ASSESSMENT OF CELLULAR IMMUNITY IN NORMAL PREGNANCY

by

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Recent advances in transplantation immunology have stimulated the interest in immunological aspects of pregnancy where foetus exists as a well tolerated homograft. From the basic principles of immunology it is known that the tissue of an individual cannot be grafted to another with a different genetic constitution, yet the fertilized human ovum containing a foreign paternal antigen seems to be eminently successful in implanting into the uterus without rejection. Keeping in mind an altered immunological basis of pregnancy, the present work has been undertaken to study the cellular immunity in different trimesters of normal pregnancy.

Material and Method

The study constitutes 75 females in different trimesters of pregnancy and 25 control healthy non-pregnant married females of varying parity and socio-economic status. The cases were drawn from Upper India Sugar Exchange Maternity Hospital afiliated to G.S.V.M. Medical College Kanpur, either admitted in the hospital or attending out-patient department. Detailed history, clinical examinations and necessary investigations were done. The cases were grouped as:

1. *Control group:* This included 25 normal healthy non-pregnant married females of varying parity and socio-economic status. This group was selected from the nursing staff and healthy relations of indoor patients.

2. *Test group:* This comprised of 75 healthy pregnant females without any complication. This included 25 healthy pregnant females in each trimester.

The following is the account of tests employed in each case.

1. Haemoglobin estimation (Dacie and Lewis 1968).

2. Total Leucocyte count (Dacie and Lewis 1968).

3. Lymphocyte studies for assesment of cellular immunity were performed in the following manner. Two ml. of venous blood was collected in E.D.T.A. for the peripheral lymphocyte count. For lymphocyte sub-population study, 10 ml. venous blood was collected in sterile containers with 250 I.U. of preservative free heparin.

For peripheral lymphocyte count, about 250-300 cells were counted and total and

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differential leucocyte count was done, from which P.L.C. was calculated. Lymphocyte assays were performed within four hours of collection of blood. Lymphocyte separation was carried out by differential gradient centrifugation method (Boyum 1968), using Ficollconray gradient lymphocyte. Giemsa stained smears of lymphocyte suspension were made and the differential count done. Total T. cell estimation was done using non-immune sheep red cell rosetting technique (Jondel *et al* 1972) Active T- cells were estimated using high affinity E. rosetting technique (West *et al* 1977). The results of various parameters of cellular immunity in cases under study were statistically analysed.

Observations

The mean P.L.C. in 75 normal pregnant patients were higher as compared to the corresponding mean value of 25 controls as shown in Table I. This difference was found to be statistically highly significant ($P < 0.001$).

The mean value of total T. cells (% and level/cu. mm) and active T. cells (% and level/cu. mm) in the 75 normal pregnant females of different trimesters, was lower as compared to the corresponding mean value of 25 controls (Table II). Again, this difference was statistically highly significant ($P<0.001$). Cellular immunity was studied seperately in different trimesters of normal pregnancy as compared to control (Table III) and detailed statistical evaluation of these data was done (Table IV). The details of analysis of data in different trimester of pregnancy are given as follows:

P.L.C.: The mean P.L.C. values were raised in normal test cases in each trimester when compared to the mean

TABLE I
Study of Lymphocytes in Normal Pregnant and Control Patients

Lymphocyte Studies	Control	Total Normal Pregnant
Number of cases	25	75
1. P.L.C. (Peripheral Lymphocytic count)		
Range	2302-2592	2350-2890
Arithmetic Mean	2363.04	2636.73
2. Total T cell %		
Range	62-72	36-68
Arithmetic Mean	67.56	46.57
3. Total T cell level per cu.mm.		
Range	1519-1792	902.5-1595.0
Arithmetic Mean	1669.86	1203.99
4. Active T cell %		
Range	38.46	15.40
A. Mean	41.76	24.53
5. Active T. cell level per cu.mm.		
Range	906.75-1136.04	352-1029.6
Arithmetic Mean	1063.32	674.27

TABLE II

Evaluation of Data Observed in Table 1

Lymphocyte Studies	Control	Total Normal Pregnant
Number of cases	25	75
1. P.L.C. (Peripheral Lymphocytic count)		
Log Mean	3.3903	3.4202
Geometric Mean	2456.5436	2631.4795
	t = 5.7 335, p<.001	
2. Total T. Cell %		
Angles	55.3062	42.9011
% Transformed back	67.6022	46.3400
	t = 20.3209, p<.001	
3. Total T cell level per cu.mm.		
Log Mean	3.2223	3.0823
Geometric Mean	1668.2394	1208.6484
	t = 17.9056, p<.001	
4. Active T cell %		
Angles	40.2510	30.2866
% Transformed back	41.7494	25.4344
	t = 14.9446, p<.001	
5. Active T cell level per cu.mm.		
Log Mean	3.0091	2.8151
Geometric Mean	1021.1433	653.3862
	t = 11.0934, p<.001	

TABLE III

To Study the Humoral Immunity in Control and Normal Pregnant Patients

Immunoglobulin Studies		Control	Total Normal Pregnant
Number of cases		25	75
1. IgG mg./100 ml.:	Range	600-945	840-1880
	Mean	734.46	1230.88
		t = 30.1266, p<.001	
2. IgA mg./100 ml.:	Range	140-168	126-188
	Mean	158	158.01
		t = .0055, p>.05	
3. IgM mg./100 ml.:	Range	80-155	185-350
	Mean	102.32	276.4667
		t = 22.6940, p<.001	

TABLE IV

Study of Immunoglobulins in Normal Pregnant Females According to Parity

Characters		Primi	Multi
No. of cases		15	10
IgG mg./100 ml.—	Range	1700-1880	1760-1880
	Range	1813.33	1831.44
	S.D.	70.49	57.53
		t = 52, p>.05	
IgA mg./100 ml.—	Range	120.168	152-178
	Mean	157.53	158.34
	S.D.	9.58	8.46
		t = .22, p>.05	
IgM mg./100 ml.—	Mean	190-302	184-210
	Mean	270.09	192.58
	S.D.	38.43	7.63
		t = 5.862, p<.001	

P.L.C. in control. The highly significant value of F (11.14) indicates that there are significant differences between the 4 groups, means. It is observed that the Ist, IInd and IIIrd trimester give higher PLC than those of control group. The PLC of Ist, IInd and IIIrd trimester is statistically lower but significantly different from the control group.

Total T. cell %: The mean total T. cell % of Ist, IInd and IIIrd trimester was lower as compared to that of control. The highly significant value of F (177.67) indicates that there are significant differences between the 4 groups. The total T. cell % of Ist, IInd and IIIrd trimester are statistically lower but significantly different from the control. In third trimester the total T. cell % again reverted back towards normal.

Total T. cell level: The total T. cell level was also lower in Ist, IInd and IIIrd trimester as compared to control, and the highly significant F. (170.5202) indicates that there are significant differences between groups.

Active T. cells % and level: The active T. cell % and level in Ist, IInd and IIIrd trimester were lower than those in controls. The highly significant value of F. (105.8930) of active T. cell % and of F. (75.3314) of active T. cell level indicate that there are significant differences between 4 groups, but there is no significant critical difference between the IInd and IIIrd trimester groups.

Discussion

The present findings of depressed T. cell level represents the depressed cellular immunity. The depression in cellular immunity is related to the acceptance of the foetus as an allograft by the mothers immune mechanism. The present findings are supported by Lewis *et al* (1966) who studied lymphocyte transformation in mixed leucocyte culture in immune responce.

Doenhoff *et al* (1971) also reported that PHA induces lymphocyte transformation and DCHR to tuberculin was depressed during pregnancy. Finn *et al* (1972) have the same opinion that there is a control suppression of T. cells in pregnancy with proportionate increase in

B. cells. Our findings differ from the reports of Dennis *et al* (1979) who do not support the concept of impaired cellular immunity in pregnancy.

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