constitutes 75 normal healthy pregnant females of different trimesters and 25 healthy non-pregnant females as controls. These cases were drawn from U.I.S.E. Maternity hospital Kanpur. After taking a detailed history and clinical examination, these patients were subjected to routine investigations (Hb gm % ABO and R-h grouping, complete urine examination).

Assay For Determination of Innunoglobulins. [Mancini, Carbonara and Hermans (1965)]. In each case, 5 ml blood was collected in plain vial, serum was separated and frozen at -20 C until used. Immunoglobulin quantitations were carried out using the singleradial immunodiffusion technique of Mancini *et al* (1965) with slight modification on tripartigen immunodiffusion plates-Ig G, Ig A and Ig M (Behringwerke, A. G. and Marburg, W. Germany). To produce a reference curve for quantitative determination of Ig G, Ig A or Ig M, 5 ul of sera with the help of partigen disenser (manufactured by Behringwerge) of corresponding standard immunoglobin was placed in well marked 1, 2 and 3 of tripartigen immunodiffusion plate. Pre-

cipitation ring diameters were measured after 40 hours for Ig G and Ig A and after 80 hours for Ig M.

Using the reference cerve, the Ig G, Ig A and Ig M concentration corresponding to the precipitate diameters of the sera from the patients were determined.

The results of various parameters in cases under study were statistically analysed for analysis of variance.

Observations

The mean value of Ig G and Ig M in the 75 pregnant cases was higher as compared to 25 controls, and the difference was statistically significant ($P < 0.001$). The mean value of Ig A in 75 normal pregnant cases showed no significant change ($P > 0.05$) as compared to 25 controls. (Table I).

Immunoglobulin levels were also studied in relation to parity (Table II). The mean value of Ig G was higher in 10 multigravidae as compared to 15 primigravidae, but statistically, this was not significant ($P > 0.05$). Similarly, the mean level of Ig A was lower in primi as compared to multigravidae but this was

TABLE I

Humoral Immunity in Control and Normal Pregnant Patients

Immunoglobulin Studies		Control	Total Normal Pregnant
Number of Cases		25	75
1. Ig G mg/100 ml	Range	600.—945	840.—1880
	Mean	734.46	1230.88
		t = 30.1266	P < .001
2. Ig A mg/100 ml	Range	140—168	126—188
	Mean	158	158.01
		t = .0055	P > .05
3. Ig M mg/100 ml	Range	80—155	185—350
	Mean	102.32	276.4667
		t = 22.6940	P < .001

TABLE II

Immunoglobulins in Normal Pregnant Females According to Parity

Characters		Primi		Multi
No. of cases		15		10
1. Ig G mg/100 ml	Range	1700—1880		1760.—1880
	Mean	1813.33		1831.44
	S.D.	70.49		57.53
		t = 52	P > .05	
2. Ig A mg/100 ml	Range	120—168		152.—178
	Mean	157.53		158.34
	S.D.	9.58		8.46
		t = .22	P > .05	
3. Ig M mg/100 ml	Range	190—302		184.—210
	Mean	270.09		192.58
	S.D.	38.43		7.63
		t = 5.862	P < .001	

also not statistically significant ($P > 0.05$). While the mean value of Ig M was higher in primigravidae as compared to multigravidae and this difference was statistically highly significant ($P < 0.001$).

Humoral immunity in various trimesters of pregnancy was assesed and compared with non-pregnant controls as well as within groups (Table III). The mean value of Ig G in Ist, IInd and IIIrd trimesters was higher as compared to that of control. The highly significant value of F (1201.6744) indicates that there is significant difference between the 4 groups. The Ig G levels of Ist, IInd and IIIrd trimesters were statistically lower but significantly different from the control levels. The mean Ig G level again reverted back towards normal in IIIrd trimester.

The mean Ig M levels of Ist, IInd and IIIrd trimesters were higher as compared to control and the highly significant value of F (192.1450) indicates that there is significant difference between 4 groups. The mean Ig A levels of Ist, IInd and IIIrd trimester were higher as compared to control levels but the value of F indicates that there is no significant difference between the 4 groups (Table III).

Discussion

In our study, the mean Ig G and Ig M levels in 75 pregnant females of different trimesters were significantly higher ($P < 0.001$) as compared to non-pregnant controls. There was no significant rise in Ig A levels in cases of normal pregnant females as compared to controls (Table I). Our findings in this respect, are similar to those of Raghwan *et al* 1977 and Ganguli *et al* 1980.

There was no significant change ($P > 0.05$) reported in Ig G and Ig A levels in primigravida and multigravida. But Ig A levels showed significant increase ($P < 0.001$) in primigravida. Benster and Wood (1970) and Raghwan *et al* (1977) have also reported similar findings in their series.

TABLE III

Humoral Immunity in Control and Normal Pregnant Cases as Grouped in Different Trimesters

Groups	No. of cases	Ig G mg/100 ml	1G A mg/100 ml	Ig M mg/100 ml
Control	25	R — 600-945 AM — 734.48	140-168 158.0	80-155 102.32
First Trimester	25	R —1700-1880 AM —1831.44	126-178 158.52	185-294 263.6
Second Trimester	25	R — 900-1240 AM — 994.8	138-172 157.12	292-350 318.0
Third Trimester	25	R — 800-1040 AM — 866.4	128-188 158.4	200-353 247.8
F (3.96)—1201.6744* Critical difference—40.0376			.0912 —	192.1450* 18.6462

*Highly Significant.

Immunoglobulin studies in different trimesters of pregnancy revealed that in first trimester of pregnancy mean values of Ig G and Ig M were significantly higher ($P < 0.001$) as compared to controls, second and third trimesters. The mean Ig A level did not show any significant ($P > 0.05$) rise when compared with control, second and third trimesters of pregnancy. In second trimester of pregnancy, Ig G and Ig M levels were significantly higher than control and in third trimester but were significantly lower than first trimester ($P < .001$). The Ig A level in second trimester did not show any significant difference ($P > 0.05$) when compared with control, first and third trimesters of pregnancy. While studying immunoglobulin levels in 3rd trimester of pregnancy, we found that mean level of Ig G and Ig M were significantly higher ($P < 0.001$) as compared to control, but significantly lower ($P < 0.001$) when compared with first and second trimesters of pregnancy. Ig M levels in third trimester of pregnancy did not show any significant change ($P > 0.05$). Our findings were similar to those of Ganguli *et al* (1980) and Raghwan *et al* (1977) who also reported an increased level of immunoglobulins in pregnancy. Maroulis *et al* (1971) reported a decrease concentration of Ig G with each successive trimester, similar to our series, whereas Ig M and Ig A concentrations in their series were either unchanged or had no consistent trend. We differ in this respect from Maroulis *et al* (1971).

Our findings differ from that of Mondenhal (1970) who reported that the immunoglobulins maintain a serum concentration similar to non-pregnant controls, throughout the course of pregnancy.

References

1. Denster, B., Wood, E. T.: J. of Obstet. Gynec. 77: 518, 1970.
2. Finn, R., Hill, C. A., Govan, A. J. and Viven Denye: Br. Med. J. 3: 150, 1972.
3. Ganguli, N. K., Gupta, I., Mahajan, R. L. and Sharma, S.: Indian J. of Med. Res. 71: Maq 1980.
4. Mancini, G., Carbonara, A. O. and Hermans, J. E.: Immunochemical Quantitation single antigens by radial immunodiffusion Immunochemistry 2: 235, 1965.
5. Maroulis, G. B., Buckley, R. H. and Younger, J. B.: Am. J. Obstet. Gynec. 109: 971, 1971.
6. Medenhal, H. W.: Am. J. Obstet. Gynec. 106: 388, 1970.
7. Raghwan, U., Gauri Bazaz Malik, M., Rey, S. and P. Madan: J. Obstet. Gynec. India: 27: 527, 1977.
8. Strelkauskas, A. J., Wilson, B. S., Dray, S. and Dodson, M.: Nature 257: 331, 1975.