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# Effects of Different types of Pica substances on Maternal and Fetal Outcome- A prospective study

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***Abstract:*** *The present study was carried out to study effects of different types of pica substances on maternal and fetal outcome. Of total 150 pregnant women were studied, 6.7% of the subjects reported to have pica. The prevalence of different types of pica substances are ice is 50%, soil is 30% and clay is 20%.The outcomes measured were anemia, prematurity, low birth weight and intrauterine fetal growth restriction. Results showed that hemoglobin levels in women with pica for soil, clay and ice during pregnancy were lower compared to non-pica group. There is significant difference in birth weight, birth length and head circumference in different types of pica compared to non-pica group. There is no significant difference in mean gestational age between pica and non-pica group .Present study recommends that as pica diagnosis during pregnancy is inexpensive and be included in prenatal care, its early diagnosis would contribute to the identification of pregnant women who could be at increased risk of anemia, intrauterine growth restriction and low birth weight. It is recommended that effort should be made to diagnose pica in early pregnancy so that adverse effects can be prevented.*

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## I. Introduction

Pregnancy is often associated with pica and food cravings. Pica is an eating disorder which is characterized by persistent urge to eat non-nutritive substances such as paper, earth, clay, metal, chalk soil, glass and sand [1-4].

Pica subtypes are characterized by substance eaten-Geophagia(Dirt, soil ,clay), Amylophagia(Starch), Pagophagia(Ice),Geomelophagia(Raw potatoes ), Hyalophagia(Glass), Lithophagia(Stones ), Trichophagia(Hair ), Plumbophagia(Lead paint ,chips ), Cautopyreiophagia(Burnt matches ) **[6].**

The prevalence of pica in pregnant women has been reported from as low as 0% to as high as 68% in the various group studied [3 ].

The medical consequences, if any of pica for mother and fetus vary with the nature of the substance ingested[8].Effects on the mother could include dental injury, constipation, intestinal obstruction, dysfunctional labor due to fecal impaction, parasitic infections, toxemia, interference with the absorption of minerals, lead poisoning and hyperkalemia [3,5].Possible effects on the fetus include prematurity, perinatal mortality ,low birth weight, irritability, decreased fetal head circumference and exposure to chemicals such as lead, pesticides and herbicides[3]. These may be avoided if pica is diagnosed early in the pregnancy and remedial measures are taken.

Diagnosis of pica in pregnancy can be made easily by questioning pregnant women is inexpensive but is generally omitted during prenatal care. But literature is scanty in this regard especially related to South India.

Since estimation of the prevalence of different types of pica and effect of each pica material on pregnancy outcome forms initial step in prevention of adverse effect of pica material on pregnancy present study is under taken to explore such a possibility.

## II. Materials and Methods

The present prospective, hospital based observational analytical study conducted in the Department of Obstetrics and Gynecology, Sri Venkateswara Medical College, Tirupati, Andhra Pradesh for a period of one year from August 2017 to September 2018. 150 pregnant women who met the inclusion and exclusion criteria attending antenatal outpatient and inpatient department included in the study based on availability, accessibility and willingness to participate.

**Inclusion criteria:** Pregnant women in first trimester who had registered antenatal checkups with pica and food cravings behavior are participated in the study.

**Exclusion criteria**:
Pregnant women with
1) Medical disorders like Diabetes, Cardiovascular disorders , Hypertension etc
2) Psychological disorders
3) Subject who has not given consent.

**Method of data collection:**

All pregnant women with pica and food craving behavior who registered in maternity hospital were informed about the study and invited to participate in the study. Those participants who met the inclusion criteria and had given consent were included in the study. The data was collected using predesigned pro forma from the subjects by the investigator. The participants are interviewed for finding the prevalence and types of pica and food cravings. They are counseled regarding proper dietary habits. They are followed up till delivery irrespective of change or no change in dietary habits. Enrolled women are followed by
1) Clinical assessment for development of signs and symptoms of under or over nutrition or other nutritional disorders.
2) Collecting blood sample from pregnant women during the end of each trimester for hemoglobin levels.
3) Assess medical complications during pregnancy.
4) Anthropometric measurements of neonates namely, weight, length and head circumference, are taken within 24 hours after birth, using standard procedure.

**Statistical analysis**: Data was entered in MS EXCEL 2007 Microsoft Corporation Publication. Results were analyzed using EPI Info CDC version 7.2.0. Data described as percentages, means and standard deviation. Statistical significance was measured through chi square test.

**Ethical considerations**

All subjects were informed about the study and its purpose and consent was taken prior to their inclusion in the study. All subjects with pica and food cravings were identified and counseled to change their dietary habits. They are followed irrespective of change or no change in dietary habits.

## III. Result

In present study 150 pregnant women with pica or food cravings were enrolled

**Table 1: Prevalence of Pica & Food cravings during pregnancy**

| **S.No** | **Pica and or food craving** | Number of patients, (%) |
|---|---|---|
| 1 | Pica only | 3(2.0) |
| 2 | Pica with food cravings | 7(4.7) |
| 3 | Food cravings without pica | 140(93.3) |

Among the study population, 6.7% had pica. Only 2% had pica only.

**Table 2: Pica prevalence by substance**

| | **Substance** | **Number of patients, (%)** |
|---|---|---|
| 1 | Ice | 5(50) |
| 2 | Soil | 3(30) |
| 3 | Clay | 2(20) |

In present study only 10 subjects reported pica behavior. Among those, the most commonly ingested pica substances is ice and no subjects reported to have Starch, Bricks, Hair, Lead paint and Burnt matches.

**Table 3: Comparison of Hemoglobin levels during pregnancy periods with pica and non-pica**

| **Substances** | **1st trimester** | | **p-value** | **2nd trimester** | | **p-value** | **3rd trimester** | | **p-value** |
|---|---|---|---|---|---|---|---|---|---|
| | **pica** | **Non-pica** | | **pica** | **Non-pica** | | **pica** | **Non-pica** | |
| **Soil** | 8.967± 0.557 | 9.6580±0.608 | 0.0008* | 9.433±0.852 | 9.993±0.539 | 0.078 | 9.267±0.628 | 10.144±0.515 | 0.0782 |
| **Clay** | 9.040± 0.590 | 9.6580±0.608 | 0.001* | 9.560±0.888 | 9.993±0.539 | 0.363 | 9.360±0.654 | 10.144±0.515 | 0.363 |
| **Ice** | 8.914± 0.515 | 9.6580±0.608 | 0.0006* | 9.200±0.909 | 9.993±0.539 | 0.002* | 9.171±0.626 | 10.144±0.515 | 0.002* |

The above table shows that persistence of anemia in women with pagophagia.

**Table 4: Comparison of Newborn characteristics at delivery with pica and non-pica**

| Substances | Gestation | | p-value | Birth weight | | p-value | Birth Length | | p-value | Head Circumference | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pica | Non-pica | | pica | Non-pica | | pica | Non-pica | | pica | Non-pica | |
| **Soil** | 39.5± 0.548 | 39.7± 0.541 | 0.252 | 2.61± 0.098 | 3.017± 0.340 | 0.003***** | 49.3± 1.033 | 51.50± 1.199 | 0.0001* | 31.17± 0.408 | 33.25± 2.66 | 0.000* |
| **Clay** | 39.6± 0.548 | 39.7± 0.541 | 0.608 | 2.62± 0.110 | 3.017± 0.340 | 0.037* | 49.2± 1.095 | 51.50± 1.19 | 0.0001* | 31.0± 0.00 | 33.25± 2.66 | 0.000* |
| **Ice** | 39.6± 0.535 | 39.7± 0.541 | 0.397 | 2.58± 0.107 | 3.017± 0.340 | 0.000* | 49.7± 0.756 | 51.50± 1.199) | 0.0016* | 31.29± 0.488 | 33.25± 2.66 | 0.000* |

The above table shows statistically difference in birth weight, birth length and head circumference in women with all types of pica

## IV. Discussion

In the present study shows that women with pica have more chances of anemia, low birth weight and intrauterine growth restriction when compared to women with no pica. Pagophagia is commonest pica type noted and it is also associated with low hemoglobin levels. Though other study has recorded pica for starch, burnt matches, lead paint, hair and bricks, the present study there were not reported.

Fahimeh Khoushabi et al[9] (2014) study showed pica prevalence by substances clay is 23.3% , ice is 53.7%, ice and freezer frost is 11.5% and others is 11.5 %,when compared to present study those levels are high this may be due to socioculturogeographic variation among study population(Iran, India).

In present study, hemoglobin levels in women with ice, soil, and clay were statistically significant and had lower levels compared to non-pica group. In women with ice, hemoglobin levels during pregnancy period are statistically significant. Fahimeh Khoushabi et al [9] (2014)study showed that hemoglobin levels in pica group were significantly lower than non pica group. The findings of present study are in agreement with above study. This may be due to high prevalence of pagophagia in both studies. Lopez.et al [2](2004)study showed that there was not a significant difference between hemoglobin levels in pica group and the control group. Smulian.J.C et al [4](1995) study showed there were no significant differences between patients with a pica and those with none with respect to age, race, weight, or anemia.

In present study shows persistence of anemia in women with ice may be due to difficult in change of behavior or due to iron lack. CA Coltman et al [11] study showed Iron lack was associated with an unusual perversion of appetite characterized by the ingestion of extraordinary amounts of ice. The data on the rates of repair of mucosal cytochrome and blood-cell hemoglobin coincide with the temporal relationship between the resolution of pagophagia and the correction of iron-lack anemia.

In present study, the birth weight, birth length and head circumference of neonates born to mother with soil, clay and ice are statistically significant when compared to non-pica group. There is no significance difference in mean gestational age in both groups. Fahimeh Khoushabi et al[9] (2014) study showed that there were no differences in mean birth weight, length, head circumference and gestational age of infants born to pregnant women from the pica group and without pica group. Rainville, A.J. et al [10](1998) study showed that there were no difference in mean birth weight and mean gestational age of infants born to women from the pica groups and the no pica groups. Though other study has not shown, present study showed low birth weight and symmetrical intrauterine growth restriction in women with pica compared to non-pica. It needs further study to know the effects of different types of pica substances on pregnancy outcome.

## V. Conclusion

The present study showed that pagophagia has persistence of anemia when compared to other substances. Hence the effects of pagophagia on pregnancy outcome need to be explored to prevent the adverse effects on mother and fetus. In addition it is necessary to implement strategies as regards both the evaluation and nutritional education. Proper nutrition is important during pregnancy and cannot be ignored because the health and nutritional status of mother and fetus are mainly depending on it. Finally, there is also need to routinely screen pregnant women for pica during antenatal visits and to intensify nutrition education at the antenatal clinics .Dietitians should ask pregnant women with anemia about pica and should counsel pregnant women who report pica. There is also the need to educate about healthy nutritional practices.

Further studies should be done to establish possible health consequences of different types of pica substances on mother and child.

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