



A Comprehensive Review On Pica

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Abstract:

'Pica' is an eating behavioural disorder that includes the purposeful consumption of inedible and non-food material. It sounds like very causal and weird about this disease but it is as fatal as other behavioural disorders. In this disease, the digestive system along with the immune system and nervous system plays a supreme role. Some inedible substances consumed in this disease cause toxic and harmful effects on the body. This disease triggers the temptation with concern with non-food material, which boosts the curiosity to know the taste of it. It also challenges the mental health of a person which creates a bad impact on society and also influences others to act like a victim of this weird disease. It is indirectly linked to hazardous diseases like lead poisoning, sickle cell anaemia & micronutrient deficiency. The craving for non-food materials is mostly seen in children, pregnant women, the homeless population & intellectually impaired. It can coexist with schizophrenia, trichotillomania & Obsessive-Compulsive Disorder (OCD). Typical pica is reported for the criteria if the individual is more than two years and continues the consumption of non-food materials for at least 1 month. It can cause life-threatening consequences & result in death due to toxic material consumption present in non-food material. About four to twenty-six percent of the population in the world is suffering from pica. Present review focuses on all the details about Pica.

Index Terms - Dyspepsia, Micronutrient deficiency, Sickle cell anaemia, Lead poisoning, Anti-psychotic drugs.

I. INTRODUCTION

Pica is an eating behavioural disorder that includes the purposeful consumption of inedible and non-food material. A bird with a curious eating habit named the brown-billed magpie also called *pica pica* is the reason the word pica exists as an eating behavioural disorder[1]. Crores of the human population in this world is under starvation due to poverty, homelessness, natural calamities, etc. In some cases, Pica might be the cause due to hunger & curiosity towards the non-food material. This disease has been studied & experienced for decades & centuries. However, the exact etiologies are not concluded yet[2], [3].

Most pregnant women, also crave ice, soil, wood, paints, etc. But this is sometimes temporary craving that is due to pregnancy & may be cured after parturition or the post-partum period. This temporary craving might result in a permanent habit causing the case of pica. It might be more fatal to both mother & child. 27.8-68% of pregnant women suffer from pica[3].

However, Pica is observed to be prolonged in concern with people suffering from a mental disorder or retardation, or else, it is a prolonged disease & persists in pregnant women for a temporary duration. Generally, children between the age of 1-2 years have the habit of eating or chewing what they see because they are curious about things and their tastes. But this habit of chewing any non-food may normalize in a few days, weeks, months, or years. It's normal as if the habit continues for a temporary period. But in the case of children suffering from pica, cross the level of consumption and develop a mental attraction towards non-food material which can raise serious health issues.

EFFECTS OF PICA ON HUMAN HEALTH

Many other pathological diseases are also introduced in the body due to the serious condition of pica behavior. The strength of harm caused is conditioned on the nature of the substance consumed. If the patient is closer to the paints and polishes paints & consumes them on a certain interval basis has a risk of lead poisoning. Lead is carcinogenic & also causes neurological disorders including lethargy, cranial nerve paralysis, coma, serious brain harm, & many more[4], [5]. As the absorption of any mineral present in any material consumed is done by the small intestines. The sharp or hard abrasive substances perforate the mucosal layers of the digestive parts. Along with some ulcerations, constipation, and loss of appetite. Geophagy (i.e., consuming mud/soil) can lead to ascariasis or toxocariasis and result in hookworm infection. Also, nutcracker syndrome[6] is caused in some cases, which blocks the superior mesenteric artery located in the kidney. In the mouth, dental abnormalities including severe tooth abrasions & surface enamel loss can be observed due to the consumption of hard and sharp objects (Acuphagia)[7].

Pica victims consume some non-food substances that can be harmful to teeth. Some pica substances are not toxic but consumed in higher quantities which is hazardous to health. The substances like hair (bezoar) can block the digestive tract and creates some serious issue related to it. Pica substances disturb the level of haemoglobin and it can also affect the serum level in the body.

Along with physical health pica can damage the mental health of victims. As the individual gets ashamed to tell others that they crave non-food which is abnormal and this can also affect the mental health of that person.

Following are the effects that are seen after consuming non-food substances [7]: -

- Lead poisoning Constipation
- Tooth abrasion, abfraction
- Parasitic infection
- Ulceration
- Surface tooth loss
- Gastrointestinal infection
- Perforation
- Calcium, zinc, and iron deficiency
- Bowel problems
- Intestinal obstruction

THE PICA SUBSTANCES CONSUMED BY THE VICTIMS AND THEIR TERMS ARE SPECIFIED IN TABLE 1.

Table 1: - Pica terms and the non-food material ingested[8].

Pica Terms	Non-food material ingested
Acuphagia	Sharp objects
Amylophagia	Starch
Cautopyreiophagia	Burnt matchsticks
Coprophagia	Faeces
Geomelophagia	Raw potatoes
Geophagia	Dirt, clay, soil or chalk
Hyalophagia	Glass
Lithophagia	Stone or gravel
Mucophagia	Mucous
Odowa	Soft stones
Osteophagia	Bones
Pagophagia	Ice
Plumbophagia	Lead
Polypica	More than one substance
Tobaccophagia	Tobacco products
Trichophagia	Hairs and wool
Urophagia	Urine
Xylophagia	Wood logs, stems

Etiology: -

Pica has no proven or judged etiologies. As pica is a psychological disease the etiology can be determined by interrogating patients about why they consume non-food materials. Not a single satisfactory answer to this question from the pica victims was reported. This indicates as this is unknown what causes pica[5]. Some etiologies are given as follows: -

- Cultural expectations.
- Psychological stress.
- Dyspepsia.
- Micronutrient deficiency.

Cultural expectation: - Pica does not have any root origin but as per hypothesis the main etiologies work on the factor of cultural expectation. However, some cultural expectation does not directly imply consuming non-food substances and causing harm to own body. Cultural pica is a common practice followed in various communities and cultures across the world[9]. As per belief, physical and spiritual health is improvised by the consumption of pica substances in most regions of India. Beliefs in the same regions also specify that when a pregnant woman craves ash, she will deliver a baby girl and so if craves dust delivers a baby boy[10].

In Africa, the females called “Chagga” believe that eating soil is related to fertility and reproductive health. Although, it is not practical. In the same culture, they compare the satisfaction and experience of sexual intercourse with eating soil.

In Peru and Bolivia, a group of people consumes clay to avoid health-related problems linked with toxins found in staple diets and potatoes. Pica is a cultural feature of certain religious rituals, folk medicine, and magical beliefs[9].

Psychological stress: - Pica is the response to psychological stress. Some people have the habit of nail biting when they are under pressure or stress and this habit of nail biting relieves that person from stress. Pica is also called a "Mediator of stress" [11] and it is acting through the immune system. Socially abused or people neglected by society develop pica behavior. Some do develop this habit due to poverty. And to overcome the psychological stress the non-food material consumption gives the feeling of fullness.

The individual who is unable to differentiate between food and non-food substances may suffer pica. Some persons suffer from traumatic events and get into pica. Traumatic events include the divorce of parents, broken families, parental neglect, etc. Psychological stress in some people is directly associated with pica. An increase in stress may lead to an increase in pica symptoms in some people.

Persons with pica may have some psychological disorders like schizophrenia and obsessive-compulsive disorder [12].

Dyspepsia: - Dyspepsia is the medical term for indigestion. Pica gets stimulated when there is some disease related to the upper gastrointestinal tract (i.e., mainly nausea and heartburn). Some pica victims say that pica contributes to the reduction of heartburn and nausea. Some non-food substances are more alkaline than that gastric pH and therefore when an individual consumes pica material these substances reduce the acidity of the stomach and this will result in indigestion.

The children with autism spectrum disorder (ASD) reported having pica [9]. ASD children have GI problems like vomiting, diarrhea, constipation, etc. The researchers say that one in four children with ASD reported pica. Pica makes severe conditions causing Gastrointestinal infections or diseases. Pica and GI problems may lead to some serious medical conditions and they can be sometimes life-threatening.

Hunger: - Pica is also associated with hunger. When there was a shortage of food in China the earth has been eaten during that period. Hunger motivates geophagy.

Micronutrient deficiency: - Some research suggests that pica is related to deficiencies of iron, zinc, and calcium. These deficiencies contribute to pica. Some scientists say that anaemia causes pica and vice versa. When iron is deficient in the body the person starts consuming non-food material (i.e., pica substances) to maintain their iron level in the body. Pregnant women and children have higher per kg iron needs that's why maybe they are victims of pica. The deficiencies of Calcium, zinc, and iron are directly related to pica. A contrast statement is well said about pica it can be caused due to iron deficiency or iron deficiency can make cravings and try to give fullness of consumption by eating non-food materials. In some cases, it is attributed to vitamin C and vitamin D deficiency. Sometimes the deficient nutrients are responsible to make the patient crave more for the same thing and might trigger the taste-gaining temptation for the non-food material.

Sickle Cell Anaemia: - Sickle cell anaemia causes due to hemoglobin deficiency in RBC which can be a great cause of pica, especially in pregnant women. Anaemia is a common condition in most pregnancies. The common anaemia that is seen during pregnancy is iron deficiency anaemia and this can stimulate the craving for non-food materials.

SYMPTOMS TO BE NOTED: -

- Food of no nutritional value is consumed for one month in adults more than 2 years old.
- Constipation.
- Diarrhea.
- Anaemia.
- Lead Poisoning.
- Nutcracker Syndrome.
- Hematuria.
- Hematochezia.
- Sickle Cell Anaemia.

PICA IN PREGNANCY: -

The adaptive behavior of a pregnant woman is always commonly observed as the craving for any food substance. Also, some non-foods are very casually craved in some instances. Even though the craving for baking soda, calcium carbonate obtained from the chalks is observed & considered very common. But severe consumption including other non-food eating habits is harmful to the body of the mother along with the fetus. Destructive and death-causing harms are results due to the pica practice during pregnancy duration.

Wherein, pregnancy is the period that is always put forth as a moment to care for the mother by looking after her needs. But the consuming harmful substances during the pregnancy period would lead to severe issues for the fetus.

Pica is not so rare in pregnant women all over the world. Geisler and his colleagues in 1999 concluded by studies about pregnant women that three-quarters of all women experienced geophagy on daily basis. These pregnant women population explained the performing the positive sides of geophagy and described it as having a strong relation with fertility and reproductive health. They symbolized pica behavior as a culture-bound syndrome & linked to femininity. Also, some suffered from anaemia, and low body weight perhaps the result of the pica (17). The types of substances pica patients craved are displayed in figure 1.

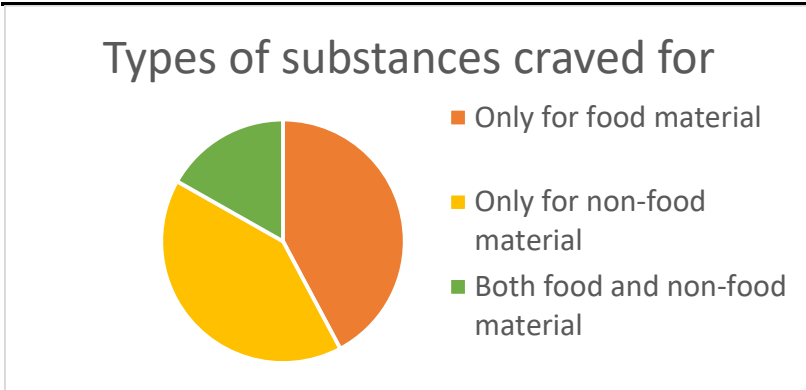


Fig 1. Types of substances craved for

In the Midwest region, Cooksey (1995) interviewed 300 pica-practicing women who were pregnant. Qualitative results show about the pica practiced as a secret though played a large role in their lives. Some women used those pica substances as a medication & some women enjoyed not only the taste but also the odor along with the taste of the substance which eventually created a high sensitivity towards the smell during the pregnancy period. Non-food material craved by pica patients is denoted in figure 2.

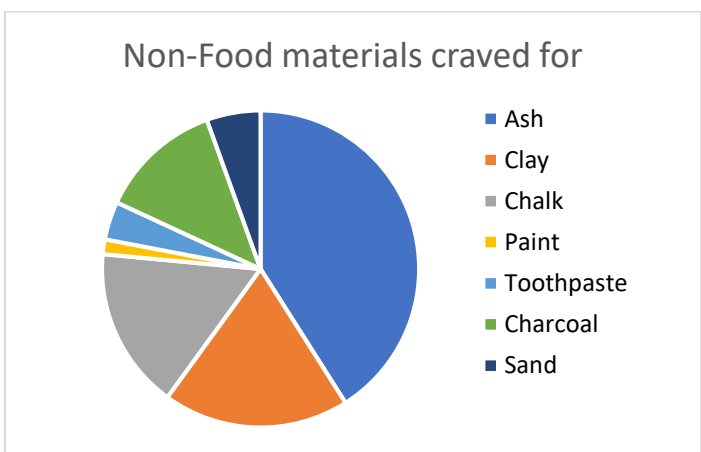


Fig 2. Non-food materials craved for

EFFECT OF PICA ON THE HEALTH OF WOMEN/FETUS:

The straightforward opinion of experienced healthcare providers is that the pica practice in pregnancy is harmful. But much conflicting evidence is found against this opinion. Poor health outcomes are noticed due to pica in pregnancy. It included lead poisoning; severe internal harm is due to toxins present in the substance.

In the survey of Edwards in 1994, the head of infants was studied and compared with the pregnant women practicing pica and not practicing pica categorized under geophagy and consuming clay & dirt. The head of the infants had small circumferences in the pregnant women consuming the dirt and clay as compared to the infants of the pregnant women who didn't consume clay or dirt.

Barton and others in their report published in 1992 contained information about the woman suffering from pica & consuming baking powder. Also, she was suffering from pica along with maternal hypertension, hypokalemia & elevated live tests. But as soon as the consumption of baking powder was stopped, all the health-related issues disappeared. The frequency of non-food materials craved by pregnant women is shown in figure 3.

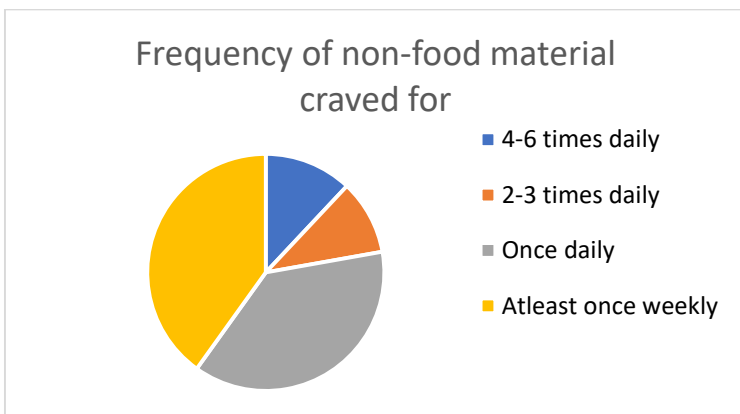


Fig 3. Frequency of non-food material craved for

STEPS TO TREAT PICA IN PREGNANT WOMEN[13]:

- Keep a note of the cravings experienced during pregnancy.
- Filling all the nutritional deficiencies with edible and healthy food substances by visiting a physician, gynecologist, obstetrician, pediatrician, etc.
- As per the guidance of the doctor, complete the course for the vitamin, calcium, or iron supplement to boost the nutritional level and end up the risk of deficiencies.
- Have a timely check-up for nutrient & mineral gain or loss.
- Occupational therapy can also be helpful to treat mental illness during pregnancy.

RELATION OF PICA WITH SICKLE CELL ANAEMIA

Sickle cell anaemia is a mutational DNA syndrome causing severe disease processes inherited by the parents containing one or more types of sickle cell trait. Obstruction of hemoglobin & oxygen supply occurs due to irregular & sickle-shaped RBC delivered throughout the different parts of the body. Thus, the vital organs do not get sufficient blood supply & cannot function normally. As the bent or curved RBCs due to attaining the shape of hemoglobin in a curved manner stick to each other & form a clog in blood vessels. Further, numerous diseases queue to result such as stroke, acute chest syndrome, anaemia, etc.

Commonly Sickle cell anaemia is having a ratio of 1:365 in African-American births and 1:16300 in Hispanic-American births. Around 300000 babies result from sickle cell anaemia cases worldwide whereas 1000 case stand in the United States. Africa holds 10-40% of the individual having Sickle cell anaemia trait & among that approximately 2% of these individuals develop the actual sickle cell anaemia syndrome. Ancestors belonging to the regions from Turkey, India, Sub-Saharan Africa, Central America, Greece, Italy, Saudi Arabia & the Caribbean have a humble chance of originating sickle cell anaemia. The best treatment or complete cure for HbS disease is a stem cell transplant in the bone marrow.

One-third of sickle cell anaemia patients have reported pica disease. In the United States one research on 365 patients who have sickle cell anaemia says that out of 365, 33% of patients have pica disease. Another research from Belgium says that of 55 patients with HbS disease, 56% have pica disease. The etiology of HbS disease with pica is not very known. People with HbS disease and stroke complications have a history of pica. Individual with HbS disease and pica interferes with their daily living activities. Pica may cause iron deficiency and people with HbS disease also have iron deficiency. Individual who is suffering from both pica and sickle cell anaemia have low levels of hemoglobin in their body and patients with a low level of iron or iron deficiency generally consume ice. Several studies have resulted from the high growth of pica in the youth due to sickle cell anaemia.

DIAGNOSIS:

An infant below 1-2 years consuming non-food material is common. Even under some psychological conditions or problems in differentiating between foody and non-foody substances, consumption can matter in frequency. Thus, the cases observed below 1-2 years infant are not termed as pica. But if the age range is expectedly higher and the behaviour of consuming non-food material is observed continuously for a month then it may be a pica case.

Observation: - The pica behaviour or the consumption of non-food material is continuous for at least a month.

Some diagnostic tests are useful to detect pica. The tests indicate signs and symptoms and signs of other infections that may happen after pica.

1. Blood, Urine, and Stool tests: - These tests indicate the infection, poisoning, and electrolyte imbalance in the body.
2. Imaging tests: - These tests are useful to detect the blockage of internal organs. These include X-Ray, CT scans (computerized tomography), Magnetic resonance imaging (MRI), ultrasound, etc.
3. Diagnostic tests: - These tests give signs of some serious health-related problems occurring due to pica. The tests include Electrocardiogram (ECG) which looks for a problem with your heart's electrical rhythm that can happen with certain electrolyte imbalances or parasitic infections.

TREATMENT

Antipsychotic drugs may help in the case of pica. According to your signs and symptoms, and effects on your body doctors can prescribe the appropriate drugs or medication to patients. Like if a patient is suffering from lead poisoning the doctors can prescribe chelation therapy to that person. The medication related to lead poisoning is either taken by mouth or intravenous medication like ethylenediaminetetraacetic acid (EDTA).

If pica affects your micronutrient balances doctors may prescribe to maintain that level in your body such as vitamin supplements. If the patient is suffering from iron deficiency anaemia the doctors may prescribe daily iron supplements to the victim.

If the patient is going through any mental disorder the doctors may prescribe therapy to the patient. Anti-depressant and anti-anxiety medication are also helpful along with the therapy.

Problems faced while treating pica: -

- Some hindrances are caused due to late reports or being unknown of these habits as a behavioural disease.
- Sometimes, patients deny the question of the presence of pica.
- Treating pica in pregnancy is complicated as the consumption of pica substance by the mother may devastate the health of a growing foetus in the womb.
- Ignorance towards pica might cause proportional harm according to the nature of the substance consumed.
- A complication in surgical removal of toxic substance engulfed and difficulty in determining the varieties of substance consumed in the case of poly pica.

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Conclusion: -

Pica is so rarely known disease, but a very high number of the population is affected unknowingly. Even some patients do not admit whether they are suffering from this disease. Like a taboo, this disease is hidden in the corners of the world and many of them do not seek any help or treatment from professionals, doctors, counsellors, etc. Though there are no proven treatments available, rehabilitation or mental diversion towards edible materials is the only way to make a patient on the safe side and prevent him/her to eat something inappropriate for their health. The present review article focuses on the Behavioural patterns of pica victims either in the post-pregnancy period or late infancy along with symptoms, diagnosis, treatment, and problems faced while treating pica patients.

REFERENCES

- [1] A. K. C. Leung and K. L. Hon, "Pica: A Common Condition that is Commonly Missed - An Update Review," *Curr. Pediatr. Rev.*, vol. 15, no. 3, pp. 164–169, Mar. 2019, doi: 10.2174/1573396315666190313163530.
- [2] K. Raghavendra, U. A. Shivarama Shetty, and P. Kumar Rao, "Pica-An Eating Disorder: A Report and Review," 2017, doi: 10.4103/2321-4848.208182.
- [3] S. Francis, N. S. Jagadeesh, R. Singaravelu, and A. Subramaniam, "The influence of pica practice on nutritional status, stress and anxiety of pregnant women," *Clin. Epidemiol. Glob. Heal.*, vol. 17, Sep. 2022, doi: 10.1016/j.cegh.2022.101133.
- [4] "Pica (for Parents) - Nemours KidsHealth." <https://kidshealth.org/en/parents/pica.html> (accessed Dec. 25, 2022).
- [5] "Pica | Symptoms, Mental Health, Eating Disorder, & Examples | Britannica." <https://www.britannica.com/science/pica-human-and-animal-disease> (accessed Dec. 25, 2022).
- [6] "ASD, Digestive Issues and Pica | Autism | NCBDDD | CDC." <https://www.cdc.gov/ncbddd/autism/features/ASD-digestive-issues-and-pica.html> (accessed Dec. 25, 2022).
- [7] "Pica (Eating Disorder): Treatments, Causes, Symptoms." <https://www.webmd.com/mental-health/mental-health-pica> (accessed Dec. 25, 2022).
- [8] S. Munir and M. I. Qadir, "Pathophysiology and management of pica Screening of potential medicinal plants View project In-silico Studies for Drug Designing View project." [Online]. Available: <https://www.researchgate.net/publication/234007632>
- [9] "Pica: What It Is, Causes, Symptoms & Treatment." <https://my.clevelandclinic.org/health/diseases/22944-pica> (accessed Dec. 26, 2022).
- [10] "Pica: Causes, Symptoms, and Treatment." <https://www.healthline.com/health/pica#symptoms> (accessed Dec. 25, 2022).
- [11] R. W. Corbett, C. Ryan, and S. P. Weinrich, "Does It Affect Pregnancy Outcomes?"
- [12] N. Rodrigues, S. Shih, and L. L. Cohen, "Pica in Pediatric Sickle Cell Disease," *J. Clin. Psychol. Med. Settings*, vol. 28, no. 1, pp. 6–15, Mar. 2021, doi: 10.1007/S10880-019-09671-X.
- [13] M. C. Du, H. Y. Chen, Y. X. Zhang, and L. B. Zhang, "Pica with superior mesenteric artery syndrome and nutcracker syndrome as imaging manifestation: A case report," *Asian Journal of Surgery*, vol. 45, no. 10. Elsevier (Singapore) Pte Ltd, pp. 2038–2039, Oct. 01, 2022. doi: 10.1016/j.asjsur.2022.04.084.