



Analysis of Brazilian pediatricians' knowledge of cow's milk protein allergy

Análise sobre o conhecimento do pediatra brasileiro sobre alergia à proteína do leite de vaca

**Camile Goebel Pillon¹, Vinicius Vargas Dal Carobo², Cristina Helena Targa Ferreira³,
Franceliane Jobim Benedetti⁴.**

¹ Curso de Medicina. Mestrado Profissional em Saúde Materno Infantil. Universidade Franciscana (UFN), Santa Maria, Rio Grande do Sul (RS), Brasil.

² Curso de Nutrição. Universidade Franciscana (UFN), Santa Maria, Rio Grande do Sul, Brasil.

³ Curso de Medicina. Departamento de Gastreenterologia Pediátrica. Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA), Rio Grande do Sul (RS), Brasil.

⁴ Curso de Nutrição. Mestrado Profissional em Saúde Materno Infantil. Universidade Franciscana (UFN), Santa Maria, Rio Grande do Sul (RS), Brasil.

*Corresponding author: Camile Goebel Pillon – Email: camilepillon@hotmail.com

Received in June 27, 2023

Accepted in June 29, 2023

ABSTRACT

To analyze the knowledge of Brazilian pediatricians about cow's milk protein allergy (CMPA) using a validated questionnaire. Quantitative study with a cross-sectional design in which an online questionnaire on CMPA knowledge was applied. The sample calculation indicated 1024 participants. The online form was divided into two blocks, the first comprising questions on the identification of pediatricians, and the second comprising the validated questionnaire, built from the Brazilian Consensus on Food Allergy (2018). The general evaluation of the questionnaire showed a percentage of agreement of 91% and a Content Validity Index of 0.95. The results of the applied questionnaires were presented in absolute and relative frequencies, mean, median, standard deviation, and percentiles. The level of significance was set at 5% ($p < 0.05$). The validated questionnaire was answered by 1316 Brazilian doctors, of whom 1017 (77.3%) were females, and their mean age was 45.50 ± 13.20 years. The mean total number of correct answers was $80.66 \pm 10.42\%$. Pediatricians mostly answered questions about the concept and treatment of CMPA. The question with the lowest rate of correct answers was related to clinical and laboratory investigation. Most physicians who answered the questionnaire demonstrated they understood the concept and the main CMPA therapeutic recommendations.

Keywords: Food allergy. Clinical diagnosis. Food hypersensitivity. Primary prevention.

RESUMO

Analisar o conhecimento de pediatras brasileiros sobre alergia à proteína do leite de vaca (APLV) por meio de um questionário validado. Estudo quantitativo com delineamento transversal no qual foi aplicado um questionário online sobre conhecimentos de APLV. O cálculo amostral foi de 294. O formulário online foi dividido em dois blocos, sendo o primeiro composto por questões de identificação dos pediatras e o segundo composto pelo questionário validado, construído a partir do Consenso Brasileiro de Alergia Alimentar (2018). A avaliação geral do questionário mostrou um percentual de concordância de 91% e Índice de Validade de Conteúdo de 0,95. Os resultados dos questionários aplicados foram apresentados em frequências absolutas e relativas, média, mediana, desvio padrão e percentis. O nível de significância foi estabelecido em 5% ($p < 0,05$). O questionário validado foi respondido por 1.316 médicos brasileiros, dos quais 1.017 (77,3%) eram do sexo feminino. A média de idade observada foi de $45,50 \pm 13,20$ anos. Ao analisar o número total de acertos, notou-se que a média de acertos foi de $80,66 \pm 10,42\%$. Os pediatras responderam principalmente a perguntas sobre o conceito e o tratamento da APLV. A questão com menor índice de acertos foi relacionada à investigação clínica e laboratorial. A maioria dos médicos que respondeu ao questionário demonstrou compreender o conceito e as principais recomendações terapêuticas da APLV.

Palavras-chave: Alergias alimentares. Diagnóstico clínico. Hipersensibilidade alimentar. Prevenção primária.



INTRODUCTION

Food allergy (FA) is a hypersensitivity response to a specific food antigen. It is classified into food allergies mediated by immunoglobulins E (IgE) and not mediated by IgE, based on the time elapsed from the ingestion of food to the beginning of the clinical manifestation, within or after two hours, respectively.¹

The prevalence of food allergies has increased in the past two to three decades and represents a public health problem, especially in industrialized countries. The exact prevalence of food allergies in a population is difficult to determine, ranging from 2% to 4%.² The gold standard for diagnosis is the double-blind, placebo-controlled food challenge, which poses no risk to the patient and can only be performed in specialized centers.³ This rapid increase in prevalence has led the medical team to seek the diagnosis and improve the quality of life of these children in less time.⁴

In the United States, it was reported that the number of food allergies would be aggravated by the uncertainty of diagnosis and different opinions of doctors. Although most of them reported having a good perception of allergy, more than 30% did not feel safe to make the diagnosis.⁵ Studies evaluated the knowledge and practice of doctors regarding FA in several countries and, collectively, it has been shown deficiencies in knowledge on the topic.^{6,7}

In Brazil, studies on knowledge about cow's milk protein allergy (CMPA) are scarce and separated by a time gap. The first, in 2007, showed errors in the basic concepts and a lack of knowledge of pediatricians and nutritionists.⁷ Seven years later, gaps in the knowledge of professionals about the primary prevention of FA were also observed.⁸

With the growing concern about FA and the role of the doctor in its diagnosis and treatment, estimating the knowledge and attitudes of pediatricians is fundamental.⁹ In this sense, the disagreements observed in guidelines or conduct underscore the need to develop educational strategies that expand the knowledge of these professionals, aiming to avoid the recommendation of elimination diets without effectiveness or the occurrence of nutritional deficits by diets that do not meet the nutritional needs of the infant.⁷

Inserting an educational instrument such as the use of the questionnaire, in the same way as in other countries where the knowledge deficit has already been perceived, will help to measure the current level of understanding of pediatricians and, through the results, direct investments in education in this subject. Therefore, this study aimed to analyze the knowledge of Brazilian pediatricians about CMPA through a validated questionnaire.

METHODS

This quantitative cross-sectional study applied an online questionnaire on CMPA knowledge. The sample consisted of Brazilian pediatricians registered with the Brazilian Society of Pediatrics (SBP). The sample size calculation was performed considering the 24,789 pediatricians registered at SBP in 2019, a confidence level of 95%, and a margin of error of 3%, totaling at least 1024 professionals.¹⁰ For the application of the questionnaire, those who answered no to the free and informed consent term or who accepted the term, but did not answer the questionnaire, were excluded.

An invitation letter for presentation, the validated questionnaire¹¹, and the Free and Informed Consent Form were inserted in Google Forms, a tool used for making online forms, as it allows the organized collection of responses, in addition to being easily accessible.

The link to the online form was forwarded to SBP, which forwarded it by e-mail to all members. The questionnaire was sent three times, between May 14th and June 19th, 2020, the answers were received and counted until July 2020. The automatic responses were only available to the authors of the survey.

The online form was divided into two blocks, the first comprising questions of identification of pediatricians and the second comprising the validated questionnaire, built from the Brazilian Consensus on FA (2018)¹² regarding knowledge in CMPA. The questionnaire, which consists of 10 questions, gathers in the first two questions the concept and classification of CMPA, in questions 4 and 5 requests for exams, and clinical cases addressing different symptoms were covered in questions 3, 7, 9, and 10, dietary treatment in question 6, and prevention in question 8.

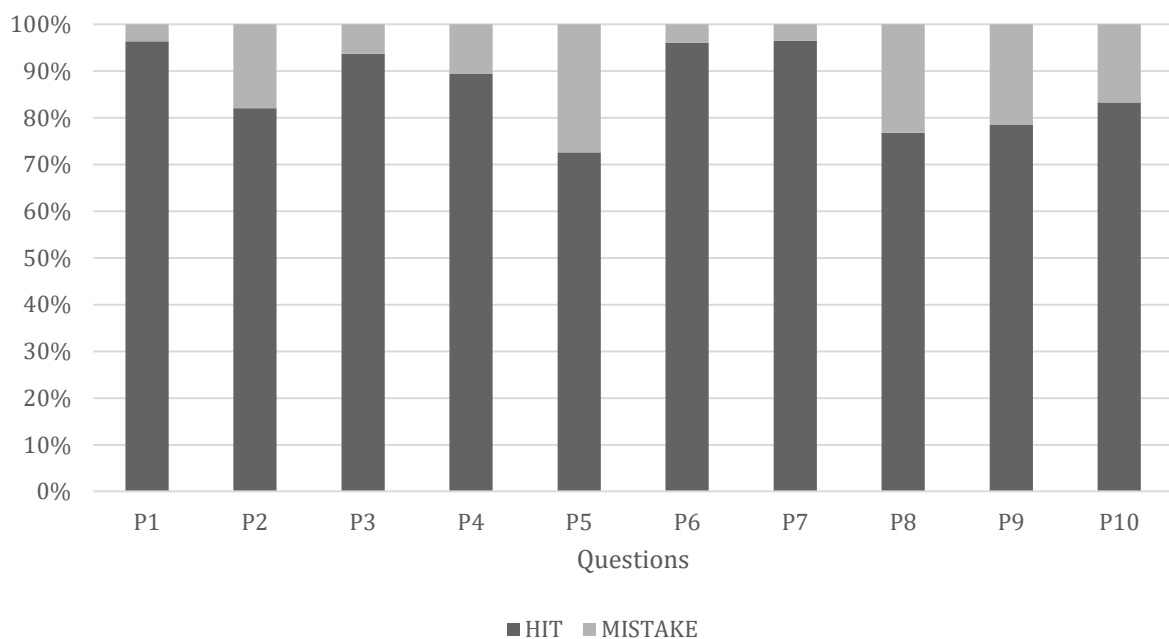
The complete questionnaire can be found in Pillon¹¹.

The general evaluation of the questionnaire showed a percentage of agreement of 91% and a Content Validity Index (CVI) of 0.95. The results of the applied questionnaires were presented in absolute and relative frequencies, mean, median, standard deviation, and percentiles. The level of significance was set at 5% ($p < 0.05$). The chi-square test was used to compare categorical variables and the t-test or ANOVA for continuous variables.

This research was approved by the Ethics and Research Committee under registration 3.628.857, in accordance with CNS Brazilian Resolution No. 466/2012 which deals with research with human beings. Participants received feedback from the questionnaire through the SBP via a response link sent by email.

RESULTS

The validated questionnaire was answered by 1316 Brazilian doctors, of whom 1017 (77.3%) were female, and the average age observed was 45.50 ± 13.20 years. When analyzing the total number of correct answers, it was noted that the average correct answer was $80.66 \pm 10.42\%$. The percentage of correct answers and errors for each question in the questionnaire are shown in Graph 1.



*P: question; %: percentage

Graph 1. Frequency of responses in the questionnaire on cow's milk protein allergy (CMPA) knowledge.

Physicians from all over Brazil participated, where 718 (54.9%) from the Southeast, 284 (21.7%) from the South, 145 (11.1%) from the Northeast, 105 (8%) from the Midwest, and 57 (4.4%) from the North of Brazil. It was found that the region with the highest number of correct answers was the South, with an average of $80.79 \pm 10.29\%$ of correct answers, followed by the Northeast with $80.77 \pm 10.52\%$, Southeast with $80.63 \pm 10.39\%$, Midwest with $80.48 \pm 1.69\%$ and North with $80.48 \pm 1.65\%$. There was no statistically significant difference between pediatricians who practice in different regions of the country except in questions 1 and 3. The association of Brazilian regions with the successes and errors of each question is shown in Table 1.

Table 1. Frequency of correct answers associated with Brazilian regions of the questionnaire on cow's milk protein allergy (CMPA) knowledge

Question /Answer	Region					p
	North	Northeast	Midwest	Southeast	South	
1						
Hit	55 (96,5)	144 (99,3)	99 (94,3)	683 (95,1)	281 (98,9)	0,009*
Mistake	2 (3,5)	1 (0,7)	6 (5,7)	35 (4,9)	3 (1,1)	
2						
Hit	44 (77,2)	115 (79,3)	86 (81,9)	597 (83,1)	233 (82)	0,691
Mistake	13 (22,8)	30 (20,7)	19 (18,1)	121 (16,9)	51 (18)	
3						
Hit	51 (89,5)	135 (93,1)	93 (88,6)	670 (93,3)	277 (97,5)	0,008*
Mistake	6 (10,5)	10 (6,9)	12 (11,4)	48 (6,7)	7 (2,5)	
4						
Hit	51 (89,5)	133 (91,7)	87 (82,9)	643 (89,6)	258 (90,8)	0,181
Mistake	6 (10,5)	12 (8,3)	18 (17,1)	75 (10,4)	75 (26,4)	
5						
Hit	37 (64,9)	110 (75,9)	79 (75,2)	517 (72)	209 (73,6)	0,541
Mistake	20 (35,1)	35 (24,1)	26 (24,8)	201 (28)	75 (26,4)	
6						
Hit	52 (91,2)	137 (94,5)	103 (98,1)	695 (96,8)	271 (95,4)	0,135
Mistake	5 (8,8)	8 (5,5)	2 (1,9)	23 (3,2)	13 (4,6)	
7						
Hit	55 (96,5)	137 (94,5)	102 (97,1)	692 (96,4)	280 (98,6)	0,219
Mistake	2 (3,5)	8 (5,5)	3 (2,9)	26 (3,6)	4 (1,4)	
8						
Hit	41 (71,9)	119 (82,1)	76 (72,4)	555 (77,3)	216 (76,1)	0,359
Mistake	16 (28,1)	26 (17,9)	29 (27,6)	163 (22,7)	68 (23,9)	
9						
Hit	49 (86)	119 (82,1)	77 (73,3)	553 (77)	230 (81)	0,158
Mistake	8 (14)	26 (17,9)	28 (26,7)	165 (23)	54 (19)	
10						
Hit	47 (82,5)	123 (84,8)	88 (83,8)	592 (82,5)	240 (84,5)	0,916
Mistake	10 (17,5)	22 (15,2)	17 (16,2)	126 (17,5)	44 (15,5)	

Data n (%); chi-squared test; *p≤0.05.

It was observed that 1238 (94.1%) of physicians had a specialist title and/or residency in pediatrics. Regarding the formation year, 462 (35.1%) answered that they had graduated between 2011-2020, 246 (18.7%) between 2001-2010, 233 (17.7%) between 1991-2000, 237 (18%) between 1981-1990, 124 (9.4 %) between 1970-1980 and before 1970 only 14 (1.1%) had completed their training. The total average of correct answers was 8.69 ± 1.406 for those who had a specialty and 8.14 ± 1.657 for those who did not ($p = 0.023$). In the year of formation, the total number of correct answers was 2011-2020: $90.57 \pm 6.0\%$, 1981-1990: $90.35 \pm 8.75\%$, 1991-2000: $90.21 \pm 10.69\%$, 2001-2010: $90.13 \pm 12.12\%$ and 1970-1980: $80.31 \pm 16.62\%$.

The frequency of correct answers per question associated with the specialty in pediatrics is shown in Table 2. Most pediatricians correctly answered questions 1, 6, and 7, which respectively represented the difference in concepts between CMPA and Lactose Intolerance, the dietary treatment in CMPA, and treatment for a clinical case of allergic colitis. Question 5

had the lowest rate of correct answers, addressing the clinical and laboratory investigation necessary to diagnose CMPA.

Table 2. Association between answered questions by doctors with specialties and/or residence in pediatrics

Question /Answer	Has specialty and/or residency		p
	Yes	No	
1			
Hit	1198 (96,8)	71 (91)	0,008*
Mistake	40 (3,2)	7 (9)	
2			
Hit	1026 (82,9)	54 (69,2)	0,002*
Mistake	212 (17,1)	24 (30,8)	
3			
Hit	1163 (93,9)	70 (89,7)	0,139
Mistake	75 (6,1)	8 (10,3)	
4			
Hit	1115 (90,1)	61 (72,2)	0,001*
Mistake	123 (9,9)	17 (21,8)	
5			
Hit	897 (72,5)	58 (74,4)	0,715
Mistake	341 (27,5)	20 (25,6)	
6			
Hit	1191 (96,2)	74 (94,9)	0,554
Mistake	47 (3,8)	4 (5,1)	
7			
Hit	1198 (96,8)	72 (92,3)	0,037*
Mistake	40 (3,2)	6 (7,7)	
8			
Hit	956 (77,2)	55 (70,5)	0,173
Mistake	282 (22,8)	23 (29,5)	
9			
Hit	971 (78,4)	64 (82,1)	0,449
Mistake	267 (21,6)	14 (17,9)	
10			
Hit	1040 (84)	56 (71,8)	0,005*
Mistake	198 (16)	22 (28,2)	

Data n (%); chi-squared test; * $p \leq 0.05$.

In addition to the specialty in pediatrics, doctors said they had performed other specializations, among which the most frequent ones, neonatology and gastroenterology stand out. It is known that among all specialties in pediatrics, gastroenterology and allergology, are the ones who study CMPA the most. The knowledge of these specialties was analyzed compared to the others (Table 3). No statistically significant differences were found in the total number of correct answers between gastroenterologists and allergists ($p = 0.784$). The combined knowledge of both specializations was analyzed in comparison with that of the other ones, revealing that those two had a higher percentage of correct answers in most questions (Table 3).

Table 3. Answers analysis given by gastroenterologists, allergologists, and other specialties

Question /Answer	Specialty		p
	Gastroenterologist an Allergologist	Others	
1			
Hit	179 (100)	526 (96)	0,006*
Mistake	-	22 (4)	
2			
Hit	172 (96,1)	432 (78,8)	<0,001*
Mistake	7 (3,9)	116 (21,2)	
3			
Hit	175 (97,8)	506 (92,3)	0,010*
Mistake	4 (2,2)	42 (7,7)	
4			
Hit	170 (95)	482 (88)	0,007*
Mistake	9 (5)	66 (12)	
5			
Hit	147 (82,1)	377 (68,8)	0,001*
Mistake	32 (17,9)	171 (31,2)	
6			
Hit	175 (97,8)	521 (95,1)	0,122
Mistake	4 (2,2)	27 (4,9)	
7			
Hit	179 (100)	524 (95,6)	0,004*
Mistake	-	24 (4,4)	
8			
Hit	156 (87,2)	403 (73,5)	<0,001*
Mistake	23 (12,8)	145 (26,5)	
9			
Hit	144 (80,4)	426 (77,7)	0,444
Mistake	35 (19,6)	122 (22,3)	
10			
Hit	161 (89,9)	440 (80,3)	0,003*
Mistake	18 (10,1)	108 (19,7)	

Data n (%); chi-squared test; *p≤0.05.

DISCUSSION

The pediatricians' knowledge of FA has been studied all over the world. In this study on the knowledge of CMPA, the physicians' mean age was around 45.5 years, most of them were females, and they had about 80% of correct answers, mainly in questions on the concept and treatment of CMPA. In Kuwait, the knowledge assessed with a self-administered questionnaire was significantly associated with the pediatrician's age, regardless of the hospital,

sex, or position. Of the 68 pediatricians who felt comfortable treating FA, only 17.6% were approved in the questionnaire.⁶ Brazilian physicians noticeably performed better, and their experience and years of experience in the profession were not associated with a higher level of knowledge. The mean percentage of correct answers among pediatricians who graduated between 1970 and 1980 was 80.31%, while among those who graduated between 2011 and 2020 was 90.57%.

The South and Northeast of Brazil were the regions with the highest numbers of correct answers, whereas the Midwest had the lowest ones. Other Brazilian studies on the knowledge of CMPS made no distinction between demographic regions.^{7,8} These results call for reflections on the performance in health in Brazilian regions, due to their inequalities. Most health regions with the poorest values of structural conditions and funds, human resources, infrastructure, and quality performance are located in the North and Northeast macroregions.¹³

Considering the differences in standards of practice regarding the types of subspecialties, gastroenterologists and allergists seem to be more in agreement in diagnosis and therapy. A point to be highlighted in this study is that the percentage of correct answers improved with the highest level of specialization, but it was not so substantial, where the average number of correct answers for doctors who have a specialty was 86% and without a specialty 81% showing that general pediatricians are prepared to attend CMPA. The questions related to dietary treatment and treatment in the case of allergic proctocolitis were those that obtained the highest number of correct answers between the groups.

However, the multidisciplinary follow-up on CMPA patients brings countless benefits, as each specialty has minimum goals to achieve. Besides gastroenterologists and allergists, such teams include nutritionists, to identify allergens and avoid nutritional deficiencies; psychologists, to follow up on the impacts on the quality of life; and nurses and primary healthcare teams, who have an essential role in providing comfort to the families, referring patients to specialists, and provide health education.²

A 2007 Brazilian study with 895 questionnaires filled out by pediatricians nationwide shows that many still used soy extract even in young children, possibly due to cost.¹⁴ In the present study, one of the questions with the greatest number of correct answers mentioned the use of soy formula in children under 6 months, which, unlike in the 2007 study, was not the option of choice for most pediatricians. These data reinforce the need to expand the knowledge of health professionals about the diagnosis and treatment of FA to ensure the use of more appropriate diagnostic and therapeutic criteria.¹⁵

In the absence of a gold-standard laboratory method to diagnose FA, clinical history is a tool of great importance. Lack of knowledge of the symptoms and their evolution has contributed to an exaggeration of diagnoses.¹³ Question 5 where 27.5% of pediatricians and 17% of gastroenterologists and immunologists were wrong about clinical and laboratory research was also described by other authors. In the USA, it was reported that the number of food allergies would be aggravated by the uncertainty of diagnosis and different opinions of doctors. In recent years there has been an increase in the number of cases. Most doctors had a good perception of FA, but more than 30% did not feel safe to generate a diagnosis.⁵

A study carried out in Qatar revealed a considerable lack of knowledge in the diagnosis of FA and the management of anaphylactic reactions in children among pediatric residents probably due to the absence of rotation in the immunology internship at the medical residency.¹⁶ A recent study carried out in India reports that formulas were unnecessarily used to prevent allergies and erroneously used to treat or control symptoms in infants misdiagnosed with CMPA. The authors described that the difficulties include the professionals' understanding of the disease, the limited health resources, and the corporate strategy of the formula industry.¹⁷

Selected countries in the Middle East and North Africa (MENA) do not follow the current recommendations for primary prevention of allergic diseases through nutritional interventions.¹⁸ Prevention knowledge was already assessed in general in Brazil in 2013 which revealed gaps in behaviors of medical professionals and nutritionists.⁹ In this study, 87% of correct answers were observed in question 8 related to the prevention of FA among specialists and 77% among pediatricians, showing a favorable result for prevention practices. Understanding how many children are affected by food allergies and which are most at risk of developing them can provide signals about genetic and environmental factors that cause food allergies and, therefore, what preventive measures can be applied to reduce their increase.¹⁹

In a group of Turkish pediatricians and sub-specialists, who answered a questionnaire on CMPA, there is a high level of knowledge, but they differ between them concerning breastfeeding with a maternal diet free of cow's milk protein or amino acid formula when necessary, as it was the most chosen treatment among pediatricians, but among gastro-pediatricians, it was extensively hydrolyzed formula.²⁰ In terms of compatibility in therapeutic indications, Brazilian doctors were more cohesive in recommending amino acid formula for those over one year of age and for anaphylactic reaction, and extensively hydrolyzed formula in infants 4 months of age without severe reaction. Brazilian recommendations comply with FA guidelines – i.e., they suggest that the alternative to breastmilk is extensively hydrolyzed hypoallergenic cow's milk formula or amino acid-based formula if it is better tolerated, whereas

partially hydrolyzed cow's milk formula, other mammals' milk, and soy-based formula are contraindicated.²

The validated questionnaire, used in the present study, contains questions based on clinical cases, making it difficult to answer directly in an online search. However, the online method makes it possible to consult materials on FA. In this sense, a limitation of the study may be related to this bias, since there was a high percentage of correct answers in the questionnaire. It must be also considered that physicians with little knowledge may not have been willing to answer the questionnaire and self-analyze their knowledge.

Even though the best evidence-based guidelines are available, they do not necessarily lead to better health outcomes. Therefore, there is an interest in knowledge assessment. There are several barriers between guidelines and health outcomes. It is necessary to raise awareness of adherence to consensus and guidelines.²¹ Vieira et al.²² showed that the rates of adherence by Brazilian pediatricians to the FA treatment guidelines were low. In total, 33.7% of respondents reported having read the old Brazilian Consensus on FA of 2007 and 19.3% knew some international guidelines for FA. This is the first study to provide a comprehensive review of perceptions about FA among physicians after the release of the Brazilian Consensus on FA 2018¹², across the country with a questionnaire validated by specialists who make up the Brazilian Society of Pediatrics.

This information highlights the importance of developing questionnaires to assess knowledge, enabling recommendations based on actual results, and furnishing scientific data for decision-making. These results and future CMPA guidelines may ensure interventions that bring greater benefit and less likelihood of health damage, favoring the efficient allocation of public resources.

CONCLUSION

The results allowed us to conclude that the great majority of physicians who answered the questionnaire demonstrated an understanding of the concept and the main therapeutic recommendations of CMPA. The disagreements observed underscore the need to develop continuing educational strategies that expand the knowledge of part of these professionals to avoid unfavorable outcomes for patients.

REFERENCES

1. Boyce JA, Assa'ad A, Burks AW, Jones SM, Sampson HA, Wood RA, et al. NIAID-sponsored Expert Panel. Guidelines for the diagnosis and management of food allergy in the United States: summary of the NIAID-Sponsored Expert Panel Report. *Nutr Res.* 2011;27(2):253-67. <http://dx.doi.org/10.1016/j.nutres.2011.01.001>
2. Muraro A, de Silva D, Halken S, et al. Managing food allergy: GA²LEN guideline 2022. *World Allergy Organ J.* 2022;15(9):100687. Published 2022 Sep 7. doi:10.1016/j.waojou.2022.10068
3. Renz H, Allen KJ, Sicherer SH, Sampson HA, Lack G, Beyer K, et al. Food allergy. *Nat Rev Dis Primers.* 2018;4(1):1-20. <http://dx.doi.org/10.1038/nrdp.2017.98>
4. Danchin M, De Bono N, Allen K, Tang M, Hiscock H. Managing simple food allergy in community settings: a pilot study investigating a new model of care. *J Paediatr Child Health.* 2016;52(3):315-20. <http://dx.doi.org/10.1111/jpc.13026>
5. Gupta RS, Kim JS, Springston EE, Pongracic JA, Wang X, Holl J. Development of the Chicago Food Allergy Research Surveys: assessing knowledge, attitudes, and beliefs of parents, physicians, and the general public. *BMC Health Serv Res.* 2009;9:142. <https://doi.org/10.1186/1472-6963-9-142>
6. Al-Herz W, Husain K, Al-Khabaz A, Moussa MAA, Al-Refaee F. Awareness of food allergies: a survey of pediatricians in Kuwait. *BMC Pediatr.* 2017;17(1):11. <https://doi.org/10.1186/s12887-016-0773-9>
7. Cortez APB, Medeiros LCS, Speridião PGL, Mattar RHGM, Fagundes Neto U, Morais MB. Conhecimento de pediatras e nutricionistas sobre o tratamento da alergia ao leite de vaca no lactente. *Rev Paul Pediatr.* 2007;25(2):106-13. <https://doi.org/10.1590/S0103-05822007000200002>
8. Ribeiro CC, Speridião PGL, Morais MB. Knowledge and practice of physicians and nutritionists regarding the prevention of food allergy. *Clin Nutr.* 2013;32(4):624-9. <https://doi.org/10.1016/j.clnu.2012.10.014>
9. Gupta RS, Lau CH, Dyer AA, Sohn M-W, Altshuler BA, Kaye BA, et al. Food allergy diagnosis and management practices among pediatricians. *Clin Pediatr.* 2014;53(6):524-30. <http://dx.doi.org/10.1177/0009922813518425>
10. Hulley SB; Cumming SR; Browner WS; Grady DG; Hearst NB; Newman TB. *Delineando a pesquisa clínica: uma abordagem epidemiológica.* Porto Alegre; Artmed; 3 ed; 2008. 384 p.
11. Pillon CG. Validação de questionário para identificar o conhecimento de pediatras sobre alergia à proteína do leite de vaca [dissertation]. Santa Maria, RS: Universidade Franciscana; 2020.

12. Solé D, Silva LR, Cocco RR, Ferreira CT, Sarni RO, Oliveira LC, et al. Consenso Brasileiro sobre Alergia Alimentar: 2018. Documento conjunto elaborado pela Sociedade Brasileira de Pediatria e Associação Brasileira de Alergia e Imunologia. *Arq Asma Alerg Imunol.* 2018;2(1):7-82. <https://doi.org/10.5935/2526-5393.20180004>
13. Paschoalotto MAC, Passador JL, Passador CS, Endo GY. Regionalização da saúde no Brasil: desigualdades socioeconômicas e na performance em saúde. *Gestão & Regionalidade.* 2022; 38(113):313-327. doi.org/10.13037/gr.vol38n113.7017
14. Solé D, Jacob CMA, Pastorino AC, Porto Neto A, Burns DA, Sarinho ESC, et al. O conhecimento de pediatras sobre alergia alimentar: estudo piloto. *Rev Paul Pediatr.* 2007;25(4):311-6. <http://dx.doi.org/10.1590/S0103-05822007000400003>
15. Faria DPB, Cortez APB, Speridião PGL, Moraes MB. Conhecimento e prática de pediatras e nutricionistas no tratamento da alergia às proteínas do leite de vaca em lactentes. *Rev Nutr.* 2018;31(6):535-46. <http://dx.doi.org/10.1590/1678-98652018000600003>
16. Adeli M, Hendaus MA, Abdurrahim LI, Alhammadi AH. The importance of educating postgraduate pediatric physicians about food allergy. *Adv Med Educ Pract.* 2016;7:597-602. <http://dx.doi.org/10.2147/AMEP.S112182>
17. Allen H, Gupta A, Mundell A, et al. Formula milk companies and allergy healthcare professionals in India. *Clin Exp Allergy.* 2023;53(7):697-710. doi:10.1111/cea.14355
18. Vandenplas Y, AlFrayh AS, AlMutairi B, Elhalik MS, Green RJ, Haddad J, et al. Physician practice in food allergy prevention in the Middle East and North Africa. *BMC Pediatr.* 2017;17(1):118. <http://dx.doi.org/10.1186/s12887-017-0871-3>
19. Barni S, Licciolo G, Sarti L, Giovannini M, Novembre E, Mori F. Immunoglobulin E (IgE)-Mediated Food Allergy in Children: Epidemiology, Pathogenesis, Diagnosis, Prevention, and Management. *Medicina (Kaunas).* 2020;56(3):111. <http://dx.doi.org/10.3390/medicina56030111>
20. Yüce A, Dalgiç B, Çullu-Çokuğraş F, Çokuğraş H, Kansu A, Alptekin-Sarioğlu A, et al. Cow's milk protein allergy awareness and practice among Turkish pediatricians: A questionnaire-survey. *Turk J Pediatr.* 2017;59(3):233-43. <http://dx.doi.org/10.24953/turkj-ped.2017.03.002>
21. Glasziou P, Haynes B. Os caminhos da pesquisa para melhores resultados de saúde. *BMJ Evid Based Med.* 2005;10(1):4-7.
22. Vieira SCF, Santos VS, Franco JM, Nascimento-Filho HM, Barbosa KOSS, Lyra-Junior DP, et al. Brazilian pediatricians' adherence to food allergy guidelines - A cross-sectional study. *PLoS ONE.* 2020;15(2):e0229356. <https://doi.org/10.1371/journal.pone.0229356>