



# Pica: An age-old eating disorder that's often missed

A thorough patient history and selective testing can help you to head off the adverse effects that occur with patients who eat nonnutritive substances such as dirt and paper.

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## PRACTICE RECOMMENDATIONS

› Ask about pica behavior or unusual cravings in certain high-risk groups: pregnant women, immigrants or refugees, and children and adults with autism or other developmental disabilities. **(C)**

› Obtain serum hemoglobin and hematocrit levels along with iron levels, if necessary, in patients who report cravings for unusual substances. **(B)**

› Check serum lead levels and consider testing for ova and parasites in patients who eat dirt. **(C)**

### Strength of recommendation (SOR)

- (A)** Good-quality patient-oriented evidence
- (B)** Inconsistent or limited-quality patient-oriented evidence
- (C)** Consensus, usual practice, opinion, disease-oriented evidence, case series

**CASE** ▶ A 6-year-old African girl, developing and growing appropriately for age, was brought to our clinic by her father with the chief complaint of “eating the textbooks at school.” The child had eaten paper for years, the father said; he never thought it unusual until her teacher brought it to his attention. The father reported that his daughter had met all developmental milestones and was up to date with her immunizations. When asked why she ate paper, the child responded, “I don’t know.”

The child was diagnosed with pica and, because we were concerned that she was eating other nonnutritive foods, we ordered hematologic studies. Her lead level (2 mcg/dL) was within the normal range; her hemoglobin/hematocrit was 10.4 g/dL/32.3%. Iron therapy was started. At follow-up 4 weeks later, the child’s paper-eating behavior had resolved.

**T**he word pica comes from the Latin word for magpie, a bird with a reputation for eating practically anything. The *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition, defines pica as persistent eating of nonnutritive substances for at least 1 month that is inappropriate to developmental level and not part of a culturally supported or socially normative practice.<sup>1</sup>

Case reports on paper pica are few, but numerous reports describe other forms of the behavior, including eating ice; dirt, soil, and clay; starch; burnt matches; cardboard; hair; laundry detergent; chalk; soap; firecrackers; and metal artifacts such as coins.<sup>2-16</sup>

Pica has been described in the literature as “underreported” and “unrecognized.” Its true prevalence is difficult to assess because most people don’t report it and the methodology of data collection varies among populations, as does the definition of pica. According to some estimates, more than 50% of children ages 18 to 36 months seek and ingest nonfood items. The practice reportedly decreases as a child ages, but an es-

➤ **Adverse effects of pica include potassium abnormalities and GI conditions ranging from abdominal pain to perforation, blockage, and colon ischemia.**

estimated 10% of children older than 12 years may engage in it.<sup>17</sup>

■ **Pica has been reported since antiquity.** Many medical and anthropological studies refer to the practice of geophagia, or dirt eating, which is prevalent in Africa and among small children and women, particularly women who are native to the southern United States, African-American, or pregnant.<sup>5-10,18,19</sup>

■ **Pica often occurs in people with developmental disabilities** such as autism and is considered a psychiatric condition in that context.<sup>3,11,15,20-31</sup> However, because many forms of pica, especially geophagia, aren't associated with mental health issues, researchers disagree about whether to consider it an abnormal behavior. A 2000 workshop on pica organized by the Agency for Toxic Substances and Disease Registry concluded that geophagia is not an abnormal behavior.<sup>17</sup> One of the most compelling arguments for this view is that dirt eating is far too common around the world to be considered abnormal, and dirt is held in some cultures to have therapeutic powers.<sup>7,13,24</sup>

### **Adverse outcomes linked to pica**

Pica is associated with adverse outcomes, however. A study by the Agency for Healthcare Research and Quality found that despite an overall decline in hospitalizations for eating disorders, hospitalizations for pica have risen.<sup>25</sup> From 1999 to 2009, pica-related hospitalizations jumped 93%, although the overall number of patients hospitalized for the condition remains small (964 in 1999 to 2000, 1862 in 2008-2009).

Documented adverse effects of pica include potassium abnormalities and gastrointestinal conditions ranging from irritation and abdominal pain to perforation, blockage, and colon ischemia.<sup>3,11,26-29</sup> Reported bidirectional effects (which both result from and contribute to pica) include iron deficiency, parasitic infections, and heavy metal exposure—particularly lead, mercury, and arsenic.<sup>4,6,9,20,30-38</sup>

### **Diagnosis: Focus on history and selective testing**

Pica is a clinical diagnosis, confirmed by the patient's history, not any single labora-

tory test. Providers should ask about pica behavior or unusual cravings in certain high-risk groups: pregnant women, particularly women from the southern United States, immigrants or refugees, and children and adults with autism or other developmental disabilities.<sup>18,22</sup>

■ **Testing should be based on the type of pica behavior.** Because various forms of pica are commonly associated with iron-deficiency anemia, obtain serum hemoglobin and hematocrit levels along with iron levels if necessary in patients who report cravings for unusual substances. Pica in pregnancy is a sign of iron deficiency, but it also may signal iron deficiency in patients who aren't pregnant. In one study of 262 nonpregnant adults with iron-deficiency anemia, 45% reported pica behaviors; of these, 87.3% reported eating ice.<sup>34</sup>

Check serum lead levels in children who engage in geophagia since dirt may contain lead. Because ingestion of soil or clay is associated with soil-borne parasitic infections, also consider testing for ova and parasites if clinically indicated. Patients who eat paper may be exposed to mercury poisoning, so a serum mercury level is advisable.

### **Management: Prevention and behavior modification are key**

Treatment for pica varies by patient and the specific behavior. Management approaches are primarily preventive, educational, and directed toward behavior modification.

■ **Prevention.** Residential facilities and primary care offices that care for people with developmental disabilities may screen for pica by means of prevalence surveys, direct observation, stool checks, review of medical history records, and interviews with caregivers.

Residential facilities can create a pica-safe environment by training staff in pica prevention, instituting regular on-site monitoring to ensure that no dangerous objects are available, and developing procedures to guide staff behavior, such as safe disposal of rubber gloves.<sup>22</sup> Parents and caregivers of young children or children with developmental disabilities who don't live in residential facilities should be aware of pica and monitor what their children are ingesting.

**■ Behavior modification.** Behavior-based approaches have proved effective for treating pica in developmentally disabled patients. Applied behavioral analysis “was found to have the most robust empirical support to treat this behavior.”<sup>39</sup> Patients found to have pica may be referred for further assessment to a behavior specialist or a psychologist with experience in treating the condition.<sup>22,39</sup>

A review of 26 studies found that, in 25 studies, behavioral therapy reduced pica behavior by 80% or more.<sup>23</sup> Behavioral treatments included reinforcement procedures alone, response reduction procedures alone, and combined reinforcement and response reduction procedures. Reinforcement shapes behavior by controlling the consequences of the behavior using a combination of rewards and punishments.<sup>23</sup> Response reduction, or blocking, involves obstructing every attempt to eat inedible items.<sup>22</sup>

Treatments that combined reinforcement and response reduction showed good efficacy.<sup>23</sup> An example of the combined approach would be to stop the patient from eating nonnutritive items while redirecting him to eat food instead.<sup>22</sup>

**■ Supplementation.** Iron supplementation has decreased or even reversed pica in patients whose clinical symptoms and behavior were associated with iron deficiency.<sup>35,40</sup>

**■ Medications.** Successful treatment with selective serotonin reuptake inhibitors (escitalopram), atypical neuroleptics (olanzapine), and attention-deficit/hyperactivity disorder medications (methylphenidate) has been reported in some patients, but case reports are few, and the evidence for the drugs' efficacy is limited.<sup>41-43</sup>

**■ Be alert for pica.** Primary care physicians need to be aware of pica and proactively seek information about cravings or behaviors suggesting the condition from patients in high-risk populations—pregnant women, children, immigrants and refugees, people with developmental disabilities—or their caregivers. Once pica is identified, clinicians should undertake appropriate laboratory investigation and behavior modification attempts.

JFP

## CORRESPONDENCE

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**Ask about pica behavior or unusual cravings in high-risk groups, such as pregnant women and children and adults with autism.**

## References

- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
- Yalug I, Kirmizi-Alsan E, Tufan AE. Adult-onset paper pica in the context of anorexia nervosa with major depressive disorder and a history of childhood geophagia: a case report. *Prog Neuropsychopharmacol Biol Psychiatry*. 2007;31:1341-1342.
- Spaniolas K, Ou S, Findeis-Hosey J, et al. Paper pica: an unusual cause of colonic ischemia. *J Gastrointest Surg*. 2010;14:1065-1066.
- Olynyk F, Sharpe DH. Mercury poisoning in paper pica. *N Engl J Med*. 1982;306:1056-1057.
- Guney M, Zagury GJ, Dogan N, et al. Exposure assessment and risk characterization from trace elements following soil ingestion by children exposed to playgrounds, parks and picnic areas. *J Hazard Mater*. 2010;182:656-664.
- Kawai K, Saathoff E, Antelman G, et al. Geophagy (soil-eating) in relation to anemia and helminth infection among HIV-infected pregnant women in Tanzania. *Am J Trop Med Hyg*. 2009;80:36-43.
- Woywodt A, Kiss A. Geophagia: the history of earth-eating. *J R Soc Med*. 2002;95:143-146.
- Stokes T. The earth-eaters. *Nature*. 2006;444:543-544.
- Kutalek R, Wewalka G, Gundacker C, et al. Geophagy and potential health implications: geohelminths, microbes and heavy metals. *Trans R Soc Trop Med Hyg*. 2010;104:787-795.
- Keith D, Keith L, Berger GS, et al. Amylophagia during pregnancy: some maternal and perinatal correlations. *Mt Sinai J Med*. 1975;42:410-414.
- Abu-Hamdan DK, Sondheimer JH, Mahajan SK. Cautopyreio-phagia. Cause of life-threatening hyperkalemia in a patient undergoing hemodialysis. *Am J Med*. 1985;79:517-519.
- Ewert P, Keim L, Schulte-Markwort M. Trichobezoar. A rare cause of recurrent upper abdominal pain [in German]. *Monatsschr Kinderheilkd*. 1992;140:811-813.
- Grigsby RK, Thyer BA, Waller RJ, et al. Chalk eating in middle Georgia: a culture-bound syndrome of pica? *South Med J*. 1999;92:190-192.
- Ahishali E, Boynue ri B, Dabak R, et al. A case of severe acute hepatitis due to oral intake of firecrackers. *Turk J Gastroenterol*. 2010;21:325-326.
- Rashid F, Davies L, Iftikhar SY. Magnetised intragastric foreign body collection and autism: An advice for careers and literature review. *Autism*. 2010;14:139-145.
- Martindale JL, Bunker CJ, Noble VE. Ingested foreign bodies in a patient with pica. *Gastroenterol Hepatol (N Y)*. 2010;6:582-584.
- Agency for Toxic Substances and Disease Registry. Summary Report for the ATSDR Soil-Pica Workshop June 2000, Atlanta, Georgia. Agency for Toxic Substances and Disease Registry Web site. Available at: [www.atsdr.cdc.gov/child/soilpica.html](http://www.atsdr.cdc.gov/child/soilpica.html). Accessed June 2, 2012.
- Njiru H, Elchalal U, Paltiel O. Geophagy during pregnancy in Africa: a literature review. *Obstet Gynecol Surv*. 2011;66:452-459.
- Young SL. Pica in pregnancy: new ideas about an old condition. *Annu Rev Nutr*. 2010;30:403-422.
- Clark B, Vandermeer B, Simonetti A, et al. Is lead a concern in Canadian autistic children? *Paediatr Child Health*. 2010;15:17-22.
- Matson JL, Sipes M, Fodstad JC, et al. Issues in the management of challenging behaviours of adults with autism spectrum disorder. *CNS Drugs*. 2011;25:597-606.

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22. Williams DE, McAdam D. Assessment, behavioral treatment, and prevention of pica: clinical guidelines and recommendations for practitioners. *Res Dev Disabil.* 2012;33:2050-2057.
23. Hagopian LP, Rooker GW, Rolider NU. Identifying empirically supported treatments for pica in individuals with intellectual disabilities. *Res Dev Disabil.* 2011;32:2114-2120.
24. Engberg DE. Geophagy: adaptive or aberrant behavior. *Nebraska Anthropologist.* 1995;12:57-68.
25. Agency for Healthcare Research and Quality. Hospitalizations for eating disorder decline, but big increase seen in pica disorder. Agency for Healthcare Research and Quality Web site. Available at: [www.ahrq.gov/news/nn/nn090811.htm](http://www.ahrq.gov/news/nn/nn090811.htm). Accessed June 2, 2014.
26. Stroman D, Young C, Rubano AR, et al. Adult-onset pica leading to acute intestinal obstruction. *Psychosomatics.* 2011;52:393-394.
27. Young SL, Khalfan SS, Farag TH, et al. Association of pica with anemia and gastrointestinal distress among pregnant women in Zanzibar, Tanzania. *Am J Trop Med Hyg.* 2010;83:144-151.
28. Altepetter T, Annes J, Meller J. Foam bezoar: resection of perforated terminal ileum in a 17-year-old with sickle  $\beta$ -thalassemia and pica. *J Pediatr Surg.* 2011;46:E31-E32.
29. Chatzimavroudis G, Christopoulos P, Atmatzidis S, et al. Pica: an uncommon cause of acute abdominal pain in children. *Indian J Pediatr.* 2011;78:886-887.
30. Rector WG Jr. Pica: its frequency and significance in patients with iron-deficiency anemia due to chronic gastrointestinal blood loss. *J Gen Intern Med.* 1989;4:512-513.
31. Sontag C, Kettaneh A, Fain O, et al. Rapid regression of prolonged pagophagia after treatment of iron deficiency [in French]. *Presse Med.* 2001;30:321-323.
32. Sharma TR, Kavuru B, Aly M. Coprophagia and pica in individuals with mild to moderate dementia and mixed (iron deficiency and macrocytic) anemia. *J Am Geriatr Soc.* 2011;59:2375-2377.
33. Kushner RF, Shanta Retelny V. Emergence of pica (ingestion of non-food substances) accompanying iron deficiency anemia after gastric bypass surgery. *Obes Surg.* 2005;15:1491-1495.
34. Barton JC, Barton JC, Bertoli LE. Pica associated with iron deficiency or depletion: clinical and laboratory correlates in 262 non-pregnant adult outpatients. *BMC Blood Disord.* 2010;10:9.
35. Khan Y, Tisman G. Pica in iron deficiency: a case series. *J Med Case Rep.* 2010;4:86.
36. Bakhireva LN, Rowland AS, Young BN, et al. Sources of potential lead exposure among pregnant women in New Mexico. *Matern Child Health J.* 2013;17:172-179.
37. Thihalolipavan S, Candalla BM, Ehrlich J. Examining pica in NYC pregnant women with elevated blood lead levels. *Matern Child Health J.* 2013;17:49-55.
38. Al-Rmalli SW, Jenkins RO, Watts MJ, et al. Risk of human exposure to arsenic and other toxic elements from geophagy: trace element analysis of baked clay using inductively coupled plasma mass spectrometry. *Environ Health.* 2010;9:79.
39. Matson JL, Hattier MA, Belva B, et al. Pica in persons with developmental disabilities: approaches to treatment. *Res Dev Disabil.* 2013;34:2564-2571.
40. Bryant BJ1, Yau YY, Arceo SM, et al. Ascertainment of iron deficiency and depletion in blood donors through screening questions for pica and restless legs syndrome. *Transfusion.* 2013;53:1637-1644.
41. Lerner AJ. Treatment of pica behavior with olanzapine. *CNS Spectr.* 2008;13:19.
42. Hergüner S, Hergüner AS. Pica in a child with attention deficit hyperactivity disorder and successful treatment with methylphenidate. *Prog Neuropsychopharmacol Biol Psychiatry.* 2010;34:1155-1156.
43. Bhatia MS, Gupta R. Pica responding to SSRI: an OCD Spectrum Disorder? *World J Biol Psychiatry.* 2009;10(4 pt 3):936-938.