Prevalence of Pica Among Pregnant Females of Low-Income Population. A Hospital Based Study

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Abstract

Objectives: The objective of study was to find out the frequency of pica in pregnant females attended for antenatal clinics in low-income population. This study also found association between pica and hemoglobin level among the low-income population.

Method: This is a cross sectional study that was carried out at the department of gynecology and obstetrics of Liaquat college of Social Security hospital (LCSSH) for period of three months i.e., January 2020 to March 2020. Criteria for inclusion include belonging to low-income population with income per capita of less than 15000/Rs. Females of all parity between 18 and 45 years of age carrying single fetus with any gestational age and no co morbidities were included and those with food allergies, eating disorders, substance abuse or underlying mal absorption syndromes are excluded from the study. The total number of pregnant females (n=385) were selected using convenience non probability sampling technique. They inquire about pica practices, previous and family history of pica, reason of pica practice and type of pica substance consumed.

Results: SPSS version 21 is used for data analysis purpose which indicates that of the 385 pregnant females, 174 (45%) were found to engaged with Pica activities with the p value of $p<0.05$. Commonest pica item consumed is Fullers clay (multani mitti) in 14.5 % followed by uncooked rice 5.5 %. Reason is likening of taste and smell of Fullers clay and crispy texture of rice for chewing. Significant association was found between pica behavior and low hemoglobin status $p<0.05$. Further analysis revealed statistically strong correlation between pica habit and previous history of pica $p<0.00$ and having family history of pica $p<0.05$ but association between pica and use of iron medications was not found statistically significant $p>0.05$.

Conclusion: Pica is found to be a quite common practice with the frequency of around 45% in our population and significantly associated with anemia. Further work is required on large scale for proper screening of pregnant females for pica and its relationship with other nutritional deficiencies.

Keywords: pica, anemia, pregnancy, geophagy

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Introduction

Pica is defined as chronic compulsion of non-nutritive substances[1]. Different varieties of pica have been reported in literature including eating of earth (geophagy), ice (pagophagy), starch (amylophagy) and raw or uncooked rice (rhizophagy)[2]. Pica has been thought to be associated with some underlying nutritional deficiencies but clear relationship is still unknown. Different communities have been found to have specific preferences of different types of pica like geophagy is found to be common among pregnant women especially in African countries where prevalence reported as high as 75% in some cultures[3]; Similarly pagophagy is also found to be most prevalent pica in United States[4]. Rhizophagia is a variety of pica less common in western world but more common in south Asian

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countries. Case report of Rhizophagia in U.K pointed two patients and both were from Asian subcontinent. One belonged to Pakistan and other to India and both were non-pregnant and multiparous. The clinical presentation was fatigue, hair loss and tooth damage and most of the symptoms resolved after iron replacement[5]. All these pica substances are consumed due to cultural, medicinal, religious traditions or in response of some underlying deficiencies. One of the hypotheses is that ice causes vasoconstriction which improves blood supply to brain and bring alertness in iron deficient individuals and is responsible for its craving[6]. In African countries craving of soil is still considered as early sign of pregnancy and an indicator of deficiency[7]. Pica was described in history about 400 BCE and since then prevalence is found in whole world population with commonest among pregnant females followed by children. Men are also found to be pica eaters according to some research studies. The pregnant females are not only at risk for pica while menstruation, lactation and blood donors are also at risk for developing pica habits[8]. The etiology, risk and health consequences of pica is still not well understood worldwide and much more research is still needed in this context as on one hand it is believed as remedy of early pregnancy symptoms while on other hand it could lead to detrimental health disadvantages[9].

Anemia is a fundamental nutritional deficiency thought to be associated with pica habit. One meta-analysis conducted showed pica behaviors lead to 2.4 increased risk of anemia similarly it is also associated with low Hematocrit level[10]. Other Effects on the mother could include dental injury, constipation, and intestinal obstruction, dysfunctional labor due to fecal impaction, parasitic infections, toxemia, and interference with the absorption of minerals, lead poisoning, and hyperkalemia[11]. Possible effects on the fetus include prematurity, perinatal mortality, low birth weight, irritability, decreased fetal head circumference, and exposure to chemicals such as lead, pesticides, and herbicides[12]. The true or actual prevalence of pica in any population is under reported as most of patients are reluctant to disclose this habit due to shame or some may feel norm but most importantly less emphasis is paid by health care individuals towards this unhealthy habit and less inquire about this.

Our aim was to find out the prevalence of pica in low-income pregnant women by direct inquiring the questions and its association with hemoglobin level of the patients. The participants were also at the same time educated and guided about adverse consequences of these habits on themselves and offspring. Much more emphasis should be provided by health care personnel towards this activity and educational antenatal classes should be offered to these women. Different societies and different parts of world showed different preferences of pica items. How much our population is affected by pica behavior and which community or area is more affected is still less clear, similarly very less attention is paid to find its prevalence in our society and towards its risk factors. Therefore, objective of study was to find out the prevalence of pica in pregnant females attended for antenatal clinics in low-income population. This study also found association between pica and hemoglobin level among the low-income population.

Patients and Methods

This is a cross sectional study that was carried out in Gynecology and Obstetrics department of Liaquat college of Social Security hospital (LCSSH). Here the study was planned w.e.f., January to March 2020 in outpatient department. The hospital is 250 bedded multidisciplinary hospital located in Landhi sector of Karachi which serves its registered employees of social security. Most of the population belongs to low-income group and labour community and has nearby residence. The function of the Institution is unique in nature for the welfare of labour class. The samples were composed of pregnant women attended the antenatal clinic at any gestational age and of any parity. A sample of 385 pregnant females were selected using convenience non probability sampling technique after meeting the inclusion criteria. Sample size was de-

termined by keeping 5% margin of error, 95 % confidence interval. Based on all these assumptions actual sample size was determined by using formula:

n = (z-score) x p x (1-p) / (margin of error)
Where n is sample size

P = expected proportion of women of pica eat ers

z score z value corresponding to 95% CI=1.96 is constant

== (1.96) x 0.5 (0.5) / .05

= 3.8416 x 0.25 / 0.0025

= 384.16

n= 385

Criteria for inclusion include belonging to low-income population with income per capita of less than 15000/Rs. Females of all parity between 18 and 45 years of age carrying single fetus of any gestational age with no co morbid were included and those with food allergies, eating disorders, substance abuse or underlying mal absorption syndromes excluded from the study.

A verbal consent was taken with all respondents before interviewing with questionnaire. Females were informed about objective of the study and also ensured regarding the confidentiality of history taken by the patient. A pretested questionnaire was used as an interviewing tool to conduct the study which was approved by ethical review committee. After getting approval, interview conducting team was formed composed of one leader who monitors the team work, collect data on daily basis and check their authenticity and two junior doctors who were explained in details the objective of the study and the questionnaire and two midwives to help them while interviewing with pregnant ladies. Questionnaire is composing of two parts. Part A contains demographic details of participants including the following variables: age, residence, patient and husband occupation, family income, number of living children, gestational age, booked or unbooked status and number of antenatal visits done in this pregnancy. Part B consist of pica questions including engaged in pica habit (yes or no) and if yes what substances were used, reason for taking it , history of pica in previous pregnancy, history of pica in family/relatives, and in the end enquiring their recent hemoglobin level and use of iron medications in this pregnancy. The females were labeled as pica eaters when they reported eating or craving of any non food items at least once any time in their pregnancy. The respondents were also be guided at the same time about balanced nutrition and effect of healthy diet on their newborn and harmful effects of pica and its complications.

For data analysis purposes, the software SPSS version 21 was used. Relevant descriptive statistics, frequency and percentage were obtained for presentation of qualitative variables like, residence, patient and husband occupation, and presence and type of pica behavior and reason for using pica, family history of pica and pica habit in previous pregnancy. Quantitative variable like age, gestational age and number of children were presented by mean standard deviation. chi square test was be used to find associations between dependant and non dependent variables like presence of pica habit and hemoglobin level, presence of anemia among pica and non pica group, booked or un-booked status and use of iron supplementations. $p<0.05$ is considered as level of significance.

Results

Out of 385 sample size 381 females responded with a response rate of 98.6%. Average age of respondents were 30.6 years i.e. between the (18 to 48 years) ± 6.3SD and mean parity was 2.5 (0 to 8) ± 1.4 SD, with mean gestational age in weeks were 35.5 (6-41) ± 6.1 SD. Majority of the females were resident of Landhi 178/381 (46.7%) followed by Malir 136/381 (35.7%) and belong to low socioeconomic class. 252 /381 (66%) of husbands were factory workers of the surrounding in-

dustrial area with 24/ 381(6.2%) of them were unemployed. Only 73/381(19.1%) of females were working women with majority of them being house wives 276/381(72.4%). Majority of the participants were booked 354 of the 381 (92.9%) as these females are registered with LCSSH. Table 1 showing demographic data of the study population.

Out of 381 female's pica behavior was found in 174 females with prevalence of >45% p<0.05. Interview with respondents engaged in pica behavior indicated ten different types of substances consumed by pregnant females with the commonest one was Multani mitti (Fuller's clay) (14.59%) followed by uncooked rice (5.57%). As shown in fig 1. when inquiring about reason for consuming pica substances multiple responses were noted most common being taste factor. Those who engaged with eating of Fullers clay mostly consumed it due to its taste and soothing smell (88%) as well as some of the females thought it as being having some nutritional qualities. One of the females said that it is good for bright skin tone of newborn. Those with habits of uncooked rice they liked it because of its crunchy and crispy texture and used it for munching. Pagophagy i.e., ice pica revealed that they used it to relives mouth dryness and dehydration, as shown in Fig 2.

On bivariate analysis significant association was found between pica behavior and low hemoglobin status. Prevalence of anemia in whole study population was recorded as 80.9 % with mean hemoglobin level is 9.7 g/dl SD ± 1.35 and only 19 % of females were found to be non-anemic i.e., Hb level of more than 11g/dl. 23.60% had mild anemia, 56.7% had moderate anemia and 1.8 % had severe anemia. Anemia was found to present in 41.5% in pica group as shown in Table 2.

The obtained results indicated the association of severe anemia in two groups is not statistically significant representing some underlying pathology behind severe anemia how ever strong co relation was found with pica behavior and moderate anemia p< 0.05. Further analysis revealed statistically strong correlation between pica habit and those having previous history of pica and having family history of pica p<0.05 but association between pica and use of iron medications was also not found statistically significant p=0.09 with 87.7% of females replied positively for use of iron medications in pregnancy and only 12.3% of females denied its use table 3.

When analyzing correlation between use of iron supplements during pregnancy and presence of anemia that is also not found significant P>0.05, 0.6 95% CI (0.32-1.2) this indicates that inspite of taking iron medications majority of females are anemic either due to their poor compliance or presence of pica behavior in these females.

Discussion

Prevalence of pica among pregnant females in our population is quite significant around 45% as suggested by our study, instead prevalence of pica worldwide during pregnancy and postpartum period was found to be 27.8%. Different countries across the world have different prevalence rates highest being found in African countries it was observed prevalence is as high as 75 % in some regions with mean around 44.5% that is comparable to our results[13]. Reasons for pica craving can be multiple as suggested in our study but this could be a learn behavior or may be taken as traditions in certain communities as significant association is observed with positive family history. Similar results are comparable with other African countries which suggested that cultural norms, dietary inequality and certain traditions may play important part in driving pica behavior in pregnant females[14]. Craving of cooked clay or Fuller's clay known as Multani mitti in our population was found to be commonest type of pica consumed by our study population. Cooked clay is known for its beneficial effects on skin and brighter skin tone and since ages it has been used as anti diarrheal, anti emetic and for cleaning and disinfecting purpose. It is also thought to contain some minerals mainly of which are hydrated silicates of Al, (Na and Ca), (Al and Mg), or/and (Mg and Fe). The concentration levels of Na, Al, Ca, Fe,

Mg, Cu, and Zn were tolerable and apparently could serve as a source of mineral nutrients deficiency in the human body[15]. Considering a safety of ingestion of clay in pregnancy levels of micro elements like Arsenic and lead was considered detrimental to development of new born and should it should be avoided[16]. It was taken as one of the favorite substances to consume during pregnancy by our population mainly because of its taste and smell. Nil Korlet et al found same reason of clay consumption among pregnant Ghanian women while majority of them had no knowledge about adverse effects of geophagy in pregnancy[17]. Khairunisa , in her poster in RCOG world congress 2016 presented comprehensive research on fullers clay habit in Pakistani population and found pica practice more commonly in low socioeconomic group and nearly all women started this habit during early pregnancy due to ptylism, hyper emesis and acidity and all of them were found to be anemic[18]. She has also observed that clay is thought to contain some important minerals but at the same time can has severe side effects as all of these women had constipation. Njoku et al suggested significant association of Ascaris and hook worm infestations with ingestion of clay and this also contributes to development of anemia[7]. Debora and Christopher in their study from African country failed to find significant association between geophagy and pregnancy induced hyper tension but found significant low level of hemoglobin, calcium and serum ferritin levels[19]. Cannilie and Mauricio explained unusual complication of tape worm infestation in form of Neurocystic sclerosis during pregnancy and post partum period and presented as new onset seizure in pregnancy. Case report showed both of the females had history of geophagy and belong to endemic area. Neurocysticercosis (NCC), the central nervous system infection, is caused by larval stage of Tenia solium and was associated with nearly one-third of seizure disorders in endemic areas[20].

Apart from consumption of Fullers clay the second commonest pica was uncooked rice which is usually found in south Asian population and less common in western world. the reason probably would be that rice is main part of females diet in this region and can be found easily at home. Scarcity of literature in this context raises need of further research in this area.

Anemia is commonest medical problem in pregnancy where prevalence in our population is around 52% according to Pakistan nutritional survey 2018[21].

Much Significant association was observed between pica habit and low hemoglobin levels in our study and females were found to be anemic which are comparable to study conducted in Hyderabad Pakistan suggested strong association of clay or dirt use in pregnancy as major risk factor of anemia in pregnancy. (aPOR, 3.7;95% CI, 1.1 to 12.3)[22]. In addition to pica behavior, addiction of beetle nut is also found to be very common in our population and has a strong association with anemia as suggested by Farkhanda and Chandra in 1120 anemic women, where (65.88%) were found having history of betel nut consumption. Beetle nut addiction is also found to have adverse effect on fetus being associated with fetal death, intra uterine growth retardation and low birth weight[23]. James barton observed association of pica in non pregnant adult female as well as in male population with iron deficiency indicated by low serum ferritin levels and low hemoglobin level required treatment with intravenous dextran he found 45% of study population engaged in pica behavior and pagophagy is the commonest type[24]. Almost comparable results were observing in Mata analysis approximately 6000 patients indicated strong co relation between pica and anemia being geophagy has 2.1 times, pagophagy 1.5 times and amylophagy is found to have 3.1 times odds. Other important consideration in our study was belonging of study population to lower socioeconomic group where prevalence of pica and anemia was found to be high as observed in different other researches[25,26].

Pica is a behavior with multiple complexities and its association with multiple variables makes this habit more challenging to understand. Multiple factors like cultural, traditional, geographical, ethni-

cal, social and religious, can impact significantly on pica habits, so much more detailed and comprehensive researches are required in this field for proper understanding of this unique habit so that proper education and guidance can be provided to females during pregnancy and also to emphasize here the provision of sub standard quality of antenatal care in certain areas especially in slum and low income areas where less attention is paid in antenatal clinics and lacking of enquiring pica behavior routinely found and leads to continuation of pica habit and ultimately resulted in anemia and other maternal and fetal health complications.

Conclusion

Pica prevalence was found quite high in our population and significantly associated with anemia. Further work is required on large scale for proper screening of pregnant females for pica and its relation with nutritional deficiencies, education, socio-economic status, family practices and traditions.

Table 1. Characteristics of study population

Age	30.6 ±6.3 (18-43)
Parity	2.5±1.4 (0-8)
Gestational age in weeks	35.5±6.1 (6-41)
Hemoglobin gm/dl	9.7 ± 1.3 (5.9-13.8)
No. of Antenatal visits	7.2± 3.1 (0-18)
Pica yes	n=174(45.7%)
no	n=207(54.3%)
Non anemic	n=72(19%)
Anemic	
Mild	n=89(23.6%)
Moderate	n=216(56.7%)
severe	n=6(1.8%)

Table 2. Association of pica with anemia and use of iron supplements

	Pica Yes	Pica no	P value	OR 95%CI
Anemia				
Yes n (%)	160 (51.3)	153 (48.8)	<0.0004.	5 (2.657-7.8)
No n (%)	14 (20)	54 (79.4)		
Use of iron supplements				
Yes n (%)	162 (47.9)	176 (52)	0.01	1.996(1.2-3.4)
No n (%)	12 (27.9)	31 (72)		
Non anemic	16	102		
Anemic				
Mild n (%)	16 (20.6)	62 (80.3)	<0.0000.	44(0.2-0.67)
Moderate n (%)	93 (19.5)	94 (50.4)	<0.00	4.03(2.8-5.750)
Severe n (%)	2 (41.6)	4 (58.3)	0.00	1.26(0.3-4.03)

Table 3. Pica Association with previous history, family history, booked/non-booked status

	Pica yes	Pica no	P value	95%CI
Booked	163	191		
Non booked	11	16	<0.002	OR1.07(0.594-1.952)
Parity				
0-2	96	104		
3-5	729	7		
>6	6	6	<0.0	
Gestational age				
6-13 weeks	3	5		
14-26 weeks	8	12		
27-41 weeks	163	190	<0.00	
Pica in previous pregnancy				
Yes	138	9		
no	36	198	>0.000	OR97.16(51.29-181.7)
Family history of pica				
Yes	123	21		
No	38	159		
Don't know	13	27	>0.000	OR 12.7(8.2-19.5)

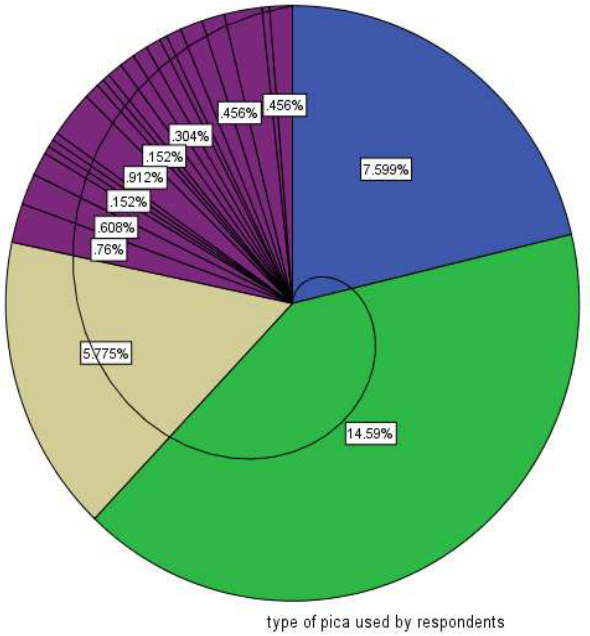

Fig 1. Common pica substances consumed

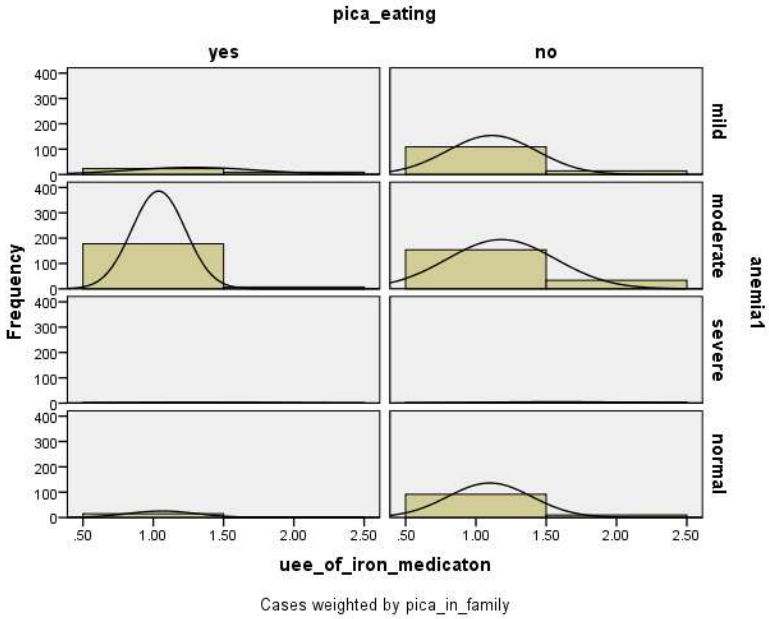

Fig 3. Pica and anemia association

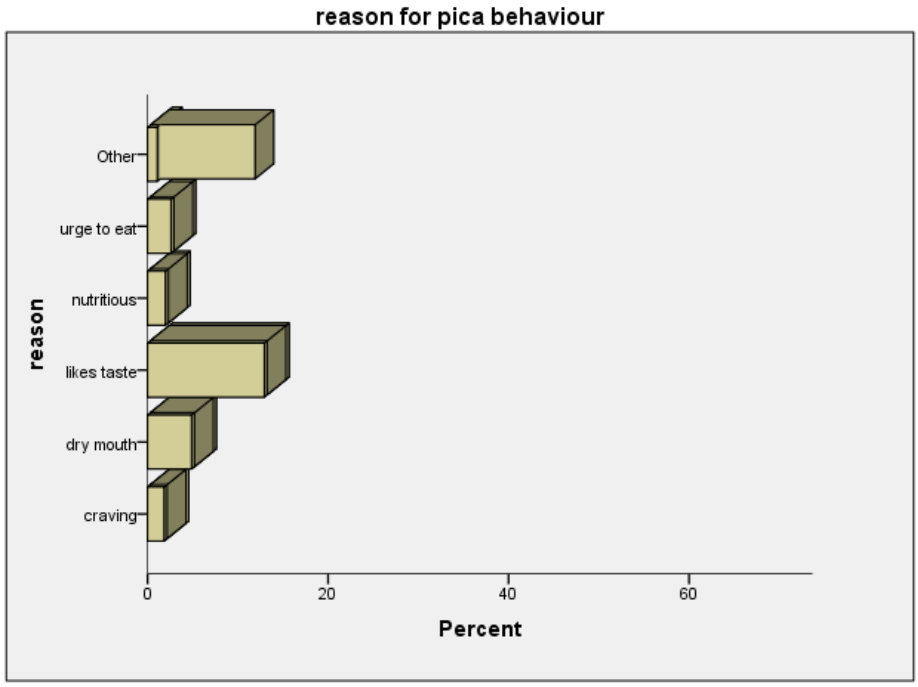

Fig 2. Reasons be

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