



RESEARCH ARTICLE

Study the Prevalence, Characteristics of Mothers, and Associated Risk Factors of Pica Eating among Pregnant Women: A Cross-sectional Study

Yaseen M. Galali*

Food Technology Department, College of Agricultural Engineering Sciences, Salahaddin University-Erbil, Erbil, KRG-Iraq

ABSTRACT

Eating disorder is a common phenomenon accompanying pregnancy including ingestion non-nutritive substances. Causes of pica are uncertain. The purpose of this study, therefore, is to assess prevalence, characteristics, and risk factors of pica among Kurdish pregnant women. A cross-sectional study was conducted in Iraqi Kurdistan and the information regarding sociodemographic information, prevalence, and characteristics, and risk factors were collected. Four hundred women were registered and interviewed for this study. Data showed that the prevalence of pica was 60.5% (242), and the most frequent forms of pica eaten were pagophagia, geophagia, and amylophagia by 29.7% (119), 25.3% (101), and 12.5% (50), respectively. Data showed that pica is related to mother education ($P = 0.011$), mother occupation ($P = 0.002$), living place ($P = 0.011$), health complication during pregnancy ($P = 0.018$), and affects breastfeeding ($P = 0.040$). Baby gender, mother age, iron supplementation, history of child abortion, and economic satisfaction were not significantly associated to pica eating (PE). The results also showed that psychological factors for PE was reduce nausea, ameliorate stress, and anxiety and very fewer pregnant used to control hunger. Mother should check for any health complication before pregnancy and receive enough and regular check-up as well as educate themselves regarding consequences of pica. Furthermore, psychological consultation is important throughout pregnancy period.

Keywords: Eating disorder, pagophagia, pica eating, pregnancy, risk factors

INTRODUCTION

Normal eating disturbance is very common during pregnancy and majority mothers experience it. Pica eating (PE) is a common eating disorder during pregnancy characterized by consistently ingesting non-nutritive substances.^[1] Common types of PE include consumption of clay or mud (geophagy), eating ice or ice frost (pagophagy), and consumption of uncooked starch-like row rice (amylophagy).^[2] On the other hand, some people practice polypica which known as eating different non-nutritive substances.^[3]

Data from studies have shown that the prevalence of PE is dissimilar among populations. According to the data available, the prevalence of PE in pregnant women ranges between 0.02% in Denmark and 74% in Kenya.^[4] Even in some population like Malawi, pregnancy is recognized through practicing pica.

Etiology of PE has been ascertained known, however, it has been attributed to several factors including health problem such as nutrients deficiency (i.e., iron), exposure to toxins (i.e., lead), and pathogens, gastrointestinal disorder,^[5] suppress nausea and vomiting, as well as cultural backgrounds.^[6] This complication may cause not only merely discomfort to pregnant women but can also interfere with appetite, adequate dietary

intake, reduce intake nutritious foods, and essential nutrients. Furthermore, non-food substance might contain an amount of nutrients which is not tolerated, cause malabsorption, and/or containing toxic substances. Consequently, it can lead to serious health complications.^[7] It can also influence breastfeeding and affect fetus and child health.^[8]

There is lack of investigation of PE in pregnant women in Iraqi Kurdistan in terms of prevalence, characteristics, and risk factors and comparing to other populations. Therefore, the aims of the study are to study the prevalence of PE, type, and risk factors among Kurdish pregnant women its relation to sociodemographic information. Also, the investigation of the characteristics of the mothers and their associated risk factors of PE.

Corresponding Author:

Yaseen M. Galali, Food Technology Department, College of Agricultural Engineering Sciences, Salahaddin University-Erbil, Erbil, KRG-Iraq. E-mail: Yaseen.galali@su.edu.krd

Received: Oct 20, 2020

Accepted: Dec 20, 2020

Published: Dec 30, 2020

DOI: 10.24086/cuesj.v4n2y2020.19-24

Copyright © 2020 Yaseen M. Galali. This is an open access article distributed under the Creative Commons Attribution License (CC BY-NC-ND 4.0).

METHODOLOGY

Study Design

The study was carried in the period between July and August 2020 through interviewing mothers visiting maternal care unit at Erbil maternity hospital clinics in Erbil City, Capital of Kurdistan region of Iraq. Electronic form was developed for those who were not able to interview face to face from other districts such as Duhok, Sulaimani, and Halabja due to COVID-19 pandemic movement restriction. The inclusion criteria included mothers with no previous history of lifelong health complications such as cancer, cardiovascular diseases, endocrine diseases, and agree to participate. The study was divided into four sections; the first section was on sociodemographic information (age, qualification, residency, occupation, and level of income satisfaction). The second section included obstetric-related information; pregnancy complication (preeclampsia, anemia, hypertension, gestational diabetes, vomiting or nausea, bleeding, and premature contractions), child delivery type, and parity. The third section included assessment of iron taking before and during pregnancy and child feeding type (breastfeeding, formula feeding, and mixture of breastfeeding and formula feeding). The fourth section assessed PE practice questionnaire during pregnancy including non-food items such as ice, flower or tree leaves, clay, soil, hair, cigarette ashes, raw rice, coffee grounds or tea, tobacco, charcoal, and/or any other non-food items ingested during pregnancy period. The reasons for PE were also studied including suppress hunger, ameliorate stress and anxiety, and attenuate nausea and vomiting.

Sample Size

Sample size was calculated using the Yemane's formulation with 50% prevalence at the range for finite targeted population.^[9]

$$n = N / (1 + Ne^2) = 400$$

Where,

n=corrected size of the targeted sample, e=Margin of error 0.05 based on the research condition. N=population size which is estimate to be around 100,000 without any health complication

Data Collection Analysis

The research was registered at the Department of Nutrition, University of Cihan, Erbil. Permission from hospitals and clinics administration offices was taken to interview the participants. The collected data were organized double-checked for appropriateness before submitting for analysis. The data were then transported to Excel spreadsheet and statistical packages for analysis. The data were then statistically analyzed for significant differences using statistical tests including logistic regression and Chi-square from version 22 of SPSS statistical package for life sciences (SPSS Inc., Chicago, IL, USA).

RESULTS

Data from sociodemographic information of participants showed that pregnant women aged between 20 and 29 were 193 (48.1%) and age between 30 and 39 were 118 (29.4%);

birth gender showed male 210 (52%) and female (47.5%). The majority of the mothers had education; high school 135 (33.8%), university 181 (45.1%), but 43 (10.6%) were not education. More than half of the participants (61.3%) were housewife and 126 (31.5%) were employed. Regarding the economic level, only 63 (15.7%) were satisfied with low level. The rest moderately 218 (54.4%) and highly 119 (29.9%) satisfied. The majority of the participants were from cities 273 (68.3%). It is interesting that the delivery types like normal vaginal delivery were 185 (46.3%) and cesarean delivery was 215 (53.7%) [Table 1].

The prevalence of the PE among studied population was 60.5% (242) and it seems that overtime is reducing. This means that in the first trimester scored the highest with 72.4% and it was reduced to 26.8% and 0.8% in the second and third trimesters, respectively.

Regarding taking iron supplementation, the data showed that 43.7% of the participants taking iron supplement in a month before pregnancy and 39.6% never taken [Figure 1]. On the other hand, taking iron supplement during pregnancy is

Table 1: Sociodemographic characteristics of participants

Variables	Count	Percent
Birth gender		
Male	210	52.5
Female	190	47.5
Mother age		
<19	31	7.6
20–29	193	48.1
30–39	118	29.4
>40	59	14.8
Education level of mother		
Elementary	42	10.4
High school	135	33.8
University	181	45.1
Non-educated	43	10.6
Mother occupational status		
Housewife	245	61.3
Employed	126	31.5
Student	29	7.2
Levels of income satisfaction		
High	119	29.9
Moderate	218	54.4
Low	63	15.7
Residency		
City	273	68.3
Town	50	12.5
Village	77	19.2
Delivery type		
NVD*	185	46.3
Cesarean	215	53.7

*Normal vaginal delivery

more prevalent than before pregnancy. In the 1st month, 21.3% take it, after 4th month taking iron seemed to be 16.6% and gradually decreasing to 2.7% in the last month of pregnancy.

The most common pica type seemed to be pagophagia (i.e., ice) by 29.7% followed by geophagia (clay), amylophagia (raw starch and rice), coffee phagia (coffee and tea ground), and trichophagia by 25.3%, 12.5%, 8.4%, and 7.9%, respectively [Table 2].

The data also showed that there was association between PE with studied variables [Table 3]. It seemed that pica is most common in mother give males (33.6%) comparing to females (113%) although not significantly difference ($P = 0.351$). Pica also most common among women aged 20–29 by 30.1%, whereas the least practiced pica is among women over 40 (9.7%) but not significantly different ($P = 0.264$).

Mothers educational level had significant influence on pica. It was found that PE is prevalent significantly ($P = 0.011$) among university and high school educated (22.3% and 21.4%, respectively) comparing to elementary (6.4%) and non-educated women (7.1%). Furthermore, pica practice is significantly practiced in housewife (41.7%) comparing to students (4.4%). The results also discovered that PE is significantly associated with residency ($P = 0.011$), health complication during pregnancy ($P = 0.018$), and types of infant feeding ($P = 0.04$) [Table 3]. The regression modeling was applied at significant level $P < 0.05$ for forwarded variables for predicting pica. The factors included

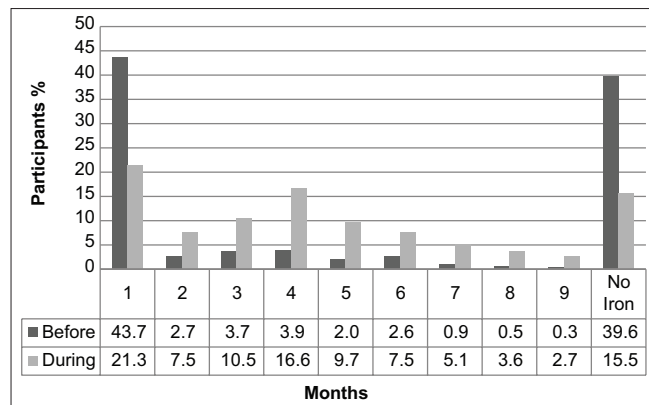


Figure 1: Iron supplement before and during pregnancy time

Table 2: Non-food items which used as pica eating by interviewed mothers

Non-food items	n	%
Pagophagia (Ice)	119	29.7
Geophagia (Clay)	101	25.3
Amylophagia (Raw rice)	50	12.5
Coffee phagia (Tea or coffee ground)	33	8.4
Trichophagia (Hair)	32	7.9
Cigarette ash	29	7.3
Charcoal	25	6.4
Flower or leaves	11	2.6

Table 3: Association between pregnant women characteristics and pica eating ($n=400$)

Variables	Pica eating		P-value***
	Yes n (%)	No n (%)	
Baby gender			0.351
Male	134 (33.6)	76 (19)	
Female	113 (28.2)	77 (19.2)	
Mother age			0.264
<19	22 (5.6)	8 (2.1)	
20–29	120 (30.1)	72 (18.1)	
30–39	66 (16.4)	52 (13)	
>40	39 (9.7)	20 (5.1)	
Mother educational level			0.011
Elementary	28 (6.4)	14 (3.2)	
High school	93 (21.4)	43 (9.9)	
University	96 (22.3)	84 (19.5)	
No education	31 (7.1)	12 (2.8)	
Mother occupational status			0.002
Housewife	167 (41.7)	79 (19.7)	
Employed	63 (15.7)	63 (15.7)	
Student	18 (4.4)	11 (2.8)	
Levels of economic satisfaction			0.137
High	74 (18.5)	45 (11.3)	
Moderate	128 (31.9)	90 (22.5)	
Low	45 (11.3)	18 (4.4)	
Pregnancy occurrence			0.232
Wanted	116 (28.9)	131 (20.1)	
Unwanted	81 (32.9)	72 (18.1)	
Parity			0.314
First	71 (17.8)	48 (12)	
Second	79 (19.7)	56 (13.9)	
Three and more	97 (24.3)	49 (12.3)	
Residency			0.011
Urban	156 (39.1)	117 (29.2)	
Town	33 (8.3)	17 (4.2)	
Rural	57 (14.4)	19 (4.9)	
History of abortion or stillbirth			0.239
Yes	96 (24.1)	51 (12.7)	
No	151 (37.7)	102 (25.5)	
Iron supplementation before pregnancy			0.567
Yes	77 (19.2)	44 (10.9)	
No	170 (42.6)	109 (27.3)	

(Contd...)

Table 3: (Continued)

Variables	Pica eating		P-value***
	Yes	No	
	n (%)	n (%)	
Iron supplementation during pregnancy			0.199
Yes	180 (44.9)	119 (29.9)	
No	68 (16.9)	33 (8.3)	
Health complication during pregnancy			0.018
Yes	194 (49)	105 (26)	
No	53 (13)	48 (12)	
Delivery			0.131
NVD*	107 (27)	78 (19)	
Cesarean	140 (35)	75 (19)	
Infant feeding			0.04
Breastfeeding	51 (14.1)	52 (13)	
Formula feeding	86 (20.1)	44 (11.1)	
Mixture feeding**	110 (27.5)	56 (14.1)	

*NVD: Normal vaginal delivery. **Mixture feeding (breastfeeding and formula feeding). ***P value level < 0.05 considered significantly different using Chi-square or Fisher's exact test

in the regression analysis included mothers education, occupation, health complication during pregnancy, residency, and breastfeeding. Only living place (residency) was found significant $P = 0.012$ [Table 4].

Regarding factors for practicing pica, 21.3% of participants declared that the main factor is for ameliorating nausea; relieve stress and controlling hunger respectively. Tea or coffee ground was frequently used to ameliorate nausea, relieve stress, anxiety, and control hunger by 21.2%, 9.4%, and 10.6%, respectively.

DISCUSSION

This study aimed discovering the prevalence of pica and its association with factors among Kurdish pregnant women. The results showed that the prevalence of pica was 60.5%. This number seemed to be higher comparing to other countries. The previous studies have reported that the prevalence of pica is different among countries, for instance, Danish women 0.02%, Iranian women 8.33%,^[1] Argentinian women 23.2%,^[10] and Sudanese women 40.4%^[11] to as high as 63.7% in Tanzanian women.^[7] PE Kurdish women are only lower than Tanzania. The factors might push them to practice pica, particularly ameliorating nausea and suppress stress and anxiety. The study found that the first trimester is the highest practiced period of pica. Lopez *et al.* (2012) found similar result noticed in Argentinian pregnant women.

The most common form of PE was pagophagia, geophagia among pregnant women. Kariuki *et al.* (2016) have found that these two types of pica were the most practiced. However, they should not continue since they might affect blood and minerals availability in diet despite having some

Table 4: Logistic regression model with pica as the dependent variable

	P-value	OR	95% CI	
			Lower	Upper
Mother educational level	0.158	1.202	1.552	0.931
Mother occupational status	0.121	1.293	1.788	0.935
Residency	0.012*	0.704	0.927	0.534
Health complication during pregnancy	0.055	1.556	2.445	0.99
Infant feeding	0.156	0.748	1.118	0.5

*Significant level at $P < 0.05$. Results of binary logistic regression. OR: Odds ratio CI: Confidence interval

inconclusive *in vitro* studies that support that geophagia releases minerals of the soil but not significant.^[12]

The study also found that pica practice related to higher mother educational level and mother occupation, urban residency, and health complication [Table 2]. The previous study by Konlan *et al.* (2020) found similar result that pica is more prevalent in urban and educated individuals but not significantly different. This may be related to higher level of stress and anxiety that they face during pregnancy and work. Therefore, they practice to reduce stress. The previous study stated that pica is more practiced in depressed pregnant women comparing to non-depressed.^[13]

It is interesting that cesarean delivery is increasing and pica is more common in the women undergo cesarean delivery. This can be kind of mimicry and fear of pain of normal vaginal delivery. Ezzeddin *et al.* (2015) also discovered that cesarean delivery is increasing in Iranian pregnant women and it is connect to pica practice.

It is also noticed that PE is associated with feeding baby [Table 3]. PE was significantly higher in women who they feed breastfeed and formula comparing to women who only breastfeed. This could be associated to the unhealthy pica practice and health complication faced during pregnant and unable to feed the baby properly. Torgersen *et al.* (2010) found that eating disorder interferes with mother's breastfeeding practice.

Despite possessing protective role of iron supplementation toward pica, but no significant ($P > 0.05$) association was found. Previous research concluded same result.^[4] Data in literature have confirmed that PE is mainly due to compensate low level of Iron or ameliorate stress and anxiety.^[14] In our study, pica seems to have more connection to relieve psychological stress and nausea.

The study also noticed that there is no significant correlation between pica and mother age, residency, baby gender, mother age, history of abortion or stillbirth, birth delivery, and pregnancy occurrence, despite having dissimilarities in each variable. The previous studies^[15] found that there is no significant relationship between pica and parity and level of income.^[16]

Regarding the factors of pica, there were significant differences between the factors and PE. The data showed that

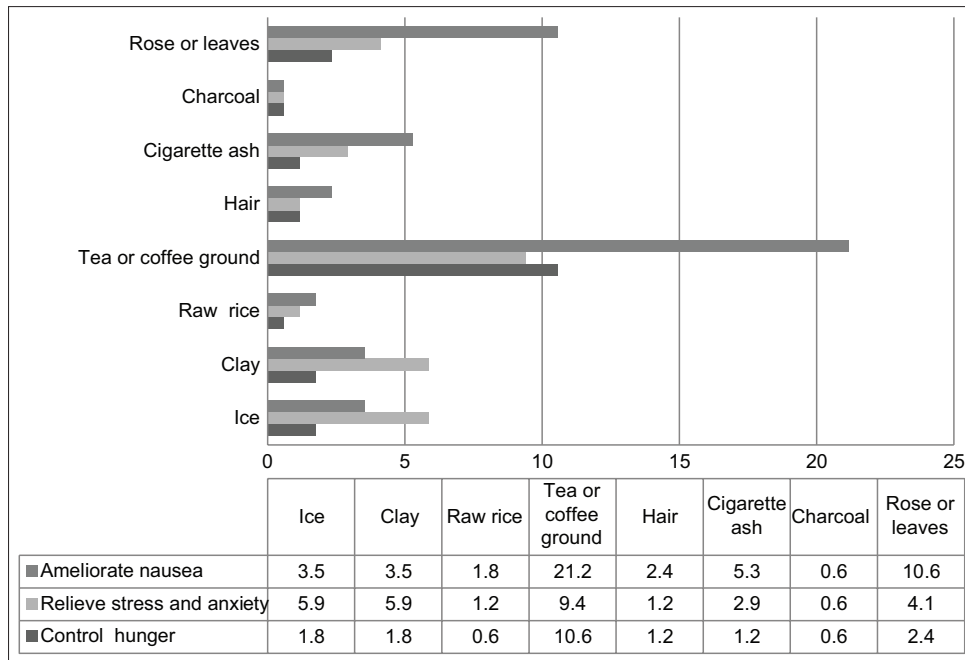


Figure 2: Association between pica items and factors of pica eating

majority of the participants practiced pica to reduce nausea and ameliorate stress and anxiety as discussed earlier, especially tea and coffee ground and rose and leaves (Figure 2). The data also confirmed the fact that these items are non-food and not usually used to suppress hunger but rather reduce stress and nausea that are common in all pregnant women.^[14]

CONCLUSION

The present study conducted to assess pica prevalence, types, and factors of PE. PE seems to be associated with mother education and occupation, health complication, residency, and then influences infant feeding. The most common types of PE found to be pagophagia, geophagia and common risk factors were nausea, stress, and anxiety.

Therefore, it is important to educate women about consequences of pica before pregnancy and more attention is required to control their health complications. Psychological aspects of pregnant women should be taken into consideration as well as they should be educated to control anxiety and stress beside their physiological aspects as pica can be mainly consequence of physiological and/or psychological problems.

REFERENCES

1. N. Ezzeddin, R. Zavoshy, M. Noroozi, H. Jahanihashemi and S. H. Riseh. Prevalence and risk factors for pica during pregnancy in Tehran, Iran. *Eating and Weight Disorders*, vol. 20, no. 4, pp. 457-463, 2015.
2. K. D. Konlan, J. A. Abdulai, K. D. Konlan, R. M. Amoah and A. Doat. Practices of pica among pregnant women in a tertiary healthcare facility in Ghana. *Nursing Open*, vol. 7, no. 3, pp. 783-792, 2020.
3. D. F. Moore and D. A. Sears. Pica, iron deficiency and the medical history. *The American Journal of Medicine*, vol. 97, no. 4, pp. 390-393, 1994.
4. A. Boatin, B. Wylie, M. P. Singh, N. Singh, K. Yeboah-Antwi and D. Hamer. Prevalence of and risk factors for pica among pregnant women in Chhattisgarh, India. *American Journal of Obstetrics and Gynecology*, vol. 206, no. 1, p. S299, 2012.
5. S. L. Young, M. J. Wilson, D. Miller and S. Hillier. Toward a comprehensive approach to the collection and analysis of pica substances, with emphasis on geophagic materials. *PLoS One*, vol. 3, no. 9, p. e3147, 2008.
6. S. L. Young, S. S. Khalfan, T. H. Farag, J. A. Kavle, S. M. Ali, H. Hajji, K. M. Rasmussen, G. H. Pelto, J. M. Tielsch and R. J. Stoltzfus. Association of pica with anemia and gastrointestinal distress among pregnant women in Zanzibar, Tanzania. *The American Journal of Tropical Medicine and Hygiene*, vol. 83, no. 1, pp. 144-151, 2010.
7. C. N. Nyaruhucha. Food cravings, aversions and pica among pregnant women in Dar es Salaam, Tanzania. *Tanzania Journal of Health Research*. vol. 11, no. 1, pp. 29-34, 2009.
8. L. Torgersen, E. Ystrom, M. Haugen, H. M. Meltzer, A. von Holle, C. K. Berg, T. Reichborn-Kjennerud and C. M. Bulik. Breastfeeding practice in mothers with eating disorders. *Maternal and Child Nutrition*, vol. 6, no. 3, pp. 243-252, 2010.
9. T. Yamane. *Statistics, An Introductory Analysis*. 2nd ed. New York: Harper and Row, 1967.
10. L. B. López, M. Marigual, N. Martín, M. Mallorga, E. Villagrán, M. E. Zadorozne, M. L. P. de Portela and C. R. O. Soler. Characteristics of pica practice during pregnancy in a sample of Argentine women. *Journal of Obstetrics and Gynaecology*, vol. 32, no. 2, pp. 150-153, 2012.
11. S. Ahmed, H. Abdullahi and I. Adam. Practice of pica among pregnant women in Khartoum, Sudan. *International Journal of Gynecology and Obstetrics*, vol. 118, no. 1, pp. 71-72, 2012.
12. P. W. Abrahams, T. C. Davies, A. O. Solomon, A. J. Trow and J. Wragg. Human geophagia, calabash chalk and undongo: Mineral element nutritional implications. *PLoS One*, vol. 8, no. 1, p. e53304, 2013.
13. N. Ezzeddin, R. Zavoshy, M. Noroozi, M. E. Sarichloo, H. Jahanihashemi and M. Notroozi. The association between postpartum depression and pica during pregnancy. *Global Journal*

- of *Health Science*, vol. 8, no. 4, pp. 120-126, 2016.
14. A. C. B. da Cunha, S. F. Patricio, L. P. F. Akerman, P. S. Maynarde and C. Saunders. Pica in the pregnancy and related psychological aspects. *Temas em Psicologia*, vol. 25, no. 2, pp. 631-646, 2017.
 15. A. M. Santos, G. R. G. Benute, R. M. Y. Nomura, N. O. Santos, M. C. S. de Lucia and R. P. V. Francisco. Pica and eating attitudes: A study of high-risk pregnancies. *Maternal and Child Health Journal*, vol. 20, no. 3, pp. 577-582, 2016.
 16. L. Kariuki, C. Lambert, R. Purwestri and H. K. Biesalski. Trends and consequences of consumption of food and non-food items (pica) by pregnant women in Western Kenya. *NFS Journal*, vol. 5, pp. 1-4, 2016.