

## Hypocalcemia: Underlying Factors in Rural Area

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### ABSTRACT

**Aim:** To study the underlying factors of hypocalcaemia in infants coming from rural setting.

**Study design:** Cross-sectional survey

**Setting:** Department of Paediatric Medicine, Ghurki Trust Teaching Hospital

**Sample Size:** 150 cases

**Methodology:** 150 patients meeting the inclusion criteria were included. Complete history and examination was done and results were noted on a predesigned proforma for every patient. Serum sample for calcium was sent to the lab.

**Results:** A total of 150 infants having hypocalcaemia were studied. There were 98 males and 52 females. Majority of infants (63.3%) belonged to age group 8-10 months. Little sun exposure was observed in 8% cases. Feeding pattern showed prolonged exclusive breastfeeding in 82% cases. 54% had malnutrition. 64% infants received inadequate weaning according to their age.

**Conclusion:** Little sun exposure, prolonged exclusive breastfeeding, inadequate weaning and malnutrition are major risk factors for hypocalcaemia.

**Keywords:** Frequency, Factors, Hypocalcaemia, Infants

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### INTRODUCTION

Calcium is a biologically important mineral required to maintain stability of membranes, muscle contraction and enzymatic activity in nearly all the cells<sup>1</sup>. In infants, hypocalcemia is defined as serum levels below 8.8mg/dl (2.2mmol/L). The clinical presentation may range from asymptomatic biochemical abnormality to poor growth, skeletal deformities, tetany, irritability, life threatening laryngospasm or seizures; depending on the duration and severity of hypocalcaemia. Vitamin D deficiency is responsible for hypocalcaemia in majority of cases leading to nutritional rickets<sup>3</sup>. There is considerable evidence that low maternal levels of vitamin D are associated with adverse outcomes for both mother and fetus in pregnancy as well as in early infancy<sup>4</sup>. Lack of exposure to sunlight, prolonged breastfeeding without supplementation, no weaning at six months of age and malnutrition play an important role in development of hypocalcaemia and rickets<sup>5,6</sup>. Hypocalcaemia is a major problem in children of developing countries like Pakistan<sup>5,6</sup>. Hypocalcaemia can easily be prevented by increasing awareness regarding proper sun exposure, proper weaning and supplementation of calcium and vitamin D to lactating mothers and infants. This study addresses the determinants of hypocalcemia in a rural population. The results will be useful in planning preventive measures for 75% of country's population.

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### METHODOLOGY

One hundred and fifty patients, meeting the defined criteria were enrolled from paediatric outpatient department Ghurki Trust Teaching Hospital. Non-probability purposive sampling was done. All infants from 6 to 12 months, of either sex, with clinical hypocalcemia were included. However infants who were delivered preterm, infants taking cows or buffalos milk, infants already taking calcium or vitamin D supplements or those having complaints of diarrhea, jaundice or edema were excluded. Study was performed from July 2015 till December 2015 over a period of six months.

Informed consent was taken from parents. Approval from ethical committee was taken. Complete history was taken and examination was performed. A non-heparinized serum sample of 2 cc was taken and sent to laboratory for serum calcium level. Each infant having hypocalcaemia was assessed for feeding practices regarding exclusive breastfeeding or inadequate weaning, sun exposure and malnutrition. Information was recorded on structured proforma.

**Hypocalcaemia:** Infant presented with any of following signs and symptoms: skeletal deformities, tetany, irritability, poor growth, seizures and measured biochemically as serum calcium level is less than 8.8mg/dL (2.2 mmol/L) in infants beyond 7 days of life.

**Little sun exposure:** Sun exposure head and face < 30 minute/week.

**Prolonged exclusive breastfeeding:** Infants only on mother's milk after the age of 6 months without any weaning.

**Inadequate weaning:** Not on adequate solid or semi-solid diet other than milk after the age of 8 months.

**Malnutrition:** Weight <5th centile according to age.

All the findings were analyzed using SPSS version 21.

## RESULTS

During study period a total of 150 infants of hypocalcaemia were studied in Department of Paediatric Medicine, Ghurki Trust Teaching Hospital, Lahore. There were 98 males (65.3%) and 52 (34.7%) females. There was male predominance [male to female ratio 1.9:1]. Majority of infants belonged to age group 8-10 months, 95 (63.3%), followed by patients 11-12 months, 55 (36.7%). The mean  $\pm$  standard deviation was 10.0 $\pm$ 1.5 months, 104 infants (69.3%) had weight between 6.2-9 kg and 27 infants (18%) had weights between 9.2-11 kg and 19 infants (12.7%) had weight between 4-6 kg. Mean weight of the infants was 7.98 $\pm$ 1.37 kg.

Little sun exposure was observed in 12 (8%) cases. Feeding pattern showed prolonged exclusive breastfeeding in 123 (82%). Eighty one (54%) had malnutrition. Ninety six (64%) infants received inadequate weaning according to their age (Tables 1). P-value was calculated using the Chi square test. It was significant for little sun exposure (0.00), prolonged exclusive breast feeding (0.00) and inadequate weaning (0.001) Table-1.

Table 1: Frequency factors associated with Hypocalcaemia in Infants (n=150)

Determinants of hypocalcaemia	Yes	No	P value
Little sun exposure	12(8%)	138(92%)	.000
Prolonged exclusive breast feeding	123(82%)	27(12%)	.000
Inadequate weaning	96(64%)	54(36%)	.001
Malnutrition	81(81%)	69(19%)	.327

## DISCUSSION

Hypocalcaemia is a very common problem in infants. Little sun exposure, prolonged exclusive breast feeding, inadequate weaning and malnutrition are the major factors associated with Vitamin D deficiency, thus resulting in low serum calcium levels<sup>3,4</sup>. In the present study the mean age at time of presentation was 10 $\pm$ 1.5 month. The majority of infants (63.3%) were between 8-10 months, with a male predominance. These findings are consistent with results by Binmohana and Khan<sup>7,8</sup>.

Inadequate exposure to sunlight is an important factor associated with the development of vitamin D-deficient rickets. Our study results also showed that

it's a significant factor in causing hypocalcaemia (p 0.00). This result is in harmony with previous studies<sup>5,6,7,8</sup>. Our study results showed that 82% infants received prolonged exclusive breastfeeding (p 0.00) while 64% had received inadequate weaning (p 0.001), both the variables were statistically significant. These results are comparable with observations made in previous studies<sup>9,10,11</sup>. Fifty four percent of infants had malnutrition; which is comparable to a study by Khattak in Peshawar<sup>12,13</sup>.

## CONCLUSIONS & RECOMMENDATIONS

Our study concluded that hypocalcaemia is common in infants. Little sun exposure, prolonged exclusive breastfeeding, malnutrition, inappropriate weaning were identified as significant risk factors. These factors can be easily addressed through public health education and thus hypocalcaemia and its complications can be prevented, leading to significant reduction in the morbidity.

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