



Prevalence of pathologic gastroesophageal reflux in regurgitant infants

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Abstract

Objective: To determine the prevalence of pathologic gastroesophageal reflux in a group of regurgitant infants attended at Helena Moura Hospital, Recife, State of Pernambuco, Brazil. The clinical criteria employed were based on Rome II criteria.

Method: The study design was transversal. The patients were all children of less than 1 year of age with a history of episodes of regurgitation for at least 3 weeks. The study group was comprised of 798 children who attended the program between January and August of 2002. The diagnostic criteria were based on Rome II criteria.

Results: The prevalence of pathologic gastroesophageal reflux was 11.15% (89/798) (95% CI 9.10-13.48). It was higher during the first two trimesters of life, 14.62% (31/212) (95% CI 10.33-19.86) in the first trimester, and 13.76% (38/276) (95% CI 10.07-18.21) in the second trimester.

Conclusion: The prevalence of pathologic gastroesophageal reflux within the group of children examined concurred with previously published studies, with predominance, therefore, of regurgitant infants.

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Introduction

Episodes of physiological gastroesophageal reflux in healthy infants aged less than two years often are symptomatic, and regurgitation is the characteristic symptom. This disorder has been recently called infant regurgitation (IR), which differs from pathologic gastroesophageal reflux (PGER) that is associated with clinical symptoms and is known as gastroesophageal reflux disease (GERD).¹⁻³

GERD is classified as primary and secondary. Primary GERD results from a functional disorder of the proximal digestive tract, whereas secondary GERD includes structural, infectious, metabolic, neurological and allergic disorders, which cause the passage of gastric contents into the esophagus.¹

Nelson et al.⁴ analyzed data obtained from 948 interviews made with parents of infants aged less than 13 months of age and reported IR in 50% of infants younger than three months, in 67% of those aged between four and six months, and in 5% of those between 10 and 12 months. These data show that IR is a frequent event and that most infants, even those without specific treatment, are asymptomatic at the end of their first year of life and few of them still regurgitate during their second year of life.^{2,4-6}

There is growing concern with the excessive request of additional exams and with the excessive prescription of

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medications to healthy infants who regurgitate.^{3,7} On the other hand, GERD has a variety of symptoms and when its etiology is not clearly defined and it is not properly managed, it may result in high morbidity.^{1,7,8} The use of clinical criteria has contributed to making evaluation more objective and the identification of infants who actually need additional investigation, safer.⁹

Orenstein *et al.*⁵ proposed a questionnaire (Infant Gastroesophageal Reflux Questionnaire (I-GERQ)), which was later validated,⁶ in order to detect infants at higher risk for PGER. In 1999, Rome II Committee¹⁰ established diagnostic criteria for childhood functional gastrointestinal disorders, including IR.

The distinction between IR and GERD in infants and children aged from zero to two years, based on clinical data, is not an easy task sometimes.⁹ And this distinction is of paramount importance because infants at higher risks for primary or secondary PGER do need to receive a distinct treatment so that the occurrence of morbidity and occasional complications can be reduced.^{1,3,11}

The underdiagnosis of this disease exposes infants to the risk of severe complications, such as adenoid hypertrophy, bronchospasm, esophagitis, esophageal stricture, Barrett's esophagus or adenocarcinoma,^{7,12-16} and, on the other hand, the overestimation of symptoms, especially when restricted to the presence of regurgitation, may lead to misdiagnosis and inappropriate treatment.

Authors from different countries^{4,6,17,18} have used clinical criteria to detect infants with suspected PGER. The Rome Criteria¹⁰ have not been used frequently to identify infants who suffer from IR, and consequently, those at higher risk for PGER. A literature review was performed using MEDLINE, Scielo and Lilacs databases, including studies from 1993 to 2003 and the following terms, both in English and in Portuguese: GER, PGER, regurgitation, incidence, prevalence, infants and children. No Brazilian studies dealing with this topic were found.

The aim of the present study was to assess the prevalence of PGER in a group of infants treated in a public health service, using clinical criteria based on the Rome II Criteria.

Methods

A cross-sectional study was carried out at the Hospital de Pediatria Professora Helena Moura, a children's hospital affiliated with the Unified Health System (SUS)/Municipal Health Department of Recife, state of Pernambuco, between January and August 2002, to determine the prevalence of regurgitation. Infants aged from one to 12 months of life with history of regurgitation for at least three weeks were included in the study.

A non-probabilistic convenience sample was used and the sample size calculation was made using *statcalc* program, Epi-Info, version 6.04. The following parameters were used: estimated prevalence of PGER in infants (10%),^{4,6,18-20} a variation of this prevalence around 25% and a 95% confidence interval (95%CI). The minimal sample size corresponded to 553 infants, but 798 were studied.

The exclusion criteria were: severe disease at the time of the interview; diagnosis of bronchial asthma; infants with neurological disease; those infants who had been submitted to digestive tract surgery or whose guardian could not take care of them during most of the day.

Pathologic gastroesophageal reflux was defined based on Rome II Criteria:¹⁰ infants who did not meet the criteria for IR (infant aged from one to twelve months with two or more episodes of regurgitation a day for longer than three weeks, without history of hematemesis, or bronchial aspiration, or apnea, or failure to thrive, or abnormal posturing), were classified as suspected cases of PGER.

A form was devised for clinical and epidemiological evaluation of infants with regurgitation, including data such as characteristics of the infants and their caretakers, socioeconomic background of the family, description of regurgitation/vomiting episodes and associated signs and symptoms. Caretakers were asked about whether they agreed to take part in the study after they received information about the study objectives. All of them read and signed the informed consent form, thus agreeing to participate. The study protocol was approved by the Research Ethics Committee of Instituto Materno-Infantil de Pernambuco (IMIP).

A database was built using Epi-Info version 6.04. Double entries with later validation were used. The frequency distributions of the analyzed variables were obtained and the prevalence and confidence interval (95%CI) of PGER were calculated.

Results

Among the studied infants, 55.40% (442/798) were male and 44.60% (356/798) were female. Most infants were aged between four and six months (34.60% or 276/798).

Most infants lived in brick houses (735/798) and approximately 95% (758/798) of the houses were supplied with treated water, in 80.58% (643/798) of them water was available in the household and in 14.42% (115/798), outside the home. Nearly all households were supplied with electric power (99.12%), however, only 67.30% (537/798) of them had a flush toilet system. Regular garbage collection was available to over 90% of the households.

In most cases, mothers were the ones who accompanied their infants at the time of the interview, 735/798 (92.10%), 73.94% (590/798) had attended school for four years or longer and 92.4% (737/798) spent most of the day looking after their child.

The prevalence of PGER in the analyzed sample was 11.15% (89/798), with a 95%CI of 9.10 to 13.48%. The prevalence of PGER was higher in the first two trimesters of life, 14.62% (31/212), 95%CI: 10.33 – 19.86, in the first trimester and 13.76% (38/276), 95%CI: 10.07 – 18.21 in the second trimester (Table 1).

The frequency distribution of clinical variables used to characterize PGER is shown in Tables 2 and 3.

Discussion

A total of 798 infants aged between one and twelve months were included in the study. This age range was chosen because the presence of regurgitation is more frequent in the first year of life and also because it is at this age that pediatricians have difficulty determining which infants need additional investigation.

From the methodological point of view, studies based on information collected via forms and questionnaires should be analyzed with caution, since results are reliant on the quality of answers received. Bicego *et al.*²¹ suggest that the higher the level of education of parents or caretakers, the easier the perception of health deterioration, and consequently, the more accurate the information provided.

Table 1 - Prevalence of PGER according to age group (Hospital Helena Moura, 2002)

Age group (months)	Prevalence	95% CI
1-3	14.62 (31/212)	10.33-19.86
4-6	13.76 (38/276)	10.07-18.21
7-9	6.98 (13/186)	3.94-11.36
10-12	5.69 (7/123)	2.52-10.93

In the present study, mothers were the ones who accompanied their infants during emergency care (92%). Theoretically, these are the persons who can provide information about the infants, although other variables may interfere with the quality of answers, such as the maternal level of education,²¹ which was reasonable in this study.

Several authors^{1-3,8} use the terms PGER and GERD interchangeably. Considering that some pattern of pathologic reflux may course with other diseases, e.g.: food allergy,^{15,22} in conceptual terms, those infants with pathological reflux caused by a functional disorder of the proximal digestive tract should be regarded as having GERD, whereas those with secondary pathologic gastroesophageal reflux should receive the diagnosis of the underlying disease. Therefore, the diagnostic hypothesis based on clinical criteria prudently points to PGER, and only after complementary exams are performed and the therapeutic response is assessed, GERD should be considered.

There is a paucity of scientific studies in the literature aimed at determining the prevalence of IR or PGER/GERD in infants outside the risk groups. This fact shows the difficulty in reaching an agreement on clinical diagnostic criteria, possibly due to the heterogeneous nature of symptoms associated with PGER and to different clinical manifestations.^{3-5,8}

Table 2 - Frequency distribution of clinical variables used to characterize PGER (Hospital Helena Moura, 2002)

	Yes n (%)	No n (%)	Total n	Statistics p
Episodes of regurgitation \geq 2x/day for longer than 3 weeks	89 (100)	267 (37.70)	356	
Hematemesis	1 (1.10)	4 (0.60)	5	0.44*
Bronchial aspiration	39 (43.80)	29 (4.10)	68	0.001 [†]
Apnea	31 (34.80)	22 (3.10)	53	0.001 [†]
Failure to thrive	27 (30.30)	28 (3.90)	55	0.001 [†]
Abnormal posturing	40 (44.90)	24 (3.40)	64	0.001 [†]

* Fisher's exact test. † < 0.001

Table 3 - Frequency distribution of clinical variables used to characterize PGER according to age group (Hospital Helena Moura, 2002)

Variable	Age group (months)				Total n
	1-3 n (%)	4-6 n (%)	7-9 n (%)	10-12 n (%)	
Episodes of regurgitation \geq 2x/day	142 (66.98)	128 (46.37)	60 (32.25)	25 (20.32)	355
Hematemesis	-	3 (1.09)	2 (1.07)	-	5
Bronchial aspiration	26 (12.26)	26 (9.42)	8 (4.30)	8 (6.50)	68
Apnea	16 (7.54)	24 (8.69)	10 (5.37)	3 (2.43)	53
Failure to thrive	7 (3.30)	18 (6.53)	18 (9.67)	12 (9.75)	55
Abnormal posturing	18 (8.49)	22 (7.97)	14 (7.52)	10 (8.13)	64

The Rome II Criteria,¹⁰ in a chapter about childhood functional diseases, presents criteria for the identification of infants with IR. The indirect use of these criteria allows the identification of infants at higher risk for PGER. It functions as a screening for those infants who need to be submitted to additional exams. In the literature review, no reports have been found on the use of these criteria for the identification of infants with suspected PGER.

In the present study, the prevalence of PGER was of 11.15%. This prevalence is similar to the one described in the literature, regardless of the diagnostic criteria used,^{4,5,17-20} suggesting that the use of the Rome Criteria may be useful in identifying infants who do not meet the criteria for IR and who therefore have to be more carefully evaluated.

Orenstein *et al.*⁵ devised a 161-item questionnaire, and based on the results they obtained they proposed a clinical score for the identification of infants at higher risk for PGER. However, such a large and complex questionnaire cannot be easily applied. Eleven questions were selected for the clinical score, among these questions were those about the infant's crying pattern, refusal to eat, abnormal posturing, inappropriate weight gain. However, these questions may provide answers that can be difficult to assess in a context where the aim is to characterize an episode of regurgitation. The validation of the score was performed in a small number of infants (35), which requires that other studies be conducted in order to assess whether the results are reproducible.

De S *et al.*¹⁹ found prevalences of PGER close to those observed in the present study, in infants aged between one month and two years of life. The authors interviewed 602 caretakers and applied the questionnaire proposed by Orenstein,⁵ using a score > 5 as cutoff point for PGER. They found out that 62 (10%) infants met the diagnostic criteria for PGER. Orenstein²³ underscores the necessity to validate the questionnaires that seek to establish a symptom-based diagnosis, so that the reproducibility of results can be checked.

The prevalence of IR varies with the infant's age and according to the place where the study is conducted.^{4,5,18-20} Prevalence decreases with age, characterizing the benign course of the disorder, contrary to GERD, where prevalence increases with age.

In the present study, the prevalence of suspected PGER was similar to that described in the literature,^{5,19,24} however, it was higher in the first months of life, differently from what is usually reported in the literature.^{5,19} Some cases of PGER may have a milder clinical course or be self-limited, that is, the symptoms disappear as the proximal digestive tract becomes further developed, which explains the larger number of symptomatic infants in the first months of life. It should be noted that the occurrence of excessive crying or food allergy symptoms may have been incorrectly interpreted as clinical manifestations of PGER.^{15,22}

There are some differences in the prevalences of IR and PGER in western countries comparatively to eastern ones. Osatakul *et al.*¹⁸ ascribe this difference to a probable ethnical component. Nevertheless, De S *et al.*¹⁹ found a

general prevalence for IR and PGER in Indian infants, using clinical criteria developed by western authors,⁵ similar to the ones obtained in the present study. Could this difference in PGER prevalence between western and eastern infants be ascribed to different eating habits, posture or even cultural criteria used by each population to identify and assess a health problem?

The large number of infants with frequent episodes of regurgitation in the first two trimesters of life may be a consequence of early weaning and introduction of artificial feeding, since the offered amount of food is imposed by the caretaker and not necessarily controlled by the infant.² The short interval between meals, the positioning and handling of the infant in the postprandial period may contribute to the development of GER, and in more sensitive infants, the passage of gastric contents into the esophagus may result in esophagitis-like symptoms supporting the suspected diagnosis of PGER. Probably, some infants younger than six months, regarded as having PGER in the present study, may fit into this situation.

The frequency distribution of clinical features of infants with PGER relative to age range shows that choking and suffocation, apnea and abnormal posturing significantly contributed to the characterization of PGER in the first two trimesters of life. Choking and suffocation are frequent among younger infants as a result of the immature coordination of intake/swallowing of foods at this age, of poor feeding technique, which could be associated or not with PGER. On the other hand, the backward movement of food when it reaches the supra-esophageal region also causes these symptoms. The frequent report of back arching associated with head tilt was alarming. It is hard to believe that this finding could be one of the symptoms of Sandifer syndrome, a rare event that often affects infants with neurological disorders; it is quite probable that respondents have misunderstood the question. The statistical analysis of the association between clinical features and presence of PGER showed a positive correlation, indicating that each feature individually made an important contribution to the observed prevalence of PGER, except for regurgitation and hematemesis.

Our conclusion is that the use of diagnostic criteria based on the Rome II Criteria to confirm the suspected diagnosis of PGER is useful as initial screening. No treatment should be implemented based on these criteria, but additional investigation should be indicated instead.

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