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A Comparison of the Erythrocyte Glucose - 6 - Phosphate Dehydrogenase (G6PD) Levels of Mothers and Their Newborns

PRELIMINARY COMMUNICATION

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It is well known that red blood cell (RBC) G6PD activity is markedly high in the newborn.[1,2] Elevated G6PD activity is commonly associated with increased numbers of young red cells in the circulation.[3] Since reticulocytosis is evident in the early newborn period, the increased erythrocyte G6PD activity in this period may possibly be related to it. The mother and the newborn are very closely linked to each other in several ways; to our knowledge, no study has been done on the relationship between the newborn and the maternal erythrocyte G6PD activity. The present communication reports the G6PD activity of the red cells of newborn babies and their mothers.

Materials and Methods

Erythrocyte G6PD s were assayed by the method of Zinkham [1] and expressed as units per 100 ml of packed red cells. Microhematocrits and reticulocyte counts were determined by the standard techniques.

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Blood was obtained from both newborns and their mothers within 24 hours of parturition. The mothers' ages ranged from 15 to 30 years. None of the newborns was premature by weight (the length of the gestational period could not be ascertained in every case). RBC G6PD activities were also determined in a control group composed of 34 nonpregnant females (students and laboratory personnel) of the same age group as the mothers.

Results

The RBC G6PD activities for hematologically normal individuals in this laboratory are 110 to 160 enzyme units (U.)/100 ml of erythrocytes. In the 34 control cases the RBC G6PD activities ranged from 72 to 173 U. with a mean of 117.8 $\pm$ 5.7 U. (standard deviation (S.D.) 33.41); in the 30 mothers, from 58 to 202 U. with a mean of 134 $\pm$ 6.8 U. (S.D. 37.6); and in the 30 newborns, from 108 to 315 U. with a mean of 184.4 $\pm$ 7.6 U. (S.D. 42) (Table 1 and Figure 1).

The values indicated a statistically significant increase in the mothers when compared to the controls ($P<0.05$) and in the newborns when compared to the mothers ($P<0.05$).

Comments

In this study the red blood cell G6PD activity of the mothers was found to be higher than that of the normal controls. Although all of the mothers had mild to moderately severe anemia according to the hematocrit values, with the exception of four cases the reticulocyte count was less than two per cent. For this reason the increased maternal erythrocyte G6PD level could not be explained by the young red cell population in their circulation. Since this enzyme activity is markedly elevated in the newborn, massive feto-maternal bleeding could account for the rise in the mother's activity. However, because of the diluting effect of the maternal blood volume, this kind of transfusion would be large and the babies would be anemic. None of our babies was anemic or in distress.

It is known that this enzyme activity is influenced by hormonal factors.[4,5] The hormonal balance differs between the pregnant and the nonpregnant female. We are now trying to determine if there is a relationship between the rise of this enzyme activity and the hormonal changes of pregnancy.

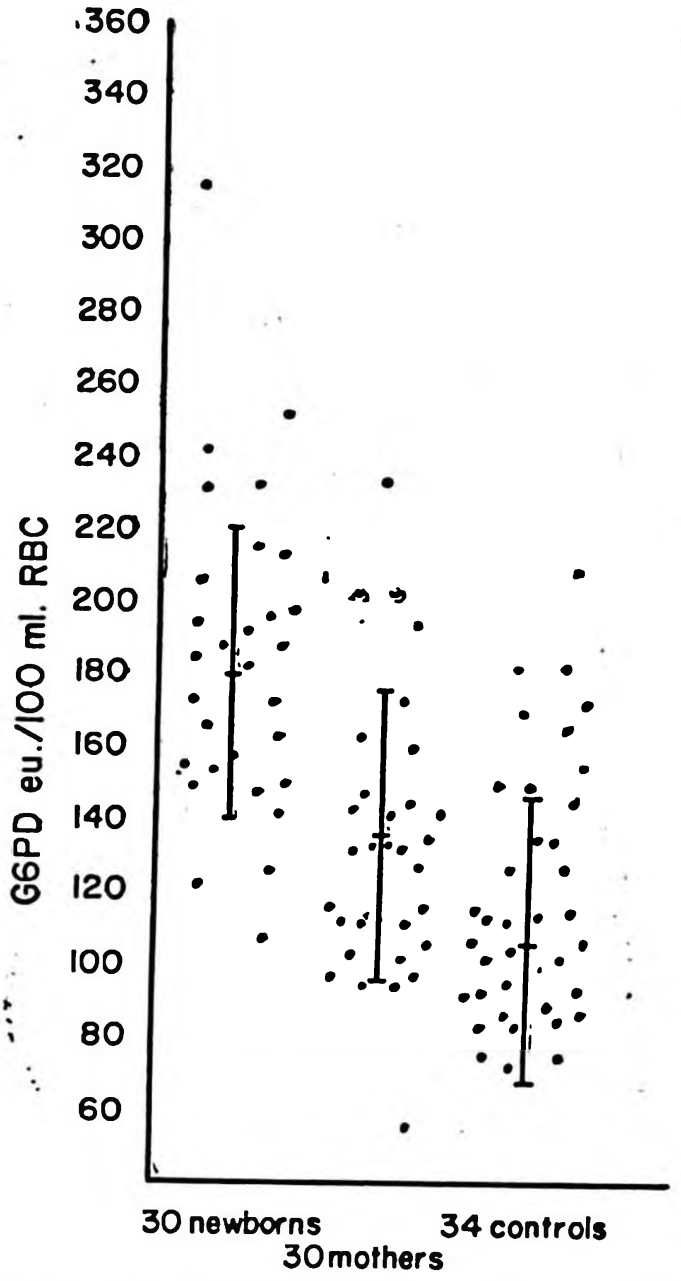

Figure 1. Erythrocyte G6PD levels in newborns, their mothers and controls.

Because it has recently been shown that the red cell G6PD activity is increased in iron deficiency anemia, [6] and with the exception of eight of our mothers all had hematocrit values lower than 34 per cent along with hypochromia and microcytosis, our findings could be explained by the iron deficiency anemia alone; however, this possibility will be studied further.

Summary

Erythrocyte G6PD activity was determined in 30 newborn babies and their mothers within 24 hours of parturition and com-

TABLE 1

MATERNAL HEMATOCRIT (Hct), RETICULOCYTE COUNT (Retics), G6PD LEVEL AND THE G6PD LEVEL OF THEIR RESPECTIVE NEWBORNS

Mother's				Newborn's
Name	Hct	Retics (%)	G6PD Level	G6PD Level
H. K.	23	0.8	111	150
F. K.	24	1.2	232	154
Ş. E.	31	1.4	134	159
M. S.	38	0.2	118.4	122.2
H. S.	39	2.2	103	147
Ç. B.	37	0.8	105	141
F. Y.	—	—	195	173
S. A.	36	0.2	58	197
G. B.	29	1.0	174	232
H. A.	28	2.6	143	193
N. Ö.	—	—	129	251
H. K.	26	1.8	201	241
S. K.	18	3.8	163.1	163
Ü. A.	30	1.0	90.6	194
Z. A.	31	1.4	142	214.6
A. D.	—	—	146.6	198
F. D.	21	2.0	141.3	188
S. Ö.	—	—	202	182
E. A.	23	0.8	140.5	231
A. E.	30	0.4	132	207
E. A.	31	1.0	160	315
K. T.	36	1.2	111	166
E. O.	—	—	133.5	185
Ş. A.	40	1.4	135	188
F. A.	26	1.0	97	173.9
N. Ö.	37	0.2	104.3	125.9
S. A.	32	0.8	117	216
M. A.	35	0.1	98	150
M.	28	1.0	116	108.1
H.	30	0.6	96.2	155
Mean			134 ± 6.8	184.4±7.6

pared with control female values. This enzyme was found statistically higher in the mothers than in the controls.

Acknowledgement

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