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Food Regurgitation in Less than 18 Months Infants, Prevalence, Clinical Manifestations and Risk Factors, a Population- Based Study

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Abstract

Background: *Food regurgitation (FR) is a physiologic process mostly happen in less than 2- year- old child in which the swallowed liquid or food moves from the stomach back into the mouth. The prevalence of FR is between 40-90% in infancy.*

Materials & Methods: *In this cross-sectional study, 5 health centers have selected randomly in south of Tehran, capital of Iran. From each health center 90 less than 18- month- old infants have selected conveniently. Each mother has undergone an interview about the infant's characteristics and risk factors by trained personnel. The infant's characteristics included age, sex, the birth weight, gestational age, the maternal age, delivery type, birth order, the age for starting the supplemental food, the prominent milk type consumed in the first 6 months of life, family history of FR in the siblings, sleeping position or feeding position of the infant and existence of FR. Furthermore, in the involved babies the FR characteristics have asked the mothers contained, the daily frequency of FR, the daily time which FR mostly occur, volume and consistency of the food in FR, time of FR in relation to feeding, doing the burping process in the infant by the mother, the infant's age of FR onset or abate, the amount of food regurgitated in each time, and associated disease in the involved infant.*

Results: *The prevalence of FR was 76.5% (344 babies). Most of the cases (54%) had less than 6- month-old. 52% of the cases were males. The percent of cases with FR was higher in the babies with nonspecific sleeping position or feeding position on back and in babies on breast feeding; there was not significant statistical relation between FR and these characteristics. FR was very common among low birth weight or preterm infants (83% & 71% respectively). 100% of the cases with congenital or chronic disorders involved with FR. The age of FR onset was mostly during the first week of life (70%) and FR abated mostly after 6 months of age (38%). In the involved infants, FR often happened all day long and mostly 1-2 times a day with low volume.*

Conclusion: *Though our findings are in consistent of other studies, performing perspective studies with support of para-clinic tests for confirming the diagnosis are highly recommended for obtaining true prevalence, characteristics and risk factors of FR among the less than 18- month- old babies.*

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Introduction

Food Regurgitation (FR) or spitting up is a process in which the swallowed liquid or food comes up from stomach into the mouth and mostly is a normal process in healthy infants. The clinical diagnosis usually bases on thorough history and physical examination [1-5]. Despite the benign nature of the event, the prevalence of FR has reported between 40- 90% in infancy [3,5]. Generally, FR is a self-limiting condition which decreases with the age and resolve in most of the infants by 1 year of age.

It is associated with normal thriving; therefore, its treatment is conservative mostly included reassurance the parents that event is a self-limited benign condition which does not need any additional testing or pharmacologic treatment [1-3,6-8]. Nowadays, there is no drug for preventing of FR in infants. In case non-physiologic regurgitation has happens in infancy which includes infants with regurgitation and vomiting associated with failure to thrive, or respiratory symptoms such as wheezing or coughing, some references recommend Proton Pomp Inhibitors (PPI) or H2 blockers administration [1,4]. Although, a long list of drugs cause gastro-esophageal regurgitation such as Tricyclic antidepressants, Calcium channel blockers, Beta blockers, Statins, Angiotensin-Converting Enzyme (ACE) inhibitors, Nitrates, Narcotics, Anticholinergics, Dopamine-like drugs (for parkinson's disease), Bisphosphonates (for osteoporosis) and analgesics, these categories of drugs not prescribed routinely in infancy.

Material and Methods

A cross-sectional population-based study has performed in south of Tehran, capital of Iran in 450 less than 18-month-old infants to determine the prevalence, clinical manifestations and risk factors of FR by interviewing the mothers by trained personnel based on a structured questionnaire. First of all, 5 health centers have selected randomly among 33 health centers in south of Tehran. Then, 90 infants attended in each health centers to perform health care, growth and development monitoring or vaccination have selected conveniently. Each mother has undergone an interview about the infant's characteristics and risk factors by trained personnel.

The infant's characteristics included age, sex, the birth weight, gestational age, the maternal age, delivery type, the age for starting the supplemental food, the prominent milk type consumed in the first 6 months of life, family history of FR in the siblings, sleeping position in the infant, existence of FR, the daily frequency of FR, the daily time which FR mostly occur, feeding position of the infant, associated symptoms with FR, volume and consistency of the food in FR, time of FR in relation to feeding, doing the burping process in the infant by the mother, the infant's age of FR onset or abate, the amount of food regurgitated in each time, and associated disease in the involved infant.

Results

450 less than 18- month- old infants in this study have been assessed. The prevalence of FR was 76.5% (344 babies). Age range of the involved infants included 186 cases (54%) and 158 cases (46%) in less than 6- month-old and 7-18- month-old respectively. The number of males was more than females (180,52% versus 164,48%). Overall, the frequency of FR among low birth weight or premature infants was 83% (10 out of 12 babies) or 71% (5 out of 7 babies) respectively (Table 1). There was no significant statistical relation between FR and infant's age, sex, birth weight or gestational age. Despite, the percent of FR in babies who were feeding with breast milk was more than the babies were feeding with other milks (including formula with or without breast milk) (75% versus 72%), no significant statistical relation was found between FR and type of feeding

milk. Furthermore, there was no significant statistical relation between FR and following characteristics of the involved infants: type of delivery, birth order, positive history of FR in the infant's siblings, and the maternal age (Table 1). It is very interesting that the infant's burping has been done in almost all the cases with FR (341 babies, 96%) by the mother and FR has happened in 343 babies (99.7%). Therefore, it sounds this technique hasn't been effective in reducing the FR frequency in the infants (Table 2).

By the mothers' report, regurgitation has occurred in the infants with semi sitting feeding position or non-specific sleeping position more than the others, however, there was no significant statistical relation between FR and feeding position or sleeping position of the cases (Table 1). Despite just 10 babies out of 450 babies (2.2%) had involved with a congenital or chronic disease (included Down syndrome in 2 cases, ASD in 3 cases, VSD in 1 case, Hirshprong disease in 1 case, Tetralogy of Fallot in 1 case, and convulsion in 3 cases), all of them (100%) have involved with FR. Unfortunately, there was no report of the frequency of FR among babies with congenital disorders.

Table 1: The Frequency and Percent of the Infant's Characteristics by Food Regurgitation in the Involved Infants

Infant Characteristics	Food regurgitation		Infant Characteristics	Food regurgitation	
	Number	Percent		Number	Percent
Age			**Delivery type**		
<3 months	84	24	Vaginal	163	47
3-6 months	102	30	Cesarian section	181	53
7-12 months	90	26	Birth order		
13-18 months	68	20	1	243	70
Sex			=>2	101	30
Male	180	52			
Female	164	48	**History of regurgitation in the siblings**		
Sleeping position			Yes	65	19
Prone	43	13	No	279	81
Supine	80	22	**Feeding milk**		
Others	221	65	Breast milk	313	90
Feeding position			Others	31	10
Semi sitting	156	45	**Age of starting supplemental food**		
Back position	188	55	<6 months	56	16
Birth weight(gram)			=> 6 months	138	40
<2500	10	3	Not yet	150	44
=>2500	334	97	**Maternal age(year)**		
Gestational age(weeks)			<20	48	14
<37	5	2	20-35	288	83
=>37	339	98	>35	8	3

According to FR characteristics, the age of FR onset was mostly during the first week of life (70%) and FR abated mostly after 6 months of age (38%). In the involved infants, FR often happened all day long and the average amount of regurgitation was little (less than 1 teaspoon each time)

(Table 2). Almost all the cases regurgitated after feeding, the consistency of food was milk curd (93%) and more than 50% of the infants usually spitted up 1-2 times a day (Table 2)

Table 2: The Frequency and Percent of the Characteristics of Food Regurgitation in the Involved Babies

Characteristics of food regurgitation			Characteristics of food regurgitation		
	Number	Percent		Number	Percent
Time of food regurgitation during day			**The infant's age of Food regurgitation onset**		
Morning	74	22	During the first week of life	244	70
Afternoon	46	14	1-4 weeks of life	100	30
Evening	28	8	**The average frequency of food regurgitation during the day**		
All day long	196	54	1 time	66	19
The amount of food regurgitation in each time			2 times	132	39
Little	337	98	3-4 times	98	28
Moderate	7	2	=>5 times	48	14
Consistency of the food regurgitated			**The infant's age at which Food regurgitation abates**		
Milky	23	7	<3 months	36	10
Milk Curd	321	93	3-6 months	41	12
Time of regurgitation with regard to feeding			7-12 months	85	24
After Feeding	343	99.7	13-18 months	46	14
During feeding	1	0.3	Not yet	136	40
Doing Burping in the infant by the mothers			**Associated disease in the involved infant**		
Yes	341	99	Yes	10	3
No	3	1	No	334	97

Discussion

In this cross-sectional study, the prevalence of FR was 76.5% in less than 18-month-old babies like the other studies [5,9,10,12]. More than 50% of the involved babies had less than 6 months old and FR frequency decreased after this age similar to the results of other studies [3,5,9,10-19]. Furthermore, similar to the results of other articles, there was no difference between males' or females' cases with regard to FR frequency [5,11]. Regarding FR times, almost 60% of our babies regurgitated 1-2 times a day, like other studies' reports [5,10,12,13,18,19]. Most of our babies (46%) stopped regurgitation till one year of age according to the mothers' report, such as other reports [2,3,6,8,18,19]. Despite the peak age for FR in this study was in first month of life, like some of the other research, other studies mentioned the peak age of FR after one month of age [2,3,9,10,12-14,17-19].

It sounds the population genetics, feeding practice, the milk type or geographical location of the babies might explain this discrepancy. Although some articles express that the common etiologies of FR are overfeeding or air swallowed during feeding, it sounds the true causes for FR are Immature anatomy and motility include short esophagus, low pressure of lower esophageal sphincter, delayed swallow–peristalsis

reflexes, and limited gastric accommodation which make FR more frequent in early infancy [1,17]. As in other articles, no significant statistical relation was found between FR and breastfeeding [5,12-14].

Therefore, it sounds that breastfeeding has no protective effect on FR. Although some of the references reported that prematurity is a risk factor for gastro-esophageal reflux, no research has been done to assess the relation between birth weight or gestational age and FR [4,17]. Despite, these significant statistical relations were not found in this study, the number of low birth weight or preterm babies was few in our sample; therefore, the confirmation of these results needs to be evaluated in larger studies. In most of our cases (40%), despite consuming thickened food, FR still continued, therefore, in contrary to the findings of other authors, thickened food has not significant statistical relation with FR frequency in our study [1,20-23]. Moreover, we found that back position for feeding and non-specific position for sleeping was more common in our involved babies with FR, however, none of them has shown significant relation with FR; Moreover, with regard to this subject the findings of other reports are controversy [13,23,24].

For assessing the effect of feeding or sleeping position of the babies on FR, performing prospective studies is recommending as confirming the relationship needs a lot of babies in different position of feeding or sleeping. Besides, though burping maneuver has performing by most of the cases' mothers (99%), it hasn't had any effect on FR frequency. It is interesting that the only article which studied burping effect on FR has shown that performing this maneuver has increased the FR frequency [25]. Birth order, delivery type, positive history of FR or maternal age of the cases hasn't shown significant relation with FR. According to our knowledge, none of the above variables has not been assessed in the other research to determine their statistical relation with FR.

Conclusion

In this study the findings are in consistence with the results of other studies regarding the prevalence and risk factors of FR. Nevertheless, the findings are based on the mothers' recall. Moreover, because of our limited resources, FR in this study hasn't confirmed by any para-clinic tests, therefore, the prevalence of FR might be an overestimate. Therefore, designing and performing perspective studies is highly recommended for obtaining the true prevalence, risk factors and characteristics of FR in less than 18- month- old babies.

Patient Consent for Publication

Written informed consent for publication of the babies' data, without any potential identifying information, was provided by the mothers of the cases.

Conflicts of Interest

The author declares no conflict of interest.

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