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Plasma Pyridoxal Phosphate Levels in Newborn Infants, Their Mothers and in the Mothers' Breast Milk

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ABSTRACT

Plasma pyridoxal phosphate (PLP) was determined in 10 newborn infants (two pairs of twins), their 8 mothers, and in addition in the mothers' breast milk. Mothers who did not take extra vitamin B-6 during pregnancy had lower levels of PLP both in plasma and in their milk. The infants' PLP decreased during the first two weeks of life when receiving only their mothers' milk. None of the mothers nor the infants showed any clinical signs of vitamin B-6 deficiency.

INTRODUCTION

The plasma levels of pyridoxal phosphate (PLP), the active form of vitamin B-6, decrease during pregnancy unless the mother takes extra pyridoxin (PN) (4, 6). The PLP level in cord blood shows a direct relationship to the plasma level of the mother (2). In breastfed infants the plasma levels decrease (1, 2) although the PLP content of breast milk increases during the first part of the lactation period (3, 8, 9). Breast milk from mothers giving birth prematurely usually has a higher protein content than term milk, but the vitamin B-6 content does not seem to be increased (3, 8).

We now report findings in ten newborn infants where PLP was determined at irregular intervals in the blood from infants, plasma and breast milk from their mothers during the first two weeks after delivery.

MATERIAL AND METHODS

The infants were all born at Sundsvall General Hospital after 30 to 39 weeks of gestation. There were two sets of twins born in the 35th week, otherwise no reason for premature birth was known. The infants received their own mother's milk and no additional formula. PLP determinations were performed on blood samples drawn on medical indications, hence at irregular intervals. No blood sample was taken only for the determination of PLP. Venous blood samples for plasma determinations of PLP were drawn from the mothers, capillary blood from the infants in EDTA-tubes and analysis performed on haemolysed whole blood, milk analysis on aliquots of 0.8 ml from one complete emptying of the breast

by an electric pump.

All mothers but one (no 3, table 1) had been supervised during pregnancy and a recommendation to take a multivitamin tablet daily had been given. Apparently not all the mothers complied with this recommendation.

PLP was determined according to Hamfelt (5) using apotyrosine decarboxylase and HPLC for separation of tyrosine and tyramine.

RESULTS AND DISCUSSION

Most mothers had rather low plasma levels of PLP. In our laboratory reference values are 20-60 nmol/l and only 3 of 8 mothers fell within these limits. The mothers with the lowest values did not take extra vitamins, whereas thoes with the highest had done so (Table 1). The plasma levels in the mothers were constant after delivery (Fig 1).

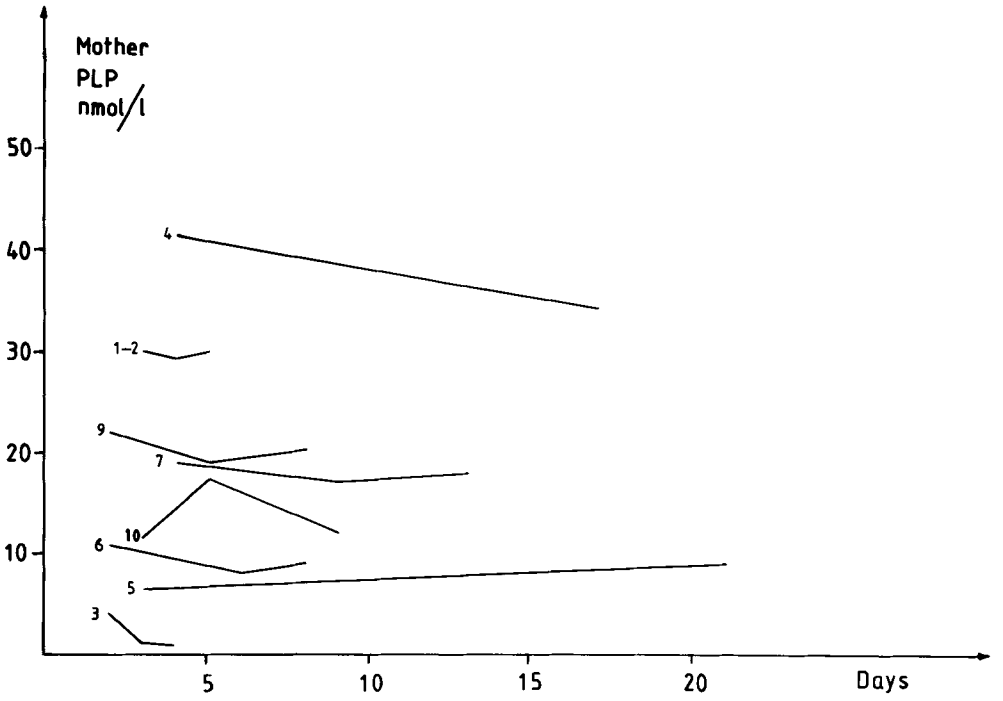

Fig. 1. Plasma levels of PLP in the mothers during the first weeks after delivery.

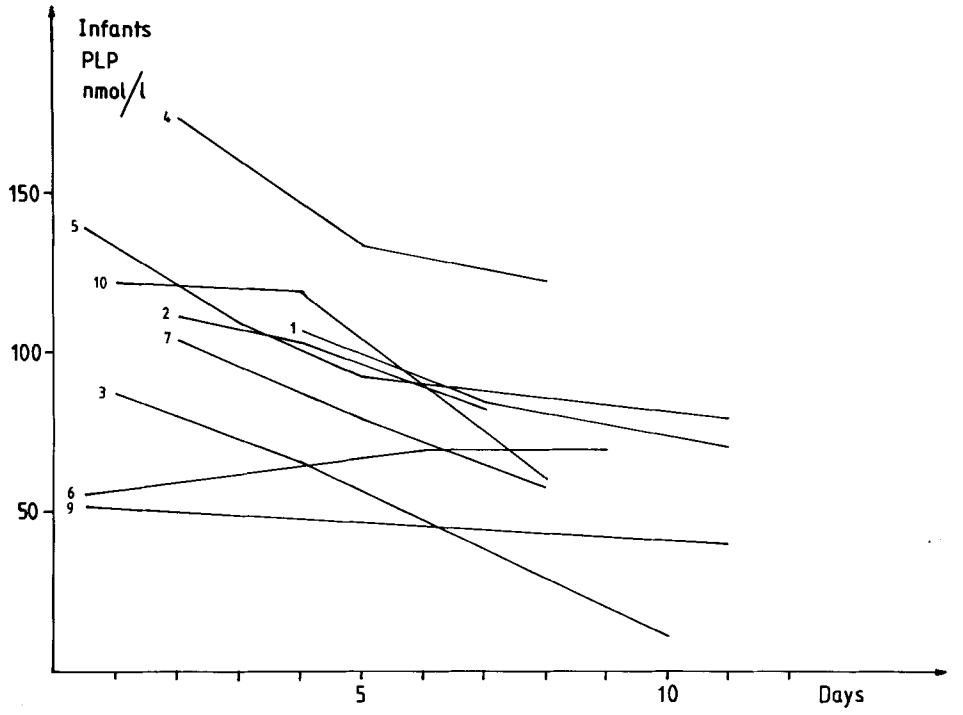

Fig. 2. Levels of PLP in the infants during the first 2 weeks of life.

The infants all showed high blood levels of PLP, or what might be considered "normal" for this age group. These levels decreased quite rapidly (Fig. 2).

The breast milk showed low levels for PLP during the very first days of lactation, but the levels increased in all but one case. After about 10 days the infants received extra vitamins including 0.5 mg PN daily. Reynolds and collaborators (7) have found that infants born before 30th week show a poor increase in PLP after PN orally. Our babies were older and all who were checked showed a good increase in PLP.

Plasma levels of PLP in women after delivery are low if the mothers do not take extra vitamin B-6 during pregnancy. The PLP in breast milk is comparatively low unless the mother has taken extra B-6. The newborn infants show relatively "normal" PLP levels soon after birth, but these levels decrease rapidly if the babies are fed only human milk and not given additional vitamin B-6. Thus both pregnant and lactating mothers and also prematurely born infants might profit from extra vitamin B-6, although it must be admitted that we have not seen any clinical signs of pyridoxin deficiency in our patients.

Table 1. Data on infants and mothers and PLP determinations att irregular intervals during the first 2 weeks after delivery.

Infant no	Gestation weeks	Birth weight g	PLP nmol/l									PN mg/day
			Infant blood			Breast milk			Mother plasma			During pregnancy
1	35	2210	108	85	71	40	55	54	30	29	30	2
2	35	1790	112	104	83							twins
3	30	1970	87	66	56	12	23	23	4.2	1.0	1.0	0
4	32	1890	175	134	125	145	173	137	42	36	34	4
5	33	2430	140	110	93	7	97	145	6.6		8.8	0
6	35	2750	56	70	69	10	37	24	11	8	9	0
7	35	2340	113	93	54	14	28	45	19	17	18	4
8	35	1930	105	79	58							twins
9	34	2455	52		40	9	22	98	22	18	21	2
10	39	3340	123	120	59	21	16	16	12	18	12	4 (?)

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