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SUPPLEMENTARY ARTICLE

Perspective of Soy Formula and Fiber Intake among Non-Cow's Milk Drinker Pediatric Patients: A Survey among Indonesian Health Care Practitioners

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Abstract

Indonesia is one of the highest countries for soy-based product consumption, which the usage also started from early age as breastmilk substitute product, although local regulation and guideline stated that soy-based formula recommended for cow's milk protein allergy. However, evidences showed that soy-based formula supplemented with fiber in non-cow's milk drinker could also have health effect to gastrointestinal system. This online survey aimed to explore the perspective of health care practitioners (HCPs) in recommending soy-based formula for non-cow's milk drinker pediatric patients, as well as identify the required additional ingredient or supplementation, specifically on fiber, in soy-based formula. Majority of respondents (97% of pediatricians ($p<0.001$)), (96% of nurses ($p=0.003$)), (99% of midwives ($p<0.001$)) recommended soy-based formula as nutritional product toward non-cow's milk drinker patients. On the added ingredients required, 43% of respondents mentioned that AA and DHA and 31% mentioned that fibre is the ingredient that need to be added to complete the benefits of soy formula. This study concluded that the overall perspective of HCPs showed that soy-based formula is a nutritional product recommended for non-cow's milk pediatric patients. However, fiber is required to be added to achieve the potential benefits of soy-based formula.

Keywords soy based formula, fiber, children, pediatric patients

Introduction

As one of the highest countries for soy-based product consumption in Asia, Indonesian people has used this food as nutritional source since early age. This includes the use of soy-based formula as the breastmilk substitute product.[1]

Despite the widely used of soy-based formula, Indonesia Pediatric Association (IDAI) specifically recommend this only for infants with Cow's Milk Protein Allergy (CMPA) as well as for several other related medical indications such as post diarrhea lactose intolerance, galactosemia and primary lactase deficiency. Based on the policy and regulation on Indonesia Food and Drugs Association (BPOM) as well as IDAI Guidelines, the management of CMPA consists of diagnosis and

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treatment in children with CMPA. Specifically, for the treatment, the algorithm suggests to eliminates allergen mainly cow's milk protein. For breastfed infant, the infants were suggested to continue breastfeed exclusively and recommended the mother to avoid the consumption of all cow's milk protein and its derivatives. Soy based infant's formula may be consider for availability and affordability concern.[2,3]

Evidences showed that supplementing dietary fiber in children may improve overall diet quality.[4] Dietary fiber intake beneficial in term of physiological effects including reducing postprandial glucose concentrations, improving fecal bulk, promoting laxation, interfering with fat and cholesterol absorption, and altering bacteria populations in the gut microbiome.[5-7] In the gastrointestinal system, soy fiber has been shown to reduce the duration of watery stools during acute diarrhea caused by bacterial and viral pathogens in underdeveloped countries. A study done in middle-class American children showed the efficacy of soy fiber supplemented infant formula, including stool characteristics and weight.[8]

In regards to the fiber content, among plant protein source form legumes, soybeans known as the second lowest fiber source after peanuts (9.3 g/100g versus 8.5 g/100g, respectively) as compared to the highest content found in green peas (25.5 g/100g).[9] However, soybean dietary fiber have a role in antioxidant scavenging activity in plant tissues and maybe also for human.[10]

On the HCPs recommendation pattern toward nutritional product, studies among pediatrician showed that in order for them to utilize probiotic use correctly, it is important to keep updated about new knowledge through various sources and methods, eq. continuous medical education (CME), lectures, workshops, case-based learning, clinical experiences, preceptorships, and even direct information via interaction with representatives from nutrition companies.[11,12] A review showed that education have little impact and knowledge increase observed with multiple learning methods.[13]

This survey aimed to explore the perspective of health care practitioners (HCPs) in recommending soy-based formula for non-cow's milk drinker pediatric patients, as well as identify the required additional ingredient or supplementation, specifically on fiber, in soy-based formula.

Method

An online survey was conducted to 350 Health Care Practitioners (HCPs) in January 2020 for the period of three weeks. The survey was hosted on the Google-form survey platform and distributed through email to all respondents. Several reminders were sent via phone call, email, WhatsApp and text messages, once in every week. Respondents taken from Danone HN HCPs internal database and participants who expressed an interest showed in electronic informed consent in the preview of the survey. The questionnaire adapted from the previous cross-sectional study,[14] and developed in the format of multiple choices, True/False, and Yes/No. At the end of the study, participants were provided with debriefing information and contact details of the research team. A chi-square test was used to analyze cross-tabulated data for bivariate analysis and linear regression model for multivariate analysis, using SPSS version 20, with all outcome variables taken at the 5% significance level ($p<0.05$).

Result

The survey sent to 350 respondents with 277 respondents responded by the end of the survey, which was resulted to 79% response rate. Majority of respondents participated in this survey were pediatricians (n=147), followed by nurses (n=68), and midwives (n=62). As shown in Table 1, most of the pediatricians were consider senior in term of age and length of service, while the average age and length of service of midwives and nurses mostly less than 41 years old and less than 15 years of service, respectively. In term of institution where the respondents work, majority of midwives were affiliated with private hospital and/or private clinics, while the proportions of affiliations among pediatricians and nurses were slightly balanced between private hospital and government hospital. 100% of the respondents confirmed that they were ever consulted with non-cow's milk drinkers' patients in the last month.

Table 1. Demographic characteristic of respondents

Variables	Pediatricians n = 147		Nurses n = 68		Midwives n = 62	
	n	%	n	%	n	%
Age						
<41	46	33	51	37	41	30
≥ 41	101	73	17	12	21	15
Length of Service						
<15 years	34	23	15	23	12	19
≥15 years	113	77	53	77	50	81
Affiliation						
Private hospital	79	54	40	54	50	81
Government hospital	68	46	28	46	12	19
Area						
West	116	79	56	79	48	77
East	31	21	12	21	14	23
Ever Consulted with Non-Cow's Milk Drinkers Pediatric Patients						
Yes	147	100	68	100	62	100
No	0	0	0	0	0	0

Based on respondent' reports during consultation, the reason of why their patients did not drink cow's milk was related to cow's milk protein allergy (59%) and followed by diarrhea (31%). As shown in Figure 1, there were few non-specific medical reasons also mentioned, as well as constipation. When the respondents being asked about the nutritional products recommended for patients whose non-cow's milk drinker, as shown in Figure 2, soy formula was recommended by majority of respondents (61%).

We further analysed the recommendation level on soy formula based on the HCP's characteristic profile. Table 2 shows that 97% of pediatricians ($p < 0.001$), 96% of nurses ($p=0.003$), and 99% of midwives ($p<0.001$) mentioned that soy formula is a recommended nutritional product toward non-cow's milk drinker patients, and the result showed statistically significant across HCP's profile.

This survey also explores the perspective of respondent toward specific ingredients that need to

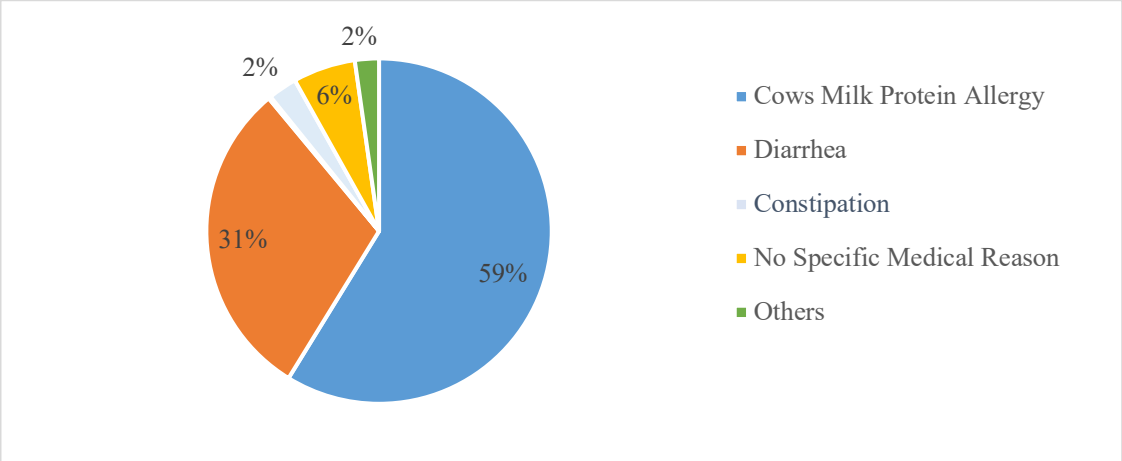

Figure 1. Reason to not consume cow's milk reported from patients during consultation

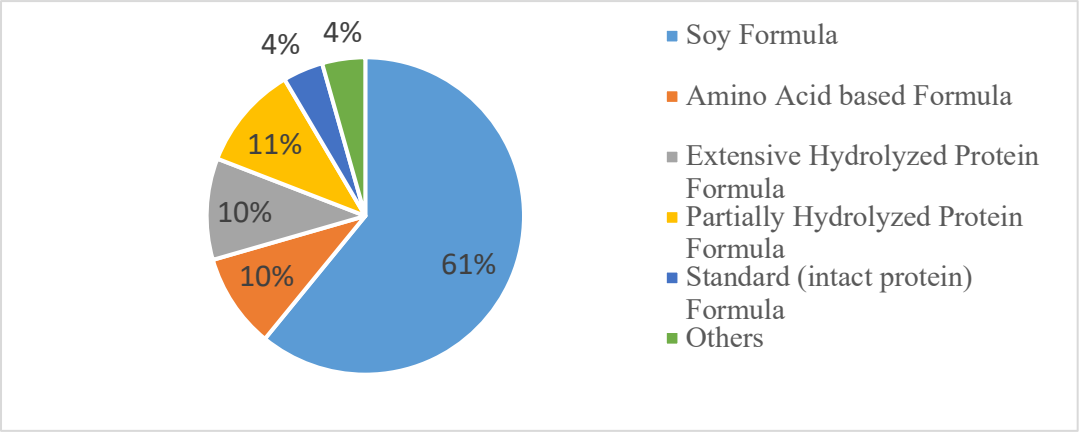

Figure 2. Nutritional products recommended by HCP for non-cow's milk drinkers

Table 2. Cross tabulation of recommendation level of soy formula

Variables	Pediatricians n = 147		p	Nurses n = 68		p	Midwives n = 62		p
	n	%		n	%		n	%	
Soy is a recommended product for non-cow's milk drinker	139	95	<0,001	65	96	0,003	61	99	<0,001
Soy is not a recommended product for non-cow's milk drinker	8	5		3	4		1	1	

be added in the soy formula. Figure 3 showed that 43% of respondents mentioned that AA and DHA need to be added and 31% also mentioned that fibre is the ingredient that need to be added to complete the benefits of soy formula. The respondents were also further asked their perspective toward adequacy level of fibre among non-cow's milk drinker patients, and as shown in Table 3, 31% of pediatricians mentioned that the fibre intake among non-cow's milk drinker patients were inadequate to very inadequate, similar with the perspective of nurses (22%) and midwives (24%), although the result was not statistically significant.

Even though the multivariate analysis in Table 4 showed no statistically significant among demographic characteristic of respondents, however among the midwives and nurses the result showed majority of the respondents (79% of midwives and 56% of nurses) who work in private hospital/clinics recommending soy formula for non-cow's milk drinker compare to those who work in government hospital, and the number showed clinically important.

Discussion

This survey reported that the overall perspective of health care practitioners (HCPs) was in favor with soy formula recommendation to non-cow's milk drinker pediatric patients. This finding is consistent with previous studies and recommendations available in Indonesia as well as global recommendations.[2,15,16] Studies mentioned that the recommendation of soy-based formula in non-cow's milk drinker pediatric patients is higher than regular or standard formula. It is also because the local pediatric association regulates the use of soy formula under certain medical conditions,[2] mainly for cow's milk protein allergy (CMPA) diagnosed patient. Knowing that the symptoms and complaints of CMPA patients could also differ, including gastro intestinal symptoms such as diarrhea and constipation, the findings from this survey that showing the reasons of patients consuming soy formula when they consulted to HCPs also validated.[17] The other study also stated that the most

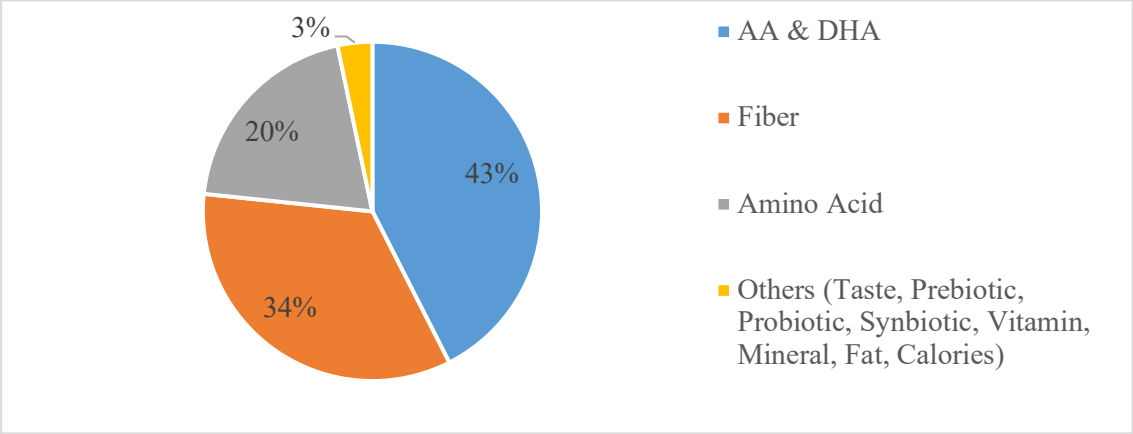

Figure 3. Perspective on specific ingredients that should be added in soy milk

Table 3. Perspective on fibre adequacy in children who couldn't drink cow's milk among healthcare professionals and its relationship

Variables	Pediatricians n = 147		p	Nurses n = 68		p	Midwives n = 62		p
	n	%		n	%		n	%	
Very inadequate	3	2	0.46	2	3	0.68	1	2	0.61
Inadequate	42	29		13	19		14	22	
Adequate	102	69		53	77		47	76	

Table 4. Multivariate analysis of HCP's recommendation level toward soy formula for non-cow's milk drinker based on demographic characteristic

Variables	Pediatricians n=147				p	Nurses n=68				p	Midwifes n=62				P
	Recommend		Do Not Recommend			Recommend		Do Not Recommended			Recommend		Do Not Recommend		
	n	%	n	%		n	%	n	%		n	%	n	%	
Age					1.00					0.56					
<41	44	30	2	1		48	71	3	4		40	65	1	1	1.00
≥ 41	95	65	6	4		17	25	0	0		21	34	0	0	
Length of Service					0.71					1.00					1.00
<15 years	97	66	5	3		44	65	0	0		45	74	1	1	
≥15 years	42	29	3	2		21	31	3	4		16	25	0	0	
Affiliation					0.72					0.54					1.00
Private	74	50	5	3		38	56	1	1		49	79	1	1	
Government	65	45	3	2		27	40	2	3		12	20	0	0	
Area					0.67					0.23					1.00
West	110	75	6	4		53	78	0	0		48	77	0	0	
East	29	20	2	1		12	18	3	4		13	22	1	1	

common reason of recommending soy-based formula by HCPs is to relief of perceived formula intolerance (spitting, vomiting, fussiness) or symptoms of colic since this can be a symptom of CMPA. Other findings of this study also showed that partial hydrolysed formula is not the first choice of HCPs for non-cow's milk drinker patients. This might be positively correlates with the previous

studies and review mentioned that partially hydrolysed formula is more recommended for prevention of CMPA and the benefits of partial hydrolysed formula to gastrointestinal manifestations will be more positive when added with prebiotic, probiotic, palmitic acid, including human milk oligosaccharide.[18]

The recommendation level of soy-based formula across HCPs reported from this study also showed interesting facts. Despite the result showed statistically not significant, however there is higher percentage of HCPs working in government hospitals recommending soy-based formula compare to their colleagues who works in private hospital or clinics. Study in China showed that there is a situation where doctors working in county hospital have more supportive attitude to national essential medicine policy, as they were more accessible to education, training on rational drug use, and better acquisition of medicine knowledge.[19] The assumption of this hypothesis also applied to finding of this study, since the local regulation and recommendation of soy-based formula were established here in Indonesia. Previous study on prescription pattern in Indonesia also confirms this finding.[14] Similar findings have also been seen in the variable of length of service across HCPs. This study showed that despite the statistically not significant result, the HCPs with length of service less than 15 years were more open to recommending soy-based formula.

Other findings from this study is the perspective of HCPs toward fiber intake and ingredient-wise perspective in soy-based formula. Apart of AA and DHA, high number of respondents mentioned that fiber should be added into the soy-based formula to achieve ultimate benefits. Even though majority of respondents also mentioned that fiber intake among non-cow's milk drinker children is adequate, but more than 30% of pediatricians and more than 20% of nurses and midwives still acknowledging that there is still a potential inadequacy of fiber intake among their non-cow's milk drinker patient. Study showed that fiber content of soybeans as the source isolated soy-based formula consider low, even second lowest after peanuts.[9] Study suggested that fiber supplementation especially in the form of oligosaccharide (FOS) and inulin demonstrated positive tolerance in children,[20] and also showed beneficial effect in gastrointestinal health.[21,22] The use of fiber-supplemented soy formula may reduce the duration of diarrheal symptoms in U. S. infants more than 6 months of age with acute diarrhea.[8] Therefore the perspective of respondents of this study toward additional fiber as potential ingredient in soy-based formula is evidence based and consistent with studies and review available.

This survey has major limitation as it is designed as an online survey whereas the subjectivity of respondents potentially interferes the objective of the reports as well as the challenges to identify the factors influencing respondents to recommends the nutritional products.

Conclusion

Overall perspective of HCPs showed that soy-based formula is a nutritional product recommended for non-cow's milk pediatric patients. However, fiber is required to be added to achieve the potential benefits of soy-based formula.

Conflict of Interest

This survey is funded by Danone SN Indonesia.

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