GASTROESOPHAGEAL REFLUX AND SWALLOWING IN NEWBORNS AND INFANTS: INTEGRATIVE REVIEW OF LITERATURE

Refluxo gastroesofágico e deglutição em recém nascidos e lactentes: revisão integrativa da literatura

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ABSTRACT

The so called gastroesophageal reflux is found in 25% of babies and can give rise to a variety of child development related prejudice. The objective of this paper was to carry out a integrative review of the literature in order to verify whether there are publications on the relation between swallowing alteration and the gastroesophageal reflux scenario in newborns and infants. The research was based on websites consultations, such as Bireme and PubMed. The key words used can be sumarized as follows: gastroesophageal reflux, newborn and infant either in portuguese or english. The descriptors were used in pairs, since their isolate use covered a lot of papers with different contents from what we need for this specific research of interest. Papers from the last 10 years have been taken into account. It remained 23 articles out of 1184 articles from Bireme and 1600 from PubMed analyzed from the application of inclusion and exclusion criteria, and the overwhelming majority of those 23 articles was related to signs, symptoms and diagnose of GER. Two of the afore-mentioned articles approached themes as GER and swallowing, demonstrating that there is no necessarily relation between GER and oropharyngeal dysphagia in newborns and infants**,** moreover, the lack of researches on these themes demonstrates the need of new studies on pathophysiological related aspects.

KEYWORDS: Gastroesophageal Reflux; Deglutition Disorders; Infant

INTRODUCTION

The gastroesophageal reflux disease (GERD) is defined as the involuntary return of the gastric content to esophagus[1] and it happens in approximately 25% of babies, being the second greatest problem regarding the most prevailing affections of the digestive tract[2].

The GERD in children is classified as physiological, functional and primary and secondary pathological[3] condition. The physiological GERD is characterized by episodic reflux, in the postprandial period, and it can occur at least in three short episodes, at the first two postprandial hours. The functional GERD occurs with more frequency than the physiological one, however, without causing disease to the child. It is called functional for not having any basic dysfunction (mechanical, inflammatory, infectious or biochemical) that can lead to reflux, and it is a process of gastrointestinal maturity. Reflux still can be occult or silent, being possible that it becomes pathological.

Inasmuch as the GERD comprises extraesophageal areas, it ceases to be a problem restrict to the digestive tract. Among the GERD complications is mentioned the bronchitic asthma and the otorhinolaryngological problems, food problems, infantile colic and dental erosion. The GERD can also be considered the factor responsible for swallowing difficulty, both in newborns and in bigger children.

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Conflict of interest: non-existent

In spite of feeding, as well as breathing, being a natural function, it is necessary, to it occurs, a very complex process that involves several phases, as swallowing and digestion. Interruptions or alterations in any of these phases can cause bad nutrition and growth deficit. The nutrition of a baby, especially in the first year of life, is essential to brain growth and development.

The most common symptoms that suggest a food problem are sucking and swallowing difficulties, apnea, repetitive cough and/or choking, excessive irritability, behavior changes during feeding, time of nutrition higher than 30 to 40 minutes, food refusal and growth deficit.

The occurrence of vomiting, regurgitation, chokings, lack of air, esophagitis, dysphagia, odynophagia, pyrosis and retrosternal pain make the child to relate food to discomfort, pain and antipleasure[1]. On the other side, the GERD jeopardizes the integrity of baby's oral motricity, causing hypersensitivity in the oral cavity, anticipation of vomiting reflex and aversion to tactile stimulation, justifying the refusal of some food and textures[11].

Thus, the objective of this paper was realize an review of literature to verify if there is publications relating swallowing disturbances to the condition of the GERD in newborns and infants.

METHODS

This paper is an integrative review, with descriptive and analytic character, being based on the analysis of articles on gastroesophageal reflux in newborns and infants.

The collection of periodicals was realized in the Bireme's website (Virtual Health Library), being consulted the LILACS and MEDLINE's database, and in the PubMed's site.

The catchwords used to the research were: gastroesophageal reflux, newborn and infant, both in English and in Portuguese. The research was carried out with descriptors in pairs, since their isolated use comprised many texts containing subject matters different from authors' interest.

All the scientific articles that approached gastroesophageal reflux, both the physiological reflux and the GERD, in newborns and infants, in the period between 2004 and 2014, were included. All duplicated articles, those that did not approach the proposed subject matter, and those that did not mention babies or were not in the limit of time were excluded.

After all information was grasped and studied, the data were analyzed considering the journal and the year of publication, the research objective, the diagnosis exams and proposed treatments, as well as the relation between the gastroesophageal reflux and swallowing disturbances. At last, the levels of evidence of each study was analyzed, according to Souza, Silva e Carvalho (2010)[12]. Subsequently this data were discussed and compared with literature.

REVIEW OF LITERATURE

In the search carried out in the Bireme's website, using catchwords in pairs, 1.184 articles were found. According to the established criteria, 8 studies were selected in LILACS and MEDLINE's database. Yet in the search carried out in the PubMed's website, 1.600 articles were found, from which remained 15 articles after the application of inclusion and exclusion criteria. The steps of this selection are illustrated in Figure 1.

Figure 1 – Information referring to the bibliographic collection and selection of articles

Articles published in the period of 2004 to 2014 were selected, being one article published per year, mostly. The years of 2012 and 2013 presented the biggest number of publications (n=4). It was possible to observe that there was an increase in the number of publications on this subject matter in the last years, as presented in Figure 2.

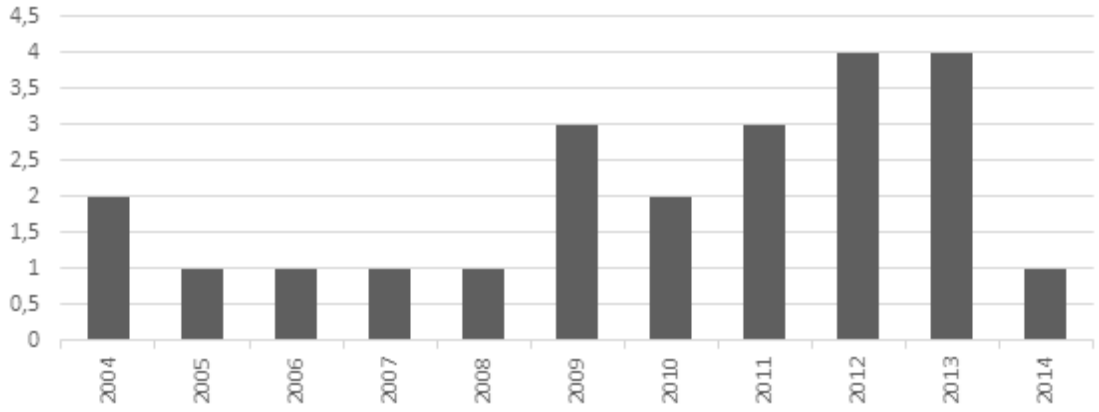

Figure 2 – Presentation of the number of articles published per year according to the results found through the search in all data-bases e websites consulted

The Figure 3 presents information obtained from the analysis of each selected publication, being possible to observe that the majority of the studies had the objective of establishing the best exam to diagnose the GERD and, also, the objective of relating clinic signs to the exams. The medical journals presented the biggest number of published articles related to the subject matter (n=18), followed by the nutrition journals (n=2), speech therapist (n=1), sleep (n=1) and neonatal care (n=1).

Bibliographic reference's number	Title	Authors	Journal	Considerations / Subject matter	Level of evidence
13	The influence of the supine and prone position in the esophageal pH monitoring in very low birth weight infants	Mezzacappa, Goulart, Burnelli	Arq. Gastroenterol. 2004 Jan-Mar;41(1).	It verifies the postural influence on the frequency and duration of GERD episodes, ascertaining the prone position's efficiency.	4
14	Prevalence of pathologic gastroesophageal reflux in regurgitant infants	Costa et al	J. Pediatr. (Rio J.). 2004 July-Aug;80(4).	It determines through Roma II's criterion the prevalence of the pathological GERD in regurgitant infants.	3
15	Predominant respiratory symptoms in indications for prolonged esophageal pH-monitoring children	Goldani et al	Arq. Gastroenterol. 2005 July-Sept;42(3).	It evaluates children and teenagers regarding demand, indications and results of prolonged esophageal pH monitoring to evaluate the GERD, concluding that the reflux indexes in positive pH tests were higher in children under the age of 2 years old.	4
16	Effect of formula thickened with locust bean gum on gastric emptying in infants.	Miyazawa et al	J Paediatr Child Health. 2006 Dec;42(12):808-12.	It verifies the effect of a formula thickened with carob seed gum on gastric emptying, ascertaining that the effect is positive.	3

Bibliographic reference's number	Title	Authors	Journal	Considerations / Subject matter	Level of evidence
17	Diurnal variation in the chemical clearance of acid gastroesophageal reflux in infants.	Woodley, Fernandez, Mousa	Clin Gastroenterol Hepatol. 2007 Jan;5(1):37-43	It evaluates feeding effects regarding duration, volume and chemical depurations.	3
18	The effect of thickened-feed interventions on gastroesophageal reflux in infants: systematic review and meta-analysis of randomized, controlled trials.	Horvath, Dziechciarz, Szajewska	Pediatrics. 2008 Dec;122(6): e1268-77	It systematically evaluates and updates data from randomized controlled trials on the efficacy and safety of thickened foods in GERD treatment.	1
19	Gastroesophageal reflux: a comparative study of receptiveness and sensitivity of upper gastrointestinal series and ultrasonography	Sakate et ak	Radiol Bras. 2009 July-Aug;42(4).	It compares the sensitivity and receptivity of esophagus, stomach and duodenum's seriography (ESD) with the intra-abdominal esophagus's ultrasonography in patients with suspected GERD.	3
20	Technical limitations in detection of gastroesophageal reflux in neonates.	Di Fiori et al	J Pediatr Gastroenterol Nutr. 2009 Aug;49(2):177-82	It characterizes GERD incidence detected by esophageal pH monitoring and not detected by intraluminal impedance.	4
21	GERD or not GERD: the fussy infant.	Bhatia, Parish	J Perinatol. 2009 May;29 Suppl 2:S7-11.	It defines the GERD and GERD associated symptoms, and treatment options.	4
22	Disagreement between symptom-reflux association analysis parameters in pediatric gastroesophageal reflux disease investigation.	Luthold, Rochat, Bahler	World J Gastroenterol. 2010 May 21;16(19):2401-6.	It verifies if there is a relation between GERD symptoms and the pH test, showing that only symptoms can generate important discordances in diagnostic classification.	4
23	Small volumes of feed can trigger transient lower esophageal sphincter relaxation and gastroesophageal reflux in the right lateral position in infants.	Van Wijk et al	J Pediatr. 2010 May;156(5):744-8, 748.e1.	It investigates the quantity of food that activates the lower esophageal sphincter's relaxation in right and left lateral decubitus.	3
24	Fluoroscopic findings ofswallowing: comparision between preterm and full-term infants	Silva-Munhoz, Bühler	J. Soc. Bras. Fonoaudiol. 2011 July-Sept;23(3).	It describes the fluoroscopic findings of swallowing, clinic signs and symptoms related to the alteration in preterm and term newborns' swallowing.	4
25	Sensitivity of upper gastrointestinal series in the diagnosis of gastroesophageal in infants	Alvares, Torres, Mezzacappa	Radiol Bras. 2011 July-Aug;44(4).	It determines the ESD's low sensitivity to diagnose the GERD in comparison with the prolonged pH test, but showed to be useful in the anatomic alterations diagnosis.	3
26	Assessment and treatment of gastroesophageal reflux in healthy infants with apneic episodes: a retrospective analysis of 87 consecutive patients.	Koivusalo et al	Clin Pediatr (Phila). 2011 Dec;50(12):1096-102.	It evaluates if the GERD treatment is related to the betterment of recurrent infant apnea, verifying that there is no relation.	3
27	Relationship between sleep and acid gastro-oesophageal reflux in neonates.	Ammari et al	J Sleep Res. 2011 Feb;21(1):80-6.	It investigates the acid reflux's impact on sleep. It concludes that the GERD occurs mostly in vigilance, and correlates sleep phases to the physiopathological impact of the GERD.	3

Bibliographic reference's number	Title	Authors	Journal	Considerations / Subject matter	Level of evidence
28	Combined esophageal intraluminal impedance, pH and skin conductance monitoring to detect discomfort in GERD infants.	Cresi et al	PLoS One. 2012;7(8):e43476.	It evaluates the discomfort that the GERD can cause through skin conductance, along with the multichannel intraluminal impedance and the esophageal pH. It concludes that the acid and little acid reflux cause the same discomfort.	3
29	Positioning after feedings: what is the evidence to reduce feeding intolerances?	Elser	Adv Neonatal Care. 2012 Jun;12(3):172-5.	It analyzes literature to verify the positions that favor the GERD.	4
30	Impact of feeding strategies on the frequency and clearance of acid and nonacid gastroesophageal reflux events in dysphagic neonates.	Jadcherla et al	JPEN i Parenter Enteral Nutr. 2012 Jul;36(4):449-55	It verifies the influence of feeding, volume, duration and rate flow, and caloric density on the GERD in dysphagic children, concluding that the duration and flow of breast-feeding can be a useful complement to better the GERD.	3
31	Infant GERD: symptoms, reflux episodes & reflux disease, acid & non-acid refflux--implications for treatment with PPIs.	Orenstein	Curr Gastroenterol Rep. 2013 Nov;15(11):353	It analyses the evolution of the GERD diagnostic means, the symptoms detection and treatment.	4
32	Efficacy and safety of once-daily esomeprazole for the treatment of gastroesophageal reflux disease in neonatal patients.	Davidson et al	J Pediatr. 2013 Sep;163(3):692-8. e1-2.	It analyses the efficacy of the esomeprazole treatment in the GERD. It ascertained that it does not interfere in signs and symptoms, however, reduces the esophageal acid exposition and the number of acid reflux episodes in newborns.	2
33	Gastroesophageal reflux causing sleep interruptions in infants.	Machado et al	J Pediatr Gastroenterol Nutr. 2013 Apr;56(4):431-5.	It evaluates the relation between the GERD and the incidence of sleep interruptions, concluding that the acid and not acid reflux cause awakenings in infants.	4
34	The incidence of oropharyngeal dysphagia in infants with GERD-like symptoms.	Fishbein et al	JPEN J Parenter Enteral Nutr. 2013 Sep;37(5):667-73.	It investigates if the oropharyngeal dysphagia has a high incidence in the GERD, concluding that there is a high relation.	1
35	Prophylactic use of a probiotic in the prevention of colic, regurgitation, and functional constipation: a randomized clinical trial.	Indrio et al	JAMA Pediatr. 2014 Mar;168(3):228-33.	It investigates if lactobacillus reuteri DSM 17938 supplementation in the first three months of life can reduce the appearance of colic, gastroesophageal reflux and constipation in newborns, and reduce the economic impact. It showed to be efficient for the functional gastrointestinal disorders and cost reduction.	2

Figure 3 – Information referring to the articles selected for the research, collected in Bireme's database, wich approached the gastroesophageal reflux disease in newborns and infants

According to the review that was realized, several exams were used to diagnose the GERD, however, the Esophageal pH monitoring was the most used (n=13) and demonstrated better sensitivity and greater reliability. The exams are presented in Figure 4.

The signs and symptoms most related to the GERD were breathing problems (n=7), followed by regurgitations (n=5) and vomiting (n=4), regarding that the same article can mention t than one sign/ symptom, as presents Figure 5.

The most mentioned types of treatment were the postural one (n=4), drug treatment (n=3) and use of thickening formula (n=3). The treatments are presented in Figure 6.

Few articles related the GERD to swallowing (n=2), being one of them published in a journal that covers the area of phonoaudiology and the other the area of nutrition. The findings of these studies are disposed in Figure 7.

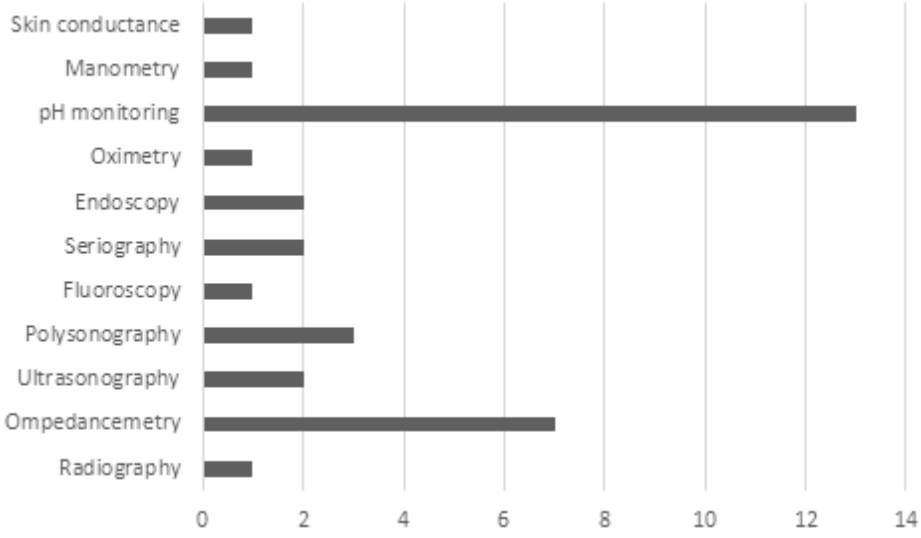

Figure 4 – Presentation of the number of articles in relation to the diagnostic test used to detect the gastroesophageal reflux disease.

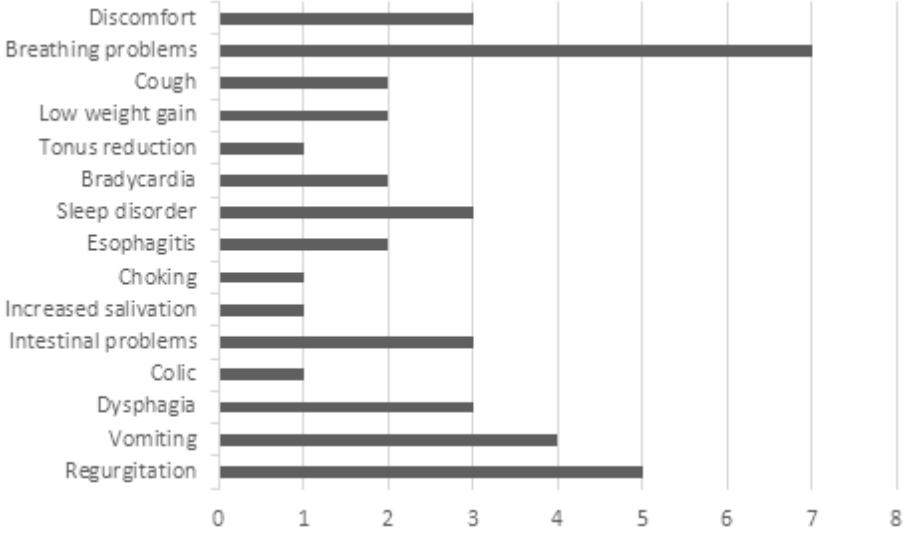

Figure 5 – Presentation of the number of articles in which was mentioned the signs and symptoms – vomiting, breathing problems, chokings and others –related to the gastroesophageal reflux disease.

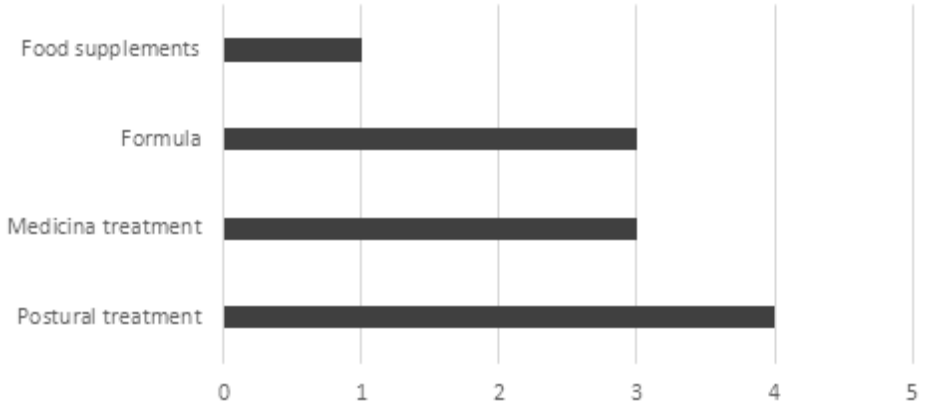

Figure 6 – Presentation of the number of articles in which were presented treatments

Bibliographic reference's number	Tilte	Authors	Abstract
24	Fluoroscopic findings of swallowing: comparison between preterm and full-term infants	Silva-Munhoz; Bühler (2011)	It finds absence of relation between the presence of the GERD and swallowing disturbances in oral and pharyngeal phases. The incoordination of sucking, swallowing and breathing was related to prematurity, as well as to sucking difficulty.
34	The incidence of oropharyngeal dysphagia in infants with GERD-like symptoms.	Fishbein et al. (2013)	It presents the incoordination of sucking/swallowing/ breathing, weak sucking, apnea, altered vomiting reflex, cough, irritability, nasopharyngeal reflux and increased lactation time as the main symptoms. It finds a high relation between oropharyngeal dysphagia and the GERD.

Figure 7 – Information referring to the articles that approached the relation between the gastroesophageal reflux disease and swallowing in babies and the findings of these studies.

DISCUSSION

The intention of this study was to research if the GERD influence on swallowing has become evident in the scientific literature, seeing the physiological GERD is common in the neonatal period and can cause damages to baby's health and development. The GERD is considered one of the main causes of visiting a pediatric gastroenterologist[2].

It was possible to observe that the number of publications is increasing over the years, corroborating Mooloy, Di Fiori, Martin (2005)[3], that verified an increase in researches on the GERD in the last decades due to its aspects that were not clarified yet.

The majority of the articles found sought to connect signs and symptoms with GERD verification[14-16,22,24,27] and to identify the most sensitive exams to the GERD diagnosis. Another objective, that was also approached, was to study the effect of the postural treatment on the GERD, what proved to be efficient in both medical researches found[13,17], confirming the literature's findings[3].

The bibliographic collection demonstrated that great majority of publications found (n=18) correspond to medical field. There was a diversity of topics in the medical research found, from food thickening[1], corporal posture[13,29], diagnosis[14,31], treatments[26,32,35] to exams[15,19,20,22,2], among others.

The most used diagnostic test and considered effective by the studies found[13,15,17,20,22,26,27,29-33] was the Esophageal pH monitoring, confirming Moraes-Filho that consider the pH monitoring a gold standard test due to its sensitivity to detect problems and, still, to its capacity of propitiating a connection with the symptoms found in patients[38].

The most mentioned signs/symptoms in the research were the breathing ones[14,15,20,21,31-33], including oxygen saturation drop, pneumonia, the crying baby syndrome, cyanosis, among others, followed by regurgitation[16,18,31,32,35] and vomiting[18,21,32,33], confirming another research[2] that cited these ones as being the main clinic signs and symptoms.

In the research developed by Silva-Munhoz and Buhler[24], the authors related sign/symptom comparing preterm newborns with term newborns,

where they ascertained that the preterm newborns presented higher desaturation, while the term newborns showed vomiting as the main symptom. Another topic found in this collection[21,32] is the baby's nutritional state, that in most cases is altered, jeopardizing its growth, what corroborates literature[2].

Drent and Pinto (2007)[39], relating the GERD to food problems, concluded that the GERD presence results in alimentary disturbances of behavioral and myofunctional orofacial magnitude, causing malnutrition and growth deficit. Meira (1998)[11] still mentions that the GERD can increase the intraoral sensitivity, making child to develop aversion to some stimuli and textures, justifying the food refusal.

The studies showed that the therapeutic approach focusing in corporal posture changes[13,29] and formulae to modify food consistency[16,18] generates positive results. Another authors approached, yet, medicinal treatment[26,31,32], being necessary to adopt surgical conducts only in extreme cases.

The jeopardized oral and pharyngeal phases of swallowing and feeding difficulties in GERD children was considered only by two studies[14,24], being one of them published in a journal that covers the area of phonoaudiology and the other, the area of nutrition. However, in an article[24] this relation was not observed in term babies, only in preterm babies relating swallowing difficulty to immaturity. Additionally, a study[40] that found association between such aspects evidenced the high incidence of this relation in babies that presented the GERD. Few researches of medical field dealt with the possibility of oropharyngeal dysphagia in this population, being scarce the references found that approach the oral phase of swallowing or even relate food problems to the GERD, evidencing the need of new researches.

The data found in the present research demonstrated that the GERD treatment must be multi-professional, being the participation of a phonoaudiologist of fundamental importance in the supervision of the sucking and swallowing conditions, enabling to obtain best results by reducing the risk of sequelae that can affect the child's global development.

CONCLUSION

The review of literature realized by this paper demonstrated that can have relation between the GERD and swallowing disturbances in newborns and infants, being that the scarcity of studies on this subject matter demonstrated the need of more researches approaching the pathophysiological aspects involved.

RESUMO

O refluxo gastroesofágico é encontrado em 25% dos bebês e pode acarretar vários prejuízos para o desenvolvimento. O objetivo deste trabalho foi realizar uma revisão integrativa da literatura buscando verificar se há publicações relacionando alterações da deglutição com o quadro de refluxo gastroesofágico em recém-nascidos e lactentes. A pesquisa foi realizada consultando os sites da Bireme e da PubMed. Os unitermos utilizados foram refluxo gastroesofágico, recém-nascido e lactente, em português e os correspondentes em inglês. Os descritores foram utilizados pareados, pois isolados abrangia muitos textos com temáticas diferentes da de interesse. Os trabalhos selecionados foram dos últimos dez anos. Não houve limite de tempo. De 1184 artigos da Bireme e 1600 da PubMed analisados a partir da aplicação dos critérios de inclusão e exclusão, restaram 23 artigos, sendo a maioria voltada aos sinais, sintomas e diagnóstico do RGE. Dois artigos abordaram o RGE e a deglutição, demonstrando que pode haver ou não relação entre RGE e disfagia orofaríngea em recém nascidos e lactentes, sendo que a escassez de pesquisas com essa temática demonstrou a necessidade de novos estudos abordando os aspectos patofisiológicos envolvidos.

DESCRITORES: Refluxo Gastroesofágico; Transtornos da Deglutição; Lactente

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