

Thickeners sold in Brazil: analysis of the composition and suitability for children under the age of 3

Espessantes comercializados no Brasil: análise da composição e da adequação para crianças menores de 3 anos

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ABSTRACT

Introduction: Thickeners are used in the treatment of swallowing disorders, named dysphagia. In Brazil there is no specific product for the pediatric population who under the age of 3 years. **Objective:** To analyze the different types of thickeners available in Brazil, considering their chemical composition and their use in pediatrics. **Methods:** Quantitative study, with descriptive approach based on the data collection. The brands of existing thickeners were analyzed in Brazil and their composition in relation to the Codex Alimentarius and nutritional recommendations for children from 0 to 3 years. **Results:** Eight brands were studied, three of which proved to be inappropriate for pediatric use because they have gum in their formulation. Other thickeners brands did not present inadequacies for use in the age group from 0 to 3 years old regarding to the type of carbohydrate, sodium content and total caloric value. **Conclusion:** In Brazil, 5 thickeners brands present in their composition levels of sodium and profile of carbohydrate adequate for children from 0 to 3 years, even when they are associated with infant formulas.

RESUMO

Introdução: Os espessantes são utilizados no tratamento dos distúrbios de deglutição, denominados disfagia, porém, no Brasil, não há produto específico para a população pediátrica menor de 3 anos. **Objetivo:** Analisar os diferentes tipos de espessantes disponíveis no Brasil, considerando sua composição química e sua utilização em pediatria. **Método:** Estudo quantitativo, do tipo descritivo com base no levantamento de dados. Foram analisadas as marcas de espessantes existentes no Brasil quanto a sua composição em relação ao Códex Alimentarius e recomendações nutricionais para crianças de 0 a 3 anos. **Resultados:** Foram estudadas oito marcas, das quais três mostraram-se inadequadas para utilização pediátrica, por possuírem goma em sua formulação. As demais marcas de espessantes não apresentaram inadequações para uso na faixa etária de 0 a 3 anos de idade no que se refere ao tipo de carboidrato, teor de sódio e valor calórico total. **Conclusão:** No Brasil, 5 marcas de espessantes apresentam em sua composição teores de sódio e perfil de carboidratos adequados para crianças de 0 a 3 anos, mesmo quando associadas a fórmulas infantis.

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INTRODUCTION

According to Agência Nacional de Vigilância Sanitária (National Health Surveillance Agency -ANVISA)¹, thickener is the substance that is able to increase, in food, the viscosity of the solutions. Its composition varies according to the presence of cornstarch, rice or potato, or by the inclusion of gums such as xanthan and guar².

Thickeners are used in the treatment of swallowing disorders, named dysphagia. Oropharyngeal dysphagia is a disorder that affects the transport of bolus from the mouth to the stomach. It can be congenital or acquired³, compromising the adequate nutrition and hydration of the subject.

The prevalence of dysphagia in pediatric population is estimated at around 25-45% in children with typical development and about 33-80% in children who present development changes⁴. Among the therapeutic resources, the most widely used one in the adult individual is a modification in the consistency of foods by using thickener. However, in Brazil there is no specific product for the pediatric population who under the age of 3 years.

The National Dysphagia Diet (NDD)⁵ standardized the consistency of thickened liquids: nectar, honey and pudding. They are indicated according to the needs and food competences of the subject. The amount of thickener that is required for each consistency depends on the specifications of the manufacturer.

In 2011, the Food and Drug Administration (FDA)⁶ prohibited the use of thickeners containing xanthan gum. That happened due to the report of necrotizing enterocolitis and death in premature infants who used the product.

Then, some formulations may present high levels of sodium. This may be relevant depending on the underlying disease of the patient⁷.

The aim of this study is to analyze the different types of thickeners available in Brazil, considering their chemical composition and their suitability for children under the age of three.

METHODS

This is a quantitative study with descriptive approach based on data collection regarding the thickeners sold in Brazil. This study was approved by the Ethics Committee of Universidade Federal de Santa Maria, under the CAAE number 23676813.8.0000.5346 and report number 476.487, following the Resolution 466/2012. We analyzed the information available on the label and on the website of the product, and those ones provided by the company. We verified the items of composition of the thickeners, such as: type of carbohydrate which was used, the presence of gums, the amount of sodium and calories per measure. For exclusion criteria, we used the

absence of this data on the label of the product or the failure to provide the information by the manufacturer.

After the analysis of composition of the type of carbohydrate which was used, the formulations were excluded if they did not meet the recommendations of the Codex Alimentarius⁸, that is, the presence of gums.

With the brands included in the study the levels of sodium and calories were analyzed by measuring spoon. In addition, we performed the simulation of thickening infant starting and follow-up formulas which are commonly used for the investigated age group. They evaluated the minimum and maximum levels of calories and sodium in 100 ml of honey consistency for each of the formulas.

The results were analyzed as reference values provided by the Codex Alimentarius the calorie and sodium for children aged 0-3 years-old.

RESULTS

Eight thickeners brands which are sold in Brazil were included. The analysis of the composition of the carbohydrate type and the presence of gums showed that the brands number 1, 2 and 5 are inappropriate for pediatric use because they have xanthan gum, guar or tara in their formulation. After excluding these formulations, the brands number 3, 4, 6, 7 and 8 were considered appropriate for the use in children because they only present carbohydrates of the maltodextrin type and starch, which are allowed by the law (Table 1).

In Table 2, it is possible to observe the levels of sodium and calorie per spoon measure and for the preparation of 100 ml in honey consistency, according to the specification of the manufacturer.

In relation to the sodium, we noted a significant difference between the brands number 6 and 8 (the absence of sodium) and brands 4 and 7 (with the highest levels). We also verified

Table 1 – Types of carbohydrates and gums presented in the thickeners.

	Composition				
	Carbohydrates		Gums		
	Maltodextrin	Amido	Xanthan	Guar	Tara
Brand 1	X	-	X	-	-
Brand 2	X	X	X	X	X
Brand 3	-	X	-	-	-
Brand 4	X	-	X	-	-
Brand 5	X	-	X	-	-
Brand 6	-	X	-	-	-
Brand 7	X	X	-	-	-
Brand 8	-	X	-	-	-

Brands: 1. Espessa Mais, 2. Nutilis, 3. Biosen, 4. Bem Vital, 5. Thicken Up Clear, 6. Sustap, 7. Thick and Easy, 8. Nutriclin

Table 2 – Levels of sodium (Na) and calories (kcal) for thickeners.

Thickener without gums	Measurement		For 100 ml of honey consistency		
	Spoon measure (g)	Na content (mg)	Number of measures	Na content (mg)	kcal
Brand 3	5.0	2.4	1 ½	3.6	27
Brand 4	4.0	7.0	1 ½	10.5	22.5
Brand 6	6.0	0	1	0	20
Brand 7	4.5	8.0	1 ½	12.0	25.5
Brand 8	5.0	0	2 ½	0	50.0

Brands: 3. Blosen, 4. Bem Vital, 6. Sustap, 7. Thick and Easy, 8. Nutriclin

that for obtaining the consistency of honey there was no difference in the number of measurements used according to the brand. These values varied from one to two and half measurements for the same consistency. This determined a significant variation in both final quantity of sodium (0 to 12 mg) and quantity of calories (kcal 20 to 50) in the studied consistency.

The thickening of infant starting and follow-up formulas with the carbohydrate-based thickeners demonstrated that all formulations thickened to the consistency of honey showed both levels of sodium and calorific value within the recommendations set out for the age group (Table 3).

Table 3 – Levels of sodium (Na) and calories (kcal) in the thickened infant formulas.

Infant Formulas	Content in 100 ml		Content in 100 ml in the thickened consistency of honey	
	Na(mg)	kcal	Na (mg)	kcal
Aptamil 1	18	66	23.2 (18 - 30)	95 (86 - 116)
Milupa 1	25	67	30.2 (25 - 37)	96 (87 - 117)
Enfamil Premium 1	1.7	67	6.9 (1.7 - 13.7)	96 (87 - 117)
Similac Advance 1	18	68	23.2 (18 - 30)	97 (90,5 - 118)
Nan Pro 1	15	67	20.2 (15 - 27)	96 (87 - 117)
Nan Confor 1	24	67	29.2 (24 - 36)	96 (87 - 117)
Nestogeno 1	25	67	30.2 (25 - 37)	96 (87 - 117)
Nestogeno Plus	28	67	33.2 (28 - 40)	96 (87 - 117)
Aptamil 2	42	71	47.2 (42 - 54)	100 (91 - 121)
Milupa 2	34	68	39.2 (34 - 46)	97 (90,5 - 118)
Enfamil 2	2.7	68	7.9 (2.7 - 14.7)	97 (90,5 - 118)
Similac Advance 2	19	68	24.2 (19 - 31)	97 (90,5 - 118)
Nan Pro 2	25	67	30.2 (25 - 37)	96 (87 - 117)
Nan Confor 2	27	67	32.2 (27 - 39)	96 (87 - 117)
Nestogeno 2	39	67	44.2 (39 - 51)	96 (87 - 117)

Brands: 3. Blosen, 4. Bem Vital, 6. Sustap, 7. Thick and Easy, 8. Nutriclin

DISCUSSION

In special cases, such as in the presence of dysphagia, it becomes a challenge for the multiprofessional team to perform dietary change, making the nutrition safe and adequate, being the thickening of the liquids one of the used approaches. However, this tactic has been questioned after episodes of necrotizing enterocolitis in premature babies, being that the type of thickener was the xanthan gum based one⁹. This effect had already been demonstrated in a study on rats, in which the intestinal lesion produced similarly from the treatment with thickeners formulated with the same type of gum¹⁰. It is noteworthy that the use of gums in infant formulas is not permitted under the Codex Alimentarius⁸ since 1987.

In our research, we verified that three brands which are sold in Brazil use gum in their composition. The brands number 1 and 5 make use of xanthan gum, and the brand 2, a mixture of gums (xanthan, guar and tara). The gums allowed by the Codex Alimentarius⁸ are the guar gum and the carob, within the limit of 0.1 g per 100 ml. However, some studies have emphasized the in relation to the maximum quantity, even regarding these gums, as they may cause side effects such as allergic reactions, abdominal pain, cramping and diarrhea¹¹⁻¹³. However, the Codex Alimentarius⁸ does not prohibit the use of maltodextrin or starch for consumption by children from 0 to 3 years. Thus, according to this study, the brands number 3, 4, 6, 7 and 8, which present no gums, but only these types and carbohydrates, could be used.

There was significant variation in sodium and calories values between brands investigated. In this study, 100 ml of infant formula thickened in honey consistency, the average sodium ranged from 6.9 to 47.2 mg. In relation to the calories, this range reached the double of the values among some brands. When used a lot, these values should be included in the daily offering of patient¹⁴.

In pediatrics, according to the Adequate Intake (AI), the sodium intake recommended for children from 0 to 3 years should be from 120 to 1000 mg/day^{15,16}. On the other hand, for the Codex Alimentarius⁸, this recommendation varies from 20 to 60 mg/100 kcal in infant formulas. From these recommendations, the brands studied in 100 ml of honey consistency did not exceed the allowed limits. However, in other consistencies or restricted diets for this mineral, it is recommended to pay attention to the sodium content presented by the thickener. In relation to the calories, the choice of thickener, the estimated caloric requirements to the patient should be considered.

Finally, it was observed that there was still significant range in the number of necessary measurements to obtain the same consistency. Among the analyzed brands this variation was from 1 to 2½ spoon measures. This fact becomes relevant because the number of measures used to achieve the desired

consistency should be noted, and the amount needed for daily consumption, which ultimately is important from an economic point of view.

CONCLUSION

The analysis of the eight thickener brands available in Brazil showed that five of them presented no guar and xanthan gums in their formulation. The other nutrients found are authorized for the consumption of children from zero to three years old. Their sodium levels were within the maximum allowable limits for this age group in infant formula thickened in the honey consistency.

REFERENCES

1. Brasil. Ministério da Saúde. Agência Nacional de Vigilância Sanitária (ANVISA). Decreto N° 55871 de 26 de março de 1965. [citado 2016 Mar 16]. Disponível em: <http://portal.anvisa.gov.br/documents/33916/391619/DECRETO%20BN%25C2%25BA%2B55.871%252C%2BDE%2B26%2BDE%2BMAR%25C3%2587O%2BDE%2B1965.pdf/59b8704c-52f4-481d-8baa-ac6edadf6490>
2. Sgarbieri VC, Pacheco MTB. Revisão: alimentos funcionais fisiológicos. *Braz J Food Technol* (Campinas). 1999;2(1/2):7-19.
3. Furkim AM, Silva RG. Programa de reabilitação em disfagia neurogênica. São Paulo: Frôntis Editorial; 1999. 53 p.
4. Bühler KECB. Como adequar a viscosidade do leite. Anais - Congresso Internacional de Fonoaudiologia. 2012 Out 31 – Nov 3, Brasília, DF, Brasil. [cited 2017 Dec 4]. Available from: <http://www.fonoaudiologia.org.br/hotsite/programacaoGeral.html>
5. National Dysphagia Diet Task Force. National Dysphagia Diet. (NDD). Standardization for optimal care. Chicago: American Dietetic Association; 2002.
6. Food and Drug Administration - FDA. FDA Expands Caution About SimplyThick. 2011. [cited 2017 Dec 4]. Available from: <http://www.fda.gov/forconsumers/consumerupdates/ucm256250.htm>
7. Almeida TM, Germini MFC, Kovacs C, Soares AMNGF, Magnoni D, Sousa AGMR. Risco da ingesta exagerada de sódio na utilização de espessante para disfagia. *Arq Bras Cardiol*. 2013;101(1):15-7.
8. Codex Alimentarius Commission. Joint FAO/WHO. Food Standards Programme. Codex Standard for Infant Formulae (Codex Stan 72-1981). In: Codex Alimentarius. v. 4 2nd ed. Roma: FAO/WHO; 1994.
9. Beal J, Silverman B, Bellant J, Young TE, Klontz K. Late onset necrotizing enterocolitis in infants following use of a xanthan gum-containing thickening agent. *J Pediatr*. 2012;161(2):354-6.
10. Lin J, Nafday SM, Chauvin SN, Magid MS, Pabbatireddy S, Holzman IR, et al. Variable effects of short chain fatty acids and lactic acid in inducing intestinal mucosal injury in newborn rats. *J Pediatr Gastroenterol Nutr*. 2002;35(4):545-50.
11. Vandenplas Y, Hachimi-Idrissi S, Casteels A, Mahler T, Loeb H. A clinical trial with an "anti-regurgitation" formula. *Eur J Pediatr*. 1994;153(6):419-23.
12. Savino F, Muratore MC, Silvestro L, Oggero R, Mostert M. Allergy to carob gum in an infant. *J Pediatr Gastroenterol Nutr*. 1999;29(4):475-6.
13. Iacono G, Vetrano S, Cataldo F, Ziino O, Russo A, Lorello D, et al. Clinical trial with thickened feeding for treatment of regurgitation in infants. *Dig Liver Dis*. 2002;34(7):532-3.
14. Santos OR, Neri LCL. Módulos de carboidratos e espessantes. In: Feferbaum R, Silva APA, Marco D, orgs. *Nutrição enteral em pediatria*. São Caetano do Sul: Yendis Editora; 2012. p. 311-22.
15. Institute of Medicine. Food and Nutrition Board. Dietary reference intakes for water, potassium, chloride and sulfate. Washington: National Academic Press; 2004. 640p. [cited 2016 Mar 5]. Available from: <http://www.nap.edu>
16. Tramonte VLCCG. Sódio, Cloro e Potássio. In: Cozzolino SMF, org. *Biodisponibilidade de nutrientes*. 3^a ed. Barueri: Manole; 2009. p. 494-512.

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