



**A CASE CONTROL STUDY: CLINICAL PROFILE AND ASSOCIATED FACTORS OF PICA IN CHILDREN ATTENDING A TERTIARY CARE HOSPITAL OF PIPARIA, GUJARAT**

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**ABSTRACT**

**Background:** There are various hypotheses regarding the persistence of pica, including hunger, psychopathology, cultural beliefs, and micronutrient deficiencies. Pica can cause accidental poisons, ulcerations, recurrent chest infections, anemia, and parasitic infestation etc.

**Method:** This case control study was conducted in Dhiraj Hospital Gujarat among 50 children with PICA and 50 children without PICA. The socio-demographic details was collected in a predefined questionnaire. Blood sample was collected for serum levels of iron, zinc and calcium.

**Results:** Onset of pica was during 13 to 24 months. Most common substance was clay (76.0%). Mothers' education and family history were significantly associated with development of pica. Serum iron, zinc and calcium were significantly lower in children with pica than control group.

**Conclusions:** Family history of pica, education of mothers are major contributing factors for pica. Serum Iron, zinc and calcium were lower in children with pica.

**KEYWORDS :** PICA, anaemia, zinc, calcium, iron

**INTRODUCTION**

Pica is defined as “persistent and compulsive eating of non-nutritive substances for a period of at least one month at age, at a developmental stage in which the behaviour is inappropriate, and occurs in a culture that does not sanction such behaviour.<sup>1</sup> There are various hypotheses regarding the persistence of pica, including hunger, psychopathology, pathogen protection, cultural beliefs, and micronutrient deficiencies.<sup>1-4</sup> Pica can cause accidental ingestion of poisons, ulcerations, mechanical bowel problems, recurrent chest infections, anemia, parasitic infestation, potassium abnormalities etc.<sup>5-7</sup> This study was undertaken to determine the association between pica and various socio demographic determinants and also relationship of pica with serum levels of Fe, Zn and Ca.

**METHODS**

This case control study was conducted in the Department of Paediatrics, Dhiraj Hospital Gujarat, for one year (January 2018 to January 2019) after approval from institutional ethical committee clearance. Total 50 cases (children with pica) and 50 controls of 1-5 years old were included in the study after getting written informed consent from parents. Healthy children who don't have pica, came for vaccination during the study period were considered as control.

The socio demographic details were collected in a predefined questionnaire through interviewing of mother or caretaker of child. Two ml blood was collected for estimation of the serum levels of iron, zinc and calcium. Children with hemoglobinopathies (Sickle cell anaemia, Thalassemia etc), mental subnormality, developmental delay, severe malnutrition were excluded.

**STATISTICAL ANALYSIS:** The data was entered into Microsoft excel 2010 spreadsheet and analyzed using EPI INFO Ver.7 software. Chi square and Z test were used. The “p” values less than 0.05 was considered as significant.

**RESULT**

Total 50 cases of PICA and 50 age and gender matched controls were enrolled in the study. Age and gender distribution was similar in both groups.

**Table 1: Characteristics in children with PICA**

PICA characteristics	No of cases	Percentage (%)
Age of Onset		
< 13	4	8.0

13 to 24	42	84.0
25-36	3	6.0
>36	1	2.0
<b>Duration of Ingestion</b>		
< 13	40	80.0
13 to 24	9	18.0
>24	1	2.0
<b>Substance</b>		
Clay	38	76.0
Charcoal	27	54.0
Stone	20	40.0
Paper	14	28.0
Clothes	12	24.0
Tooth paste	8	20.0
<b>No of substance ingested</b>		
1	5	10.0
2	23	46.0
3	20	40.0
>3	2	4.0
<b>Frequency of Ingestion (/day)</b>		
< 3	11	22.0
3 to 5	23	46.0
>5	16	32.0
<b>Presenting complaint</b>		
PICA (direct history)	31	62.0
PICA (indirect history)	19	38.0
Pain abdomen	16	32.0
Poor appetite	14	28.0
Cough	12	24.0
Pallor	12	24.0
Diarrhoea	5	10.0
Vomiting	4	8.0

Characteristics of children with PICA were shown in table 1. Majority of children have pica at the age 13 to 24 months (42, 84.0%). Most commonly ingested substance was clay (38, 76.0%), charcoal (27, 54.0%), stone (40.0%), paper (14, 28.0%), clothes (12, 24.0%), toothpaste (8, 16.0%).

**Table 2: Comparison of various characteristics between cases and controls**

Characteristics	Cases N (%)	Control N (%)	p value
Age	29.31 ± 5.44	30.54 ± 4.45	p > 0.05

<b>Gender</b>			
Male	34 (68.0%)	34 (68.0%)	
Female	16 (32.0%)	16 (32.0%)	P = 1.00
<b>Residence</b>			
Semi urban	10 (20.0%)	18 (36.0%)	X <sup>2</sup> = 3.68
Rural	34 (68.0%)	29 (58.0%)	p = 0.15
Urban	6 (12.0%)	3 (6.0%)	
<b>Mother Education</b>			
Illiterate	27 (54.0%)	12 (24.0%)	X <sup>2</sup> = 9.45
literate	23 (46.0%)	38 (76.0%)	p = 0.002
<b>Mother Occupation</b>			
Housewife	35 (70.0%)	28 (56.0%)	X <sup>2</sup> = 2.10
Working	15 (30.0%)	22 (44.0%)	p = 0.14
<b>Socio economic status</b>			
Upper	0 (0.0%)	0 (0.0%)	X <sup>2</sup> = 1.00
Middle	22 (44.0%)	27 (54.0%)	p = 0.31
Lower	28 (56.0%)	23 (46.0%)	
<b>Family history of PICA</b>			
Yes	8 (16.0%)	2 (4.0%)	X <sup>2</sup> = 4.00
No	42 (84.0%)	48 (96.0%)	p = 0.04
<b>Family Type</b>			
Joint	16 (32.0%)	24 (48.0%)	X <sup>2</sup> = 2.66
Nuclear	34 (68.0%)	26 (52.0%)	p = 0.10
<b>Complementary feed at appropriate age</b>			
Yes	39 (78.0%)	43 (86.0%)	X <sup>2</sup> = 1.08
No	11 (22.0%)	7 (14.0%)	p = 0.29
<b>Birth Order</b>			
1 <sup>st</sup>	22 (44.0%)	18 (36.0%)	X <sup>2</sup> = 1.14
2 <sup>nd</sup>	26 (52.0%)	28 (56.0%)	p = 0.56
≥ 3rd	2 (4.0%)	4 (8.0%)	

Table 2 shows demographic factors associated with PICA. Out of 50 cases, 27 (54.0%) mothers of children with PICA were illiterate while only 12 mothers (24.0%) of control group were illiterate. This difference was statistically significant. (p = 0.002). Family history was present in 8 (16.0%) children of case group and 2 (4.0%) children of control groups (p=0.04). Other factors such as residence, mother occupation, family type, and birth orders were not significantly associated with PICA.

Total 39 (78.0%) children with pica had anaemia while only 13 (26.0%) children in control group had anaemia (p < 0.0001). Serum iron and hemoglobin was also significantly lower in children with pica as compared to control group (case v/s control; Hb - 9.12 ± 1.21 gm/dl v/s 11.8 ± 1.11 gm/dl, p < 0.001; S. Iron - 34.21 ± 6.72 MCG/DL v/s 65.81 ± 9.11 MCG/DL, p < 0.001). Children with pica had also low zinc and calcium as compared to children in control group.

**Table 3: Comparison of serum electrolyte among case and control**

Electrolyte	Cases	Control	P value
Hb (gm/dl)	9.12 ± 1.21	11.8 ± 1.11	< 0.001
Serum Iron (mg/dl)	34.21 ± 6.72	65.81 ± 9.11	< 0.001
Plasma Zinc (mg/dl)	75.54 ± 16.7	88.31 ± 13.45	< 0.001
Serum Calcium (mg/dl)	8.41 ± 0.33	8.91 ± 0.54	< 0.001

**DISCUSSION**

In the present study, both the groups were comparable with respect to age and gender. Onset of pica was during 13 to 24 months. Most frequently ingested substance was clay (76.0%), charcoal (54.0%), stone (40.0%) and paper (28.0%). About 86.0% children had habit of PICA of 2-3 substance. Most common complaint was abdominal pain (32.0%), poor appetite (28.0%) and cough (24.0%).

Pasupathy S et al. also observed similar characteristics in their case control study. In their study, nearly 3/4<sup>th</sup> children had pica at 13-24 months (72.5%). About 82.4% children ingest 2-3

substances. Soil is the most common type of substance (49%) followed by paper (33.3%) and stone (23.5%).<sup>8</sup> In the study of Ravinder et al study, clay was most commonly ingested substance. The most common presenting complains were cough (30 %), abdominal pain (34 %), poor appetite (26 %), pallor (19%), diarrhoea (17%) and vomiting (12%).<sup>9</sup>

In the present study, mothers' education and family history of pica were significantly associated with development of pica. More than half of mothers of children with pica (54.0%) were illiterate while only 24.0% of control group were illiterate (p = 0.002). Family history was present in 16.0% children of case group and 4.0% children of control groups (p=0.04). Other factors such as residence, mother occupation, socio economic status, family type, complementary feeding at appropriate age and birth orders were not significantly associated with PICA.

Pasupathy S et al. reported that family history of pica was present in 11.8% of case group as compared to 2.0% of control group. (p=0.04).<sup>8</sup> Ravinder et al study also reported that 44% of children with pica had family history of Pica.<sup>9</sup>

In the present study, anaemia was more prevalent in children with pica (78.0%) with mean HB of 9.12 ± 1.21 gm/dl as compared to control groups (26.0%, p < 0.0001) with mean Hb of 11.8 ± 1.11 gm/dl. Serum iron was also significantly lower in children with pica (34.21 ± 6.72 MCG/DL) than control group (65.81 ± 9.11 MCG/DL, p < 0.001).

In the study of Pasupathy S et al, anaemia was observed in 82.3% children of pica group with mean Hb 9.38±1.55 gm/dl while only 31.4% of children with control group had anaemia with mean Hb 11.68±1.20 gm/dl (p < 0.001).<sup>8</sup> Gupta N et al, also observed less Hb in children with pica (8.4±1.4gm/dl) than control group (9.4±1.4gm/dl).<sup>15</sup> There was low serum iron levels (31.27 ± 20.68 MCG/dl) in the pica group as compared to control group (66.92 ± 24.31MCG/dl, p < 0.001). Gupta N et al, also showed low serum iron (43.3±10.4 MCG/DL) in children with pica than non-pica group (51.4±10.7 MCG/dl, p < 0.001).<sup>10</sup> Ravindra et al. observed that hemoglobin levels were less than 8 gms/dl in 34.5 % of pica children compared with 12% in control for children.<sup>9</sup>

In the present study, zinc and calcium were low in children with pica as compared to children in non pica group (case v/s control; S. Zinc - 75.54 ± 16.7 MCG/DL v/s 88.31 ± 13.45 MCG/DL, p < 0.001; S. calcium - 8.41 ± 0.33 mg/dl v/s 8.91 ± 0.54 mg/dl, p < 0.001).

In the study of Pasupathy et al. mean serum zinc was 74.68±19.26 in pica group which was low as compared control group (86.29±14.18Mg/dl). Mean calcium in children with pica (8.68 ± 0.54 mg/dl) was significantly low than control group (8.94 ± 0.51mg/dl, p = 0.014).<sup>8</sup> Gupta N et al, reported plasma zinc in children with pica was 58.8±13.9 MCG/dl which was about 45% lower than control group mean zinc (104.4±11.8Mg/dl).<sup>10</sup>

**CONCLUSION**

Family history of pica, education of mothers are major contributing factors for pica. Children had onset at 13-24 months age for period of less than 1 year and ingest 2-3 substances at a frequency of 3-5 times per day. The children with pica are prone to anaemia. Serum Iron, zinc and calcium were lower in children with pica.

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**DECLARATIONS**

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**Conflict of interest:** None declared

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