

Pica: a frequent symptom in iron deficiency anemia

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Abstract

Introduction: Pica is the habitual ingestion of non-nutritive substances. The aim of the study is to investigate the frequency and types of pica and the relationship of pica with patient characteristics.

Material and methods: This descriptive prospective study was conducted between October 2005-December 2006. 119 patients with iron deficiency anemia (IDA) were included. The data were collected by using a standard questionnaire form.

Results: In this study, a total of 119 IDA patients whose mean age was 37.0 ±11.5 (mean ± SD) (range 15-72 years) were investigated. Ninety-four of the cases had pure IDA, 19 additional vitamin B₁₂ deficiency and six pregnancy. The frequency of pica was 34.4% in the study group, 38.3% in pure IDA patients, 15.8% in iron and vitamin B₁₂ deficiency patients and 33.3% in pregnant. Pica was more prevalent in pure IDA patients than those with additional vitamin B₁₂ deficiency ($p = 0.048$). Age was not a significant factor in pica frequency. There was no relationship between the severity of anemia and the frequency of pica. No difference has been observed between complete blood count parameters of IDA patients with and without pica, apart from a borderline difference in mean platelet volume ($p = 0.057$).

Conclusions: As a result, pica is a frequent finding in IDA, and patients with and without pica have similar characteristics.

Key words: anemia, iron-deficiency, iron, pica.

Introduction

Pica is the persistent eating of a non-nutritional substance as defined by the American Psychiatric Association and the most common of which is eating soil and ice [1]. Pica usually is the manifestation of iron deficiency anemia (IDA) and is relieved when condition is treated. The aim of the current study is to investigate the frequency and types of pica and the relationship of pica with patient characteristics.

Material and methods

Study was performed prospectively between October 2005 and December 2006 among patients admitted to Gulhane Military Medical Academy Hematology Department and diagnosed as iron deficiency anemia. There was no exclusion criteria. All interviews were conducted by the authors of the study. Written informed consent was taken from all patients. A standard questionnaire form was used which included corresponding address, medical and pica history, physical examination

findings, laboratory results and the prescriptions. None of the subjects had psychological complaints nor previous psychological history. During the history taking pica was explained to the patients and none of them hesitated to give information about their habits. All of the patients with pica were included since none were unwilling to participate. There was no refractory or relapsing pica among patients after treatment of IDA.

Complete blood counts have been performed with automated analyzer (Abbott Cell-Dyn 4.000, Abbott Park, IL, USA). Anemia was defined as a hemoglobin < 13.0 g/dl in men and < 12.0 g/dl in women [2]. Serum levels of ferritin, vitamin B₁₂ and folate, peripheral blood smear, reticulocyte count and hemoglobin electrophoresis were used for evaluation of anemias [3]. If these laboratory evaluations were not adequate to diagnose, we examined the bone marrow and evaluate the serum iron and iron-binding capacity. Serum levels of vitamin B₁₂ and folate levels were measured by radioimmunoassay (Dualcount Solid-Phase, No-Boil Assay for Vitamin B₁₂/folic acid; Diagnostics Products Corp, Los Angeles, CA). Serum

levels of ferritin were measured by an automated chemiluminescence system (Ciba Corning Automated Chemiluminescence System; Ciba Corning Diagnostic Corp, Medfield, USA). Iron stores were considered inadequate if serum ferritin was less than 22.5 pmol/l for women and 49.4 pmol/l for men. Reference range for the vitamin B₁₂ assay was between 147.6 and 664.2 pmol/l, and reference range for the serum folate was between 6.8 and 45.3 nmol/l.

Chi-square test was used to evaluate pica frequency and related factors. For comparisons of complete blood count parameters in cases with and without pica, unpaired t-test was used. All results were given as mean \pm standard deviation (SD). An α level of 0.05 was considered to be statistically significant. Statistical analysis was done with MS Excel 2000 software.

Results

A total of 119 IDA patients (114 women and 5 men) whose mean age was 37.0 \pm 11.5 (mean \pm SD) (range 15-72 years) were investigated. Ninety-four of the cases had pure IDA, 19 additional vitamin B₁₂ deficiency and six pregnancy. Demographic data are shown in Table I.

The frequency of pica was 41/119 (34.4%) in whole IDA patient population. Some cases have more than one type of pica. The pica types and frequencies are shown in Table II.

The frequency of pica was 38.3% in pure IDA patients, 15.8% in iron and vitamin B₁₂ deficiency patients and 33.3% in pregnant. Pica was more prevalent in pure IDA patients than those with additional vitamin B₁₂ deficiency ($p = 0.048$). The frequency was not significantly different in IDA cases with pregnancy ($p = 0.587$).

Pica frequency was 19/55 (34.5%) and 22/64 (34.4%) in cases younger than 35 and > 35 years, respectively ($p = 0.862$). Pica frequency was 10/23 (43.5%) in cases younger than 25 years and 31/96 (32.3%) in cases > 25 years old ($p = 0.441$). Briefly, pica frequency was not different among age groups.

The relationship between pica and sex could not be evaluated because of small number of male patients.

There was no statistically significant difference among the frequencies of pica in cases with hemoglobin values lower and greater than 10 g/dl (36.6 and 31.2% respectively; $p = 0.683$). The frequency of pica was 41.2% in cases with hemoglobin values equal or lower than 8 g/dl ($p = 0.723$). There was no association between the severity of anemia and the frequency of pica.

Comparison of complete blood count parameters in cases with and without pica is shown in Table III. No difference has been observed between complete blood count parameters of IDA patients with and without pica, apart from a borderline difference in

Table I. Demographic data

	Pure IDA	Combined IDA and vitamin B ₁₂ deficiency	IDA in pregnancy
Case number	94	19	6
Mean age*	36.79 \pm 11.13	40.74 \pm 13.31	29.50 \pm 7.39
Gender	90 F, 4 M	18 F, 1 M	6 F

IDA – iron deficiency anemia, F – female, M – male
* Values were given as mean \pm standard deviation

Table II. Pica types and frequencies

Pica type	Frequency*
Geophagia	18/41 (43.9%)
Pagophagia	9/41 (21.9%)
Citrus shell eating	6/41 (14.6%)
Raw rice eating	4/41 (9.7%)
Coffee grain eating	3/41 (7.3%)
Salt (sodium chloride) eating	2/41 (4.9%)
Chewing gum eating	2/41 (4.9%)
Paper eating	1/41 (2.4%)
Ash eating	1/41 (2.4%)
Cheese yeast eating	1/41 (2.4%)
Gasoline drinking	1/41 (2.4%)
Pencil tip eating	1/41 (2.4%)
Toothpaste eating	1/41 (2.4%)
Sunflower seed eating	1/41 (2.4%)

*There were cases having more than one type of pica

mean platelet volume (MPV's were 9.34 ± 1.24 and 8.87 ± 1.26 fl in cases with and without pica, respectively, $p = 0.057$).

Discussion

Iron deficiency is the most common cause of anemia worldwide and it is more prevalent in developing countries. Pica is one of the most frequent manifestations of IDA. Pica cases accompanying IDA are mostly reported as case reports in literature; actually the number of clinical studies investigating pica in IDA cases is infrequent. It was reported that pica might be seen in one third to half of patients with IDA [4, 5]. Pica history was present in 34.4% of IDA cases in our study. The most common forms of this symptom are probably pagophagia (a form of pica involving the compulsive consumption of ice or iced drinks) and geophagia (soil or clay ingestion), but there are many less common ones [4, 6]. As it is seen in Table II, geophagia and pagophagia were the most common forms of pica in our patients although there were less common forms such as ingesting chewing gum, toothpaste and drinking gasoline. Although pagophagia has been reported as the most common form in some studies, similar to our study there are many reports which emphasize geophagia as the most frequent type of pica [5-7]. Geissler *et al.* reported that pica could be a practice rooted in custom, folklore and superstition among certain cultural groups; we also suppose that different types of pica might be related to cultural differences [6, 7]. Although pica's pathophysiology has not been elucidated, it is known that it is related to iron deficiency per se, rather than to anemia [4]. Disappearance of pica after beginning of iron replacement and the lack of difference in pica frequency among different anemia severity cases support this hypothesis.

According to definition in Webster dictionary, pica is a craving for unnatural food, earth, or ashes

occurring especially in pregnancy or hysteria. Lack of difference in IDA cases with or without pregnancy suggests that pregnancy itself is not the real cause of pica as depicted in dictionary, but development of iron deficiency during pregnancy is more likely to be the real cause of pica. A strong relationship between iron deficiency and geophagia accompanying pregnancy has been reported in Geissler *et al.* and Lopez *et al.* studies [7, 8].

Kushner *et al.* reported that pica might be seen in cases who developed iron deficiency after gastric operations [9]. We have only two cases with gastrectomy and they did not have pica.

Pica was more prevalent in pure IDA patients when compared to patients with additional vitamin B₁₂ deficiency in our study. We could not find such an investigation in the literature. This result might suggest that etiological factors (hypermenorrhea, chronic gastrointestinal losses etc.) causing pure iron deficiency could be related to pica pathophysiology rather than factors causing combined iron and vitamin B₁₂ deficiency such as gastric absorption abnormalities. We have evaluated the pica patients with regard to presence of hypermenorrhea and chronic gastrointestinal loss for validation of this speculation. 26 of 41 pica cases reported hypermenorrhea and one previous gastrointestinal system bleeding while 44 of 78 non-pica cases stated hypermenorrhea and two previous gastrointestinal system bleeding. Although chronic blood loss history was higher in patients with pica, it was not statistically significant (27/41 vs. 46/78, χ^2 Pearson's analysis, $\chi^2 = 0.536$, $p = 0.464$). The evaluation of premenopausal and non-pregnant women for the presence of hypermenorrhea revealed no statistically significant difference between cases with and without pica (25/34 vs. 44/64, $\chi^2 = 0.243$, $p = 0.622$), although frequency of hypermenorrhea was higher in cases with pica. Still comprehensive studies which could record menstrual bleeding

Table III. Comparison of complete blood count parameters in cases with and without pica

CBC parameters	Cases with pica		Cases without pica		p Value
	mean \pm SD	range	mean \pm SD	range	
WBC ($\times 10^9/l$)	6.14 \pm 1.57	3.18-9.35	6.37 \pm 2.12	3.28-15.70	0.507
RBC ($\times 10^{12}/l$)	4.38 \pm 0.51	3.50-5.71	4.28 \pm 0.37	3.14-5.26	0.261
HGB [g/dl]	9.6 \pm 1.3	6.4-11.6	9.6 \pm 1.3	6.2-11.8	0.782
HCT [%]	30.3 \pm 3.9	21.7-36.0	30.2 \pm 3.4	20.4-36.1	0.935
MCV (fl)	69.1 \pm 6.2	55.9-78.8	70.7 \pm 6.8	54.1-83.0	0.219
MCH [pg]	21.9 \pm 2.6	17.3-25.8	22.6 \pm 2.9	15.6-27.5	0.179
MCHC [g/dl]	31.6 \pm 1.4	28.2-33.9	31.9 \pm 1.6	26.8-35.1	0.276
RDW [%]	16.9 \pm 2.3	12.8-24.6	16.3 \pm 2.2	12.4-22.0	0.241
PLT ($\times 10^9/l$)	306 \pm 83	163-505	333 \pm 92	114-555	0.117
MPV (fl)	9.34 \pm 1.24	6.44-13.30	8.87 \pm 1.26	6.11-12.40	0.057

quantitatively and sensitively and which include a detailed gastrointestinal survey are needed in order to clarify whether there is any relationship between the etiology of IDA and the presence of pica.

Another striking result of our study is the lack of difference between complete blood cell parameters of IDA patients with and without pica apart from a borderline difference in mean platelet volume. We could not find such an investigation in the literature. This result might not have any significance when evaluated with minimal differences in platelet counts, or this increment in MPV might indicate platelet activation or a slight increase in platelet production in cases with pica [10]. More comprehensive studies are needed to evaluate these results.

The limitations of our study are the restricted number of cases, relatively low number of cases with pregnancy or patients with additional vitamin B₁₂ deficiency and lack of control group.

As a result, pica is a frequent symptom in IDA, and patients with and without pica have similar characteristics.

References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Washington, DC: American Psychiatric Association 2000.
2. Beutler E, Waalen J. The definition of anemia: what is the lower limit of normal of the blood hemoglobin concentration? *Blood* 2006; 107: 1747-50.
3. Massey AC. Microcytic anemia. Differential diagnosis and management of iron deficiency anemia. *Med Clin North Am* 1992; 76: 549-66.
4. Moore DF, Sears DA. Pica, iron deficiency and the medical history. *Am J Med* 1994; 97: 390-3.
5. 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: 512-3.
6. Kettaneh A, Eclache V, Fain O, et al. Pica and food craving in patients with iron-deficiency anemia: A case-control study in France. *Am J Med* 2005; 118: 185-8.
7. Geissler PW, Prince RJ, Levene M, et al. Perceptions of soil-eating and anaemia among pregnant women on the Kenyan coast. *Soc Sci Med* 1999; 48: 1069-79.
8. 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: 151-2.
9. 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: 1491-5.
10. Bancroft AJ, Abel EW, McLaren M, Belch JJ. Mean platelet volume is a useful parameter: a reproducible routine method using a modified Coulter thrombocytometer. *Platelets* 2000; 11: 379-87.