



PICA DISORDERS: ARE DENTISTS AWARE

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ABSTRACT

Pica is an unusual craving for and ingestion of either edible or inedible substances. The condition has been described in medical journals for centuries. Pica poses significant health risks that often require medical interventions. These patients are susceptible to electrolyte and metabolic disorders, lead and mercury poisoning, hypokalemia, parasitic infections, tooth wear, intestinal obstruction and various problems of the gastrointestinal tract. The exact etiology of pica remains unclear. This article highlights various causes, forms, complications & treatment modalities of pica disorders.

INTRODUCTION

The name "pica" comes from the Latin word for magpie, a bird known for its large and random appetite. Pica is a complex behavior and refers to excessive / abnormal craving for normal food or for other substances not commonly regarded as food such as earth, charcoal, raw rice, ice etc. Pica is the pathological craving for and eating of a non nutritive item (e.g., clay, coal, paper, ashes, balloons, chalk, metal, grass, crayons, insects, sand, soap, paste, string, plastic, baby powder, paint chips, wallboard, ice) or food ingredients (flour, raw potatoes). It is a complex behavior that can present with any number of variations, and multiple pica determinants range from demands of tradition and acquired tastes in the cultural context to presumptive neurobiological mechanisms (e.g., iron deficiency, CNS neurotransmission, physiological conditioning). There are many reasons why people eat dirt or other non-food items [1]. This practice has been described as "abnormal" and is a very misunderstood problem. Pica is defined, in part, by cultural norms. In the

United States today, eating clay is considered pica, but in past centuries, it was not. Clay eating and soil eating were common in the 1800s, especially among slaves in the South. In the 1950s and 1960s, the practice was so popular that clay-filled lunch bags were sold at Alabama bus stops as snacks for travellers. Even today, what could be classified as pica behavior is a normative practice in some cultures as part of their beliefs, healing methods, or religious ceremonies. Among adults, pica can start during the first trimester of pregnancy, but there are other people who have it as well. "It has been associated with obsessive-compulsive disorder and schizophrenia," says Lugerner. The ingestion of dirt or clay has been reported throughout the world in poor societies, in the tropics and subtropics." Strange cravings can sometimes be triggered by not getting enough nutrients, including iron and zinc. Still other people with pica simply desire a specific texture in their mouth. No one really knows exactly how common it is, as many patients are probably too embarrassed to discuss the



behavior. Southerners mailed bags of hometown clay to their friends and relatives who moved north [2].

Some reports estimate that clay eating is a daily practice in over two hundred cultures worldwide [3]. Quite often, pica is only seen and recognized when it results in complications that lead someone to obtain medical attention. Such children display signs of iron deficiency, including pallor and thinned nails that are concave and have raised edges, known as spooning of the nails. The small elevations on the child's tongue may be flattened and may have superficial erosions and fissuring at the angles of the mouth, which frequently signals riboflavin deficiency. While hospitalizations for eating disorders are down overall, one category is rising at an alarming rate, says the Agency for Healthcare Research and Quality. From 1999 to 2009, hospitalizations for patients with an eating disorder called pica jumped a whopping 93 percent. Pica is eating something that is not food—notably in large quantities and on a regular basis. Magpies eat just about anything, but humans who eat non-foods are choosier. The compulsion usually focuses on a single item. Doctors have operated on people whose intestines were blocked with nuts, bolts, or screws. People who regularly consume twigs, newsprint, or bathroom deodorizers are not as rare as thought. Affected populations Pica can begin as early as the age of one year. It is usually outgrown by six or seven years of age, but some cases persist until puberty. Some adult women, particularly pregnant women, can suffer from this disorder. Severely retarded people often must be monitored to protect them from eating non-edible substances.

Diagnostic Criteria

Pica is characterized by an appetite for substances that are largely non-nutritive, such as paper, clay, metal, chalk, soil, glass, or sand. According to DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th Edition) criteria, for these actions to be considered pica, they must persist for more than one month at an age where eating such objects is considered developmentally inappropriate, not part of culturally sanctioned practice and sufficiently severe to warrant clinical attention. DSM persistent eating of non-nutritive substances for a period of at least one month. Does not meet the criteria for either having autism, schizophrenia, or Kleine-Levin syndrome. The eating behaviour is not culturally sanctioned. If the eating behaviour occurs exclusively during the course of another mental disorder (e.g., intellectual disability, pervasive developmental disorder, schizophrenia), it is sufficiently severe to warrant independent clinical attention. Pica is often seen in mentally or developmentally disabled persons. Several recent studies suggest significant psychiatric co morbidity as a determinant of pica. Kraepelin was the first to document an extraordinary array of inedible materials consumed by psychotic patients and felt that this behaviour might be a vegetative sign of psychosis, "a perversion of the appetite."

Delusional schizophrenic patients may ingest glass, pins, or various other non-nutritive items, and driven non-nutritive eating has been seen in disorganized schizophrenic patients [4].

Prevalence

Pica is thought to be underreported, and the prevalence is not known with any accuracy. It is considered "developmentally inappropriate" in children older than 18 to 24 months. Pica has been linked to mental disorders and they often have psychotic co morbidity. Stressors such as maternal deprivation, family issues, parental neglect, pregnancy, poverty, and a disorganized family structure are strongly linked to pica. Pica is more commonly seen in women and children, and in areas of low socioeconomic status [5]. Particularly it is seen in pregnant women, small children, and those with developmental disabilities such as autism. Children with intellectual disability and autism are affected more frequently than children without these conditions. Among individuals with intellectual disability, pica is the most common eating disorder. In this population, the risk for and severity of pica increase as the severity of the disability increases. Children eating painted plaster containing lead may suffer brain damage from lead poisoning. There is a similar risk from eating soil near roads that existed before tetraethyl lead in petrol was phased out (in some countries) or before people stopped using contaminated oil (containing toxic PCBs or dioxin) to settle dust. In addition to poisoning, there is also a much greater risk of gastro-intestinal obstruction or tearing in the stomach. Another risk of eating soil is the ingestion of animal faeces and accompanying parasites. Pica can also be found in other animals and is commonly found in dogs [6].

Epidemiology International statistics Pica occurs throughout the world. Geophagia is the most common form of pica in people who live in poverty and people who live in the tropics and in tribe-oriented societies. Pica is a widespread practice in western Kenya, southern Africa, and India. It has been reported in Australia, Canada, Israel, Iran, Uganda, Wales, Turkey, and Jamaica [7].

Age-, sex-, and race-related demographics Pica is observed more commonly during the second and third years of life and is considered developmentally inappropriate in children older than 18-24 months. Research suggests that pica occurs in 25-33% of young children and 20% of children seen in mental health clinics. A linear decrease in pica occurs with increasing age. Pica occasionally extends into adolescence but is rarely observed in adults who are not mentally disabled. Among individuals with intellectual disability, pica occurs most often in those aged 10-20 years [8]. Infants and children commonly ingest paint, plaster, string, hair, and cloth. Older children tend to ingest animal droppings, sand,



insects, leaves, pebbles, and cigarette butts. Adolescents and adults most often ingest clay or soil. In young pregnant women, the onset of pica frequently occurs during their first pregnancy in late adolescence or early adulthood. Although the pica usually remits at the end of the pregnancy, it may continue intermittently for years. Pica typically occurs with equal frequency in boys and girls; however, it is rare in adolescent and adult males of average intelligence who live in developed countries. Although no specific data exist regarding the racial predilection of pica, the practice is reported to be more common among certain cultural and geographic populations. For example, geophagia is accepted culturally among some families of African lineage and is reported to be problematic in 70% of the provinces in Turkey. Ethnic differences and societal norms Geography, sociocultural factors, and developmental considerations are all significant in determining pica. Demographic information reveals that pica has been associated with diets that are low in iron, zinc, and calcium compared with a balanced controlled diet [9].

Subtypes are characterized by the substance eaten:

Amylophagia (starch), Coprophagia (feces), Emetophagia (vomit), Geomelophagia (raw potatoes), Geophagia (dirt, soil, clay), Hyalophagia (glass), Lithophagia (stones), Mucophagia (mucus), Pagophagia (ice), Trichophagia (hair), Urophagia (urine), Xylophagia (wood). This pattern of eating should last at least one month to fit the diagnosis of pica [10].

Causes

While a relationship between pica and iron deficiency has been suggested, a cause and effect relationship has not yet been proven. Some substances which are craved by patients with this disorder interfere with the body's absorption of iron from food. The precise pathophysiology of the syndrome is unknown. Patients consume unusual items, such as laundry starch, ice and soil clay. Both clay and starch can bind iron in the gastrointestinal tract, exacerbating the deficiency. A dramatic example of the problems produced with clay consumption occurred in the 1960s with reports of iron deficiency in children along the border between Iran and Turkey (Say et al., 1969). These youngsters had other, peculiar abnormalities including massive hepatosplenomegaly, poor wound-healing and a bleeding diathesis [11]. Presumably, the children initially had simple iron deficiency associated with pica, including geophagia. The soil contained compounds that bound both iron and zinc. The secondary zinc deficiency caused the hepatomegaly and other unusual abnormalities. Yet another cause can be associated with this disease. It is high level of lead. Lead exposure is a problem for many children that live or visit for extended periods of time in older houses that have lead-based paint in them. These were built mainly before the 1970s and lead paint was

outlawed in 1978 [12]. However, other sources of lead include certain types of medications, some kinds of pottery and several others. Some authorities believe that pica is a learned pattern of behaviour while others theorize that it is due to other cultural, psychological and physiological factors or a combination of these factors. In many cases, correction of iron or other deficiencies in the patient may eliminate the abnormal craving that characterizes this disorder. Traumatic events/ stress, maternal deprivation, parental separation/ neglect, child abuse, disorganized family structure, poor parent-child interaction, low socio-economic status, malnourishment, lead poisoning are other causes. Pregnancy, epilepsy, brain damage, intellectual disability, developmental disorders are some other risk factors. Moral weakness, perverted instinct, and psychological factors are implicated. The scant research that has been done on the causes of pica suggests that the disorder is a specific appetite caused by mineral deficiency in many cases, such as iron deficiency, which sometimes is a result of celiac disease or hookworm infection. Often the substance eaten by someone with pica contains the mineral in which that individual is deficient. More recently, cases of pica have been tied to the obsessive-compulsive spectrum, and there is a move to consider it in the etiology of pica. However, pica is currently recognized as a mental disorder by the widely used Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). Sensory, physiological, cultural and psychosocial perspectives have also been used by some to explain the causation of pica. It has been proposed that mental-health conditions, such as obsessive-compulsive disorder (OCD) and schizophrenia, can sometimes cause pica [13]. However, pica can also be a cultural practice not associated with a deficiency or disorder. Ingestion of kaolin (white clay) among African-American women in the US state of Georgia shows the practice there to be a DSM-IV "culture-bound syndrome" and "not selectively associated with other psychopathology". Similar kaolin ingestion is also widespread in parts of Africa. Such practices may stem from health benefits such as the ability of clay to absorb plant toxins and protect against toxic alkaloids and tannic acids. Although no firm empiric data support any of the nutritional etiologic hypotheses, deficiencies in iron, calcium, zinc, and other nutrients (e.g., thiamine, niacin, and vitamins C and D) have been associated with pica. In some patients with malnutrition who eat clay, iron deficiencies have been diagnosed, but the direction of this causal association is unclear. Whether the iron deficiency prompted the eating of clay or whether the inhibition of iron absorption caused by the ingestion of clay produced the iron deficiency is unknown. Current methodologies for the physical, mineralogical, and chemical characterization of pica substances, particularly clay and soil, may be useful for determining the bioavailability of nutrients and other bioactive components and for generating data to support or negate these nutritional hypotheses. The association of pica, iron deficiency, and a number of patho physiologic



states with decreased activity of the dopamine system suggests the possibility of a correlation between diminished dopaminergic neurotransmission and the expression and maintenance of pica. To date, however, no specific pathogenesis resulting from any underlying biochemical disorders have been identified empirically [14].

Effect on dentition: Pica is likely to cause effects on teeth. Chewing on stones and bricks can lead to attrition of teeth. Damage to teeth and gingiva occurs due to chewing from abrasive materials such as twigs or metals. On reviewing literature, many cases reporting ill effects of pica on dentition have been published. An unusual case report, where the tooth showed attrition due to a sand eating habit was reported by Djemal et al.[15] Another case reported by Johnson et al. showed abfraction, attrition and erosion due to a habitual and culturally adapted practice.[16] An unusual case report, where depression associated with pregnancy lead to patient adopt eating disorder. Her dental implications diagnosed her with pica and bulimia. Literature shows ample evidence of dental problems associated with pica and hence dentists should be knowledgeable to diagnose and treat such cases [17].

Complications It may occur due to the substance consumed. In poisoning or exposure to infectious agents, the reported symptoms are extremely variable and are related to the type of toxin or infectious agent ingested. For example, lead poisoning may result from the ingestion of paint or paint-soaked plaster; hairballs may cause intestinal obstruction, mechanical bowel problems, constipation, ulcerations, perforations, haemorrhage and intestinal obstructions and neurologic, hematologic, endocrine, cardiovascular and renal effects. Toxoplasma or Toxocara infections may follow ingestion of faeces or dirt. Nutritional effects include iron and zinc deficiency syndromes. Obesity occurs in cases of consuming too much laundry starch. Inadequate protein or energy-intake from consuming things like coffee grounds or oyster shells in place of real foods. Nutritional deficiencies, such as the interference of soil with the absorption iron, zinc, and potassium in the digestive system. Infestations of parasites such as tapeworms resulting from consuming dirt or faeces. High blood pressure, high levels of sodium salts in the blood, and abnormal liver functions such as those resulting from consuming large quantities of baking powder. Low birth weight, premature birth, mental and physical abnormalities, and even death among infants whose mothers practice pica during pregnancy [18].

Investigations There is no single test that confirms pica. The ambiguity conveyed in early clinical descriptions continues to the modern era, although several lines of rational investigation have emerged. However, because pica can occur in people who have lower than normal nutrient levels and malnutrition, the health care provider

should test blood levels of iron and zinc. Haemoglobin can also be checked to test for anaemia. Lead levels should always be checked in children who may have eaten paint or objects covered in lead-paint dust. The health care provider should test for infection if the person has been eating contaminated soil or animal waste. Imaging studies used to identify ingested materials and aid in the management of gastrointestinal (GI) tract complications of pica may include the following: abdominal radiography, upper and lower GI barium examinations, upper GI endoscopy [19].

Prognosis Ultimately the prognosis depends on a variety of factors. Pica may stop spontaneously in children and pregnant women, but can go on for years in people with mental and developmental disabilities unless treatment is sought. In the case of those with special needs, sometimes medication can be used to lessen the pica eating. Regardless of the root cause, seeking a doctor's help is key to starting the road to recovery. The clinical consequences of pica may have broad epidemiological implications as in lead intoxication and geophagia in children, which lead to severe impairment of intellectual and physical development. In addition, acute and chronic medical complications may pose surgical emergencies (intestinal obstruction from bezoars) as well as more subtle encroaching symptoms such as parasitosis, intoxication, and nutritional deficits. Pica often remits spontaneously in young children and pregnant women; however, it may persist for years if untreated, especially in individuals with intellectual and developmental disabilities. Pica is a serious behavioral problem because it can result in significant medical sequelae, which are determined by the nature and amount of the ingested substance. Pica has been shown to be a predisposing factor in accidental ingestion of poisons, particularly in lead poisoning. The ingestion of bizarre or unusual substances has also resulted in other potentially life-threatening toxicities, such as hyperkalemia after cautoptreyreophagia (ingestion of burnt match heads) [20].

Treatment for pica may vary by patient and suspected cause (e.g., child, developmentally disabled, pregnant or psychotic) and may emphasize psychosocial, environmental and family-guidance approaches; (iron deficiency) may be treatable through iron supplements through dietary changes. Although ferrous sulphate is often recommended to treat iron deficiency, frequent problems with the drug including gastrointestinal discomfort, bloating and other distress, make it unacceptable to many patients. Ferrous gluconate, which is roughly equivalent in cost, produces fewer problems and is preferable as the initial treatment of iron deficiency [21]. Ascorbic acid supplementation enhances iron absorption. An initial approach often involves screening for and, if necessary, treating any mineral deficiencies or other co morbid conditions. For pica that appears to be of psychotic etiology, therapy and medications such as Selective Serotonin Reuptake Inhibitors have been used successfully.



However, previous reports have cautioned against the use of medication until all non-psychotic etiologies have been ruled out. Some evidence suggests that drugs that enhance dopaminergic functioning (eg, olanzapine) may provide treatment alternatives in individuals with pica that is refractory to behavioral intervention [22]. Looking back at the different causes of pica related to assessment, the clinician will try to develop a treatment. The parent and the child should be asked to make a diary or a daily log of the times when he or she chews on non-food items and when he/she does not. They should also be asked to write down anything that they think is important about each particular. There are different variations of pica, as it can be from a cultural tradition, acquired taste, or a neurological mechanism such as an iron deficiency or a chemical imbalance. First, there is pica as a result of social attention. A strategy might be used of ignoring the person's behaviour or giving them the least possible attention. If their pica is a result of obtaining a favourite item, a strategy may be used where the person is able to receive the item or activity without eating inedible items. The individual's communication skills should increase so that they can relate what they want to another person without engaging in this behaviour. If pica is a way for a person to escape an activity or situation, the reason why the person wants to escape the activity should be examined and the person should be moved to a new situation. If pica is motivated by sensory feedback, an alternative method of feeling that sensation should be provided. Other non-medication techniques might include other ways for oral stimulation such as gum. Foods such as popcorn have also been found helpful. These things can be placed in a "Pica Box" that should be easily accessible to the individual when they feel like engaging in pica. Behaviour-based treatment options can be useful for developmentally disabled and mentally ill individuals with pica. These may involve using positive reinforcement normal behaviour. Many use aversion therapy, where the patient learns through positive reinforcement which foods are good and which ones they should not eat. Often treatment is similar to the treatment of obsessive compulsive or addictive disorders (such as exposure therapy). A recent study classified nine such classes of behavioral intervention: Success with treatment is generally high and generally fades with age, but it varies depending on the cause of the disorder. Developmental causes tend to have a lower success rate. Pregnancy craving causes tend to have higher success rates [23]. Treatment techniques include: Presentation of attention, food or toys, not contingent on pica being attempted. Differential reinforcement, with positive reinforcement if pica is not attempted and consequences if pica is attempted. Discrimination training between edible and inedible items, with negative consequences if pica is attempted. Visual screening, with eyes covered for a short time after pica is attempted. Aversive presentation, contingent on pica being attempted: oral taste (e.g., lemon), smell sensation (e.g., ammonia),

physical sensation (e.g., water mist in face). Physical restraint includes self-protection devices that prohibit placement of objects in the mouth, brief restraint contingent on pica being attempted, and time-out contingent on pica being attempted. Overcorrection, with attempted pica resulting in required washing of self, disposal of non edible objects and chore-based punishment. negative practice (non-edible object held against patient's mouth without allowing ingestion). Psychiatric counseling aimed at behaviour modification is often recommended. A multidisciplinary approach involving psychologists, social workers, dentists and physicians is recommended for effective treatment [24].

Homoeopathic Management:

Antimonium crudum Craving for raw food and vegetables & craving and intolerance for acids, pickles and bread

Alumina: Craving for starch, chalk, charcoal, cloves, coffee or tea grounds, raw rice, acids

Calcarea carbonica: Craving for chalk, charcoal, coal and pencils

Calcarea phosphorica: Desires lime, slate, pencils, earth, chalk, clay etc

Cicuta virosa: Abnormal appetite for chalk, charcoal, coal, cabbage, which are relished

Natrum muriaticum: Craving for salt

Nitricum acidum: Craving for lime, slate, pencil, papers and charcoal

Nux vomica: Craving for charcoal, pepper, chalk

Silicea: Craving for lime, sand, raw foods [25]

CONCLUSION

Pica is a complex disorder with varying prognosis among patients. Epidemiological surveys in different settings and age groups (urban, rural, youth, adults) indicate a greater prevalence of pica than expected by sporadic individual clinical reports. The adverse medical, surgical, and developmental consequences mean that early recognition and prevention are imperative. Further research is needed to clarify the normal psychobiology and developmental progression of food selection, the intricate role of socio cultural influences, and the significance of appetite and ingestive disturbances in neuropsychiatric disorders. Special focus should be given to the high incidence of pica in the mentally handicapped and to the role of iron deficiency (the single most prevalent nutritional deficiency in world population studies) in causing and perpetuating eating disorders. Education, prevention, and informed behavioral interventions are the mainstay of treatment. Advances in understanding the neurobiology of food selection may yield better nutritional and pharmacological approaches in the future.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.



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