

## ORIGINAL RESEARCH

# Pica in Rural Obstetric Population: An Underestimated Nutritional Mystery

<sup>1</sup>Bhavna Kumare, <sup>2</sup>Savita Somalwar, <sup>3</sup>Nikita Vijay

## ABSTRACT

**Objective:** To determine the prevalence of pica during pregnancy, maternal hemoglobin levels at delivery and the association of pica with low birth weight and preterm birth.

**Study design:** A descriptive cross-sectional study.

**Subjects/setting:** Two hundred pregnant women aged 18 to 35 years admitted in labor room of Department of Obstetrics and Gynecology, NKPSIMS.

**Study duration:** 1 March 2012 to 28 February 2013.

Main outcome measures—maternal hemoglobin at delivery, mean birth weight and mean gestational age were compared in pica and no pica group.

**Statistical analysis:** Mean, percentage and chi-square test (for paired data).

**Results:** Seventeen percent of these pregnant women practiced pica. The most common pica substance that was consumed was chalk (44.1%) and clay (38.2%). Women in pica group had lower hemoglobin levels  $8.63 \pm 1.12$  gm% (mean  $\pm$  SD) at delivery than women who did not report pica ( $10.03 \pm 0.96$  gm%). There was no difference in mean birth weight and gestational age of neonates born to women with pica group and no pica group.

**Conclusion:** The findings suggest that pica practices are associated with significantly lower maternal hemoglobin levels at delivery, but are not associated with low birth weight and preterm birth.

**Keywords:** Anemia, Pica, Pregnancy.

**How to cite this article:** Kumare B, Somalwar S, Vijay N. Pica in Rural Obstetric Population: An Underestimated Nutritional Mystery. J South Asian Feder Obst Gynae 2014;6(2):71-74.

**Source of support:** Nil

**Conflict of interest:** None declared

## INTRODUCTION

Nutrition during pregnancy is one of the neglected and overlooked issues, especially in developing countries. Of

all nutrition disorder with psychological and medical implications, pica is perhaps the most fascinating; the least well understood behavior with serious health effects. Pica, an age old eating disorder is described as a chronic (more than 1 month) behavior of craving and subsequent purposive consumption of non-nutritive substances (such as earth, clay, chalk, soap, ice, etc).<sup>1</sup> The word 'Pica' is Latin for Magpie, a notorious bird known for its strange eating behavior.

There has been no single agreed-upon explanation of the cause of such behavior but a combination of biochemical, psychological and cultural factors may be at work. Its association with iron deficiency anemia is widely recognized. While pica can imply the consumption of a range of substances, geophagy, the consumption of earth, is among the most common type of pica.<sup>2</sup>

Pica in children has been studied in detail, but pica during pregnancy remains understudied and underreported.<sup>3</sup> The published data reveal prevalence of pica during pregnancy between 8 and 65%.<sup>4</sup> One reason that pica remains poorly understood is that neither its prevalence nor social and biological correlates have been well characterized. Secondly, pica is frequently either overlooked by health professionals, or is not disclosed by consumers or both.

Pica during pregnancy is a worldwide phenomenon, but there are no detailed descriptions of practice in Indian pregnant women so far. The aim of this study was to present the first evidence of prevalence of pica in rural obstetric population and to determine the association of pica with low hemoglobin at delivery, preterm birth and low birth weight of babies.

## AIMS AND OBJECTIVES

- To determine the prevalence of pica during pregnancy.
- To determine association of pica with maternal hemoglobin levels, birth weight of baby and gestational age at delivery.

## MATERIALS AND METHODS

*Research design:* Descriptive, cross-sectional study.

*Research setting:* Department of Obstetrics and Gynecology, NKP Salve Institute of Medical Sciences, Nagpur, Maharashtra, India.

*Duration of study:* One year (March 2012-February 2013).

<sup>1-3</sup>Lecturer

<sup>1-3</sup>Department of Obstetrics and Gynecology, NKP Salve Institute of Medical Sciences and Research Centre, Nagpur Maharashtra, India

**Corresponding Author:** Bhavna Kumare, Lecturer, Department of Obstetrics and Gynecology, Plot 57, Prithviraj Nagar Beltarodi Road, Nagpur-440034, Maharashtra, India, Phone: 9860460980, 07103-203010, e-mail: bhavnakumare@gmail.com

**Research population and sample size:** Two hundred pregnant women aged 18 to 35 years who were admitted in hospital for delivery were included in the study.

**Inclusion criteria:** Pregnant women aged between 18 and 35 years who got admitted to antenatal ward for delivery at the hospital.

**Exclusion criteria:** Nonpregnant women, pregnant women with antepartum hemorrhage, Pre-eclampsia, Multiple pregnancies, hemoglobinopathies, malaria or dengue fever and those who refused to participate.

Purposive sampling was used in this observational cross-sectional study. All participants gave informed consent and then were interviewed about usual food habits, cravings and ingestion of non-food substance. Blood sample for measurement of hemoglobin was collected on admission in the hospital and gestational age at delivery and birth weight of the neonate were noted. These 3 variables were compared for women who reported pica and women who did not. We defined anemia during pregnancy as hemoglobin below 10.5 gm/dl, which is further divided into mild, moderate and severe. Preterm birth is less than 37 completed weeks of pregnancy and low birth weight as weight of baby less than 2.5 kg. Continuous variables were reported as medians (ranges), categorical variables as percentages or relative risk ratios (95% confidence intervals (CI)] as required and Chi-square tests (for paired data). Statistical significance was set at  $p < 0.05$ .

**OBSERVATIONS AND RESULTS**

We have summarized the baseline characteristics for both mother with pica and those without pica in Table 1. Of the 200 women interviewed a total of 34 (17%) reported pica as a part of their lifestyles. The mean age of pregnant women was 23 years (19-32 years). The majority (71.5%) of the women had completed 5 to 8 years of primary education. Almost three quarters (75%) were not employed and were housewives. Majority (91%) of the pregnant women in the study had low monthly household income and were principally

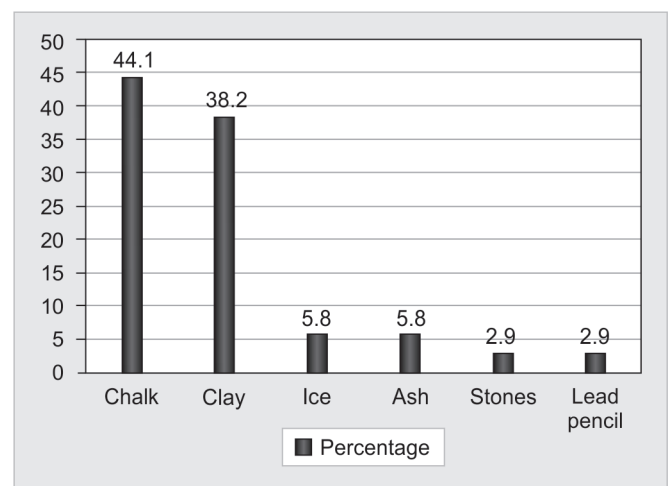
**Table 1:** Demographic characteristics of study population

Demographic profile	Nonpica group (%) (n = 166)	Pica group (%) (n = 34)
<b>Education</b>		
• Less than high school	69.2 (115)	82.3 (28)
• High school	21.0 (35)	14.7 (5)
• Graduate	8.4 (14)	2.9 (1)
• Postgraduate	1.2 (2)	0
<b>Household income</b>		
• Up to ₹ 10,000/-	98.1 (161)	97 (33)
• More than 10,000/-	3.0 (5)	2.9 (1)
<b>Employment</b>		
• Unemployed	83.1 (138)	94.1 (32)
• Employed	16.8 (28)	5.8 (2)

from rural parts of Nagpur. Most of the women knew of cravings associated with pregnancy but were unaware of abnormal cravings and eating habits arising in pregnancy. Very few women (5.8%) with pica had relatives at home who practiced pica.

Specific items ingested are shown in Graph 1; six substances were reported by participant as pica substance. Eight women (23.5%) described strong cravings for traditional pica items such as clay, chalk which they ignored. The reasons given for not eating a craved pica substance: that it was unhygienic in pregnancy. They were not included in the study as they had not eaten the said pica substance. The most common pica substance that was consumed was chalk (15 out of 34) and clay (13 out of 34) which is grouped under geophagy (28 of 34 women or 82.3%). The other pica substances like ash, ice, stones, lead pencil were less common. The reason for eating chalk was for its taste (93%) and so for clay was its smell (70%). The prevalence of pica was higher in second (19 of 34 women or 55.8%) and third trimester (13 of 34 women or 38.2%) compared to first trimester (2 of 34 women or 5.8%). Women never disclosed their pica practices to their clinician and none of women were ever asked by their clinicians about their normal and abnormal cravings or eating habits in pregnancy.

As shown in Table 2, comparison between the two groups (pica and no pica group) were made using Chi-square test (for paired data). Women in pica group had lower hemoglobin levels at delivery than women who in no pica group which is highly significant ( $p < 0.001$ ). Table 3, shows that Pica, especially geophagy was associated with a marginally increased risk of mild (64.6%) and moderate anemia (23.5%). Geophagy was not associated with the risk of developing severe anemia (2.9%). There was no difference in mean birth weight or mean gestational age of infants born to women from pica group and no pica group.



**Graph 1:** Frequency of nonfood substance (pica) consumed by pregnant women in the study (n = 34)

**Table 2:** Relationship of pica with anemia, preterm birth and low birth weight of neonate

Variable	Odds ratio (95% CI)	$\chi^2$	p-value (two-tailed)
Anemia (Hb <10.5 gm%)	0.02 (0.00, 0.08)	95.23	0.001
Preterm birth (<37 weeks)	0.87 (0.52, 1.46)	0.15	0.69
Neonatal weight (<2.5 kg)	0.68 (0.41, 1.10)	2.15	0.14

**Table 3:** Grades of anemia in pica and nonpica groups

Grades of anemia (Hb-gm%)	Nonpica group (%) (n = 166)	Pica group (%) (n = 34)
No anemia (10.5-12)	37.9 (63)	5.8 (2)
Mild anemia (8.1-10.4)	58.4 (97)	64.6 (23)
Moderate anemia (6.1-8)	3.0 (5)	23.5 (8)
Severe anemia ( $\leq 6$ )	0.6 (1)	2.9 (1)

## DISCUSSION

About 17% of rural pregnant women with low income attending tertiary care hospital reported regularly practicing pica at Nagpur in India. Chalk and clay, which are grouped in geophagy, were the most common pica substances consumed by the pregnant women. We also found that chalk and clay consumption were significantly associated with increased risk of low hemoglobin levels from cross-sectional analyses. Pica practices were not related to adverse pregnancy outcome in our study.

We characterized sociodemographic correlates of pica. Pregnant women's age, education and household income were not related to the prevalence of pica. Previous studies in sub Saharan Africa reported eating clay soil during pregnancy.<sup>5-7</sup> These findings confirm the belief that clay eating is widely accepted practice among pregnant women in developing countries. Studies in West, especially, Mexico and Argentina, however, differ in the type of pica substance consumed where ice, freezer frost (Pagophagy) and laundry starch (Amylophagy) were the most common pica substance consumed by pregnant women.<sup>3,8</sup> The only similarity, with our study which was found was that the women in these studies were from low socioeconomic status and ethnic minority.<sup>3</sup>

We observed higher prevalence of pica (chalk and clay) in second trimester (55.8%) followed by third trimester (38.2%). This finding is in agreement with a prospective study conducted at Rio de Janeiro on 227 pregnant women, where the onset of pica occurred in the second trimester in 46.7% of the cases, and in the third trimester, in 30% of them.<sup>8</sup> A possible explanation for this might be that, the onset of pica practices in second trimester may indicate women's response to an increased physiologic need for iron because of an increase in red blood cell mass and growth of fetus.<sup>5</sup> However, a recent large study conducted on 1014 puerperal women in Argentina observed onset of pica in first months of pregnancy.<sup>9</sup> It is difficult to explain this result and further work is required to establish this issue.

We found that anemia was strongly associated with the prevalence of pica. More importantly, geophagy was associated with decreased hemoglobin concentration and a marginally increased risk of mild to moderate anemia.<sup>5</sup> The cross sectional association of geophagy with anemia among pregnant women has been reported from Mexico,<sup>3</sup> Tanzania<sup>5,10</sup> Argentina.<sup>9</sup> One small Indian study conducted in Karnataka on 180 pregnant women from lower socio-economic strata also showed low hemoglobin level who practiced pica, however, the prevalence was low (5%) and substance commonly consumed were ice, raw rice, tamarind seed and chalk.<sup>11</sup>

Most of the studies in literature showed that anemia is the strongest and most persistent nutrition risk associated with pica practice. But, there has been a long debate over the direction of the association, whether anemia predisposes a woman to pica or whether anemia is the consequence of pica. However, pica is a frequent symptom found in iron deficiency anemia.<sup>12</sup> There is also an ongoing debate regarding whether geophagia is nutritionally beneficial or detrimental, however, our study showed that it may be harmful and could result in anemia.

In this study, we found that pica practices were not associated with adverse health parameters for neonate like a low birth weight or preterm birth. This finding is in agreement with prospective studies conducted on 1,014 puerperal women in Argentina and on 227 pregnant women in Rio de Janeiro.<sup>8,9,13</sup> No studies examined the effect of soil consumption on pregnancy outcome in sub-Saharan Africa or in south Asian countries.

We recognize that there are several limitations to our study. In this study, anemia was graded into mild, moderate and severe degree simply on hemoglobin estimation. The typing of anemia with complete blood count, peripheral smear and measurement of iron stores with serum ferritin level was not done which could have given better idea on association of pica with iron deficiency anemia. Secondly, stool specimens for detecting eggs, larvae, or cyst of parasitic infections were not undertaken which might have helped in knowing the prevalence of these infections along with pica since geophagy was so common in our study. Lastly, though the women were treated for anemia, disappearance of their pica symptoms was not confirmed. This, in particular, could have given reasonable knowledge on the cause and effect theory of pica and anemia.

The present study confirms previous findings and contributes additional evidence that suggest that women who practise pica during pregnancy carry a potential risk of developing anemia. The nutritional implication can be benign or life-threatening depending on the substance ingested. Most serious complications found in literature are lead poisoning (lead based paints), severe anemia (starch and clay) and intestinal obstruction (hair, stones). No laboratory test exists that confirms or rules out the diagnosis of pica, however, a complete blood count, zinc levels, lead levels and stool examination must be considered. Most of the treatments are aimed at education and behavior modification. Because of the multifaceted nature of the behavior, further confirmatory studies are needed to examine correlation of pica with parity and different trimester of the pregnancy.

## CONCLUSION

Pica is an indicator of nutrition and health risk, more prevalent than realized and often goes unrecognized. The diagnosis of anemia often precedes the identification of pica as women do not volunteer such information and fail to view this behavior as anything unusual, harmful or worth reporting. Additionally, the issue of pica is rarely addressed by health care providers probably because of little knowledge about the disorder. Its diagnosis consists in inquiring pregnant women at each prenatal visit and discouraging the practice as a preventive measure, especially in countries where anemia is one of the important causes of maternal morbidity and mortality.

## REFERENCES

1. Young SL. Pica in pregnancy: new ideas about an old condition. *Annu Rev Nutr* 2010 Aug 2;30:403-422.

2. Nyaruhucha CN. Food cravings, aversions and pica among pregnant women in Dares Salaam, Tanzania. *Tanzan J Health Res* 2009;11(1):29-34.
3. Simpson E, Mull JD, Longley E, East J. Pica during pregnancy in low income women born in Mexico. *West J Med* 2000;173(1):20-24.
4. Lopez LB, Ortega Soler CR, de Portela ML. Pica during pregnancy: a frequently underestimated problem. *Arch Latinoam Nutr* 2004;54(1):17-24.
5. Kawai K, Saathoff E, Antelman G, Msamanga G, Fawzi WW. Geophagy (Soil-eating) in Relation to Anemia and Helminth Infection among HIV-Infected Pregnant Women in Tanzania. *Am J Trop Med Hyg* 2009;80(1):36-43.
6. Luoba AI, Geissler PW, Estambale B, Ouma JH, Alusala D, Ayah R, et al. Earth-eating and reinfection with intestinal helminths among pregnant and lactating women in western Kenya. *Trop Med Int Health* 2005;10(3):220-227.
7. Adam I, Khamis AH, Elbashir MI. Prevalence and risk factors for anaemia in pregnant women of eastern Sudan. *Trans R Soc Trop Med Hyg* 2005;99(10):739-743.
8. Saunders C, Padilha Pde C, Della Líbera B, Nogueira JL, Oliveira LM, Astulla A. Pica: epidemiology and association with pregnancy complications. *Rev Bras Ginecol Obstet* 2009;31(9):440-446.
9. López LB, Marigual M, Martín N, Mallorga M, Villagrán E, Zadorozne ME, et al. Characteristics of pica practice during pregnancy in a sample of Argentine women. *J Obstet Gynecol* 2012;32(2):150-153.
10. Young SL, Khalfan SS, Farag TH, Kavle JA, Ali SM, Hajji H, et al. Association of pica with anemia and gastrointestinal distress among pregnant women in Zanzibar, Tanzania. *Am J Trop Med Hyg* 2010;83(1):144-151.
11. Garg M, Sharma R. Prevalence of pica practices among pregnant women in and around Manipal, Udipi District, Karnataka. *Health & Population Perspective* 2012;33(2)86-95.
12. Cengiz B, Kursat K, Ahmet I, Esin B. Pica: a frequent symptom in iron deficiency anemia. *Arch Med Sci* 2009;5(3):471-474.
13. Lopez LB, Langini SH, Pita de Portela ML. Maternal iron status and neonatal outcomes in women with pica during pregnancy. *Int J Gynaecol Obstet* 2007;98(2):151-152.