

Available online at www.sciencedirect.com

SciVerse ScienceDirect

www.nrjournal.com

Association of age and family history with supplement use in pediatric patients with allergy

Masaru Kubota^{a,*}, Nagisa Mori^a, Shoko Hamada^a, Ayako Nagai^a, Shiro Seto^b,
Yutaka Suehiro^c, Takashi Kusunoki^d, Yoshihiro Wakazono^e, Takahiro Kiyomasu^f

^a Department of Human Life and Environment, Nara Women's University, Kita-uoya-nishimachi, Nara 630-8506, Japan

^b Department of Pediatrics, Kishiwada City Hospital, Osaka 596-8501, Japan

^c Department of Pediatrics, Osaka Saiseikai Nakatsu Hospital, Osaka 530-0012, Japan

^d Department of Allergy, Shiga Medical Center for Children, Shiga 524-0022, Japan

^e Department of Pediatrics, Kyoto Katsura Hospital, Kyoto 615-8256, Japan

^f Department of Pediatrics, Yamato Takada Municipal Hospital, Nara 635-8501, Japan

ARTICLE INFO

Article history:

Received 8 June 2011

Revised 25 September 2012

Accepted 28 September 2012

Keywords:

Allergy

Child

Cross-sectional study

Epidemiology

Supplement use

ABSTRACT

This study was conducted to determine the frequency and characteristics of supplement use in pediatric patients with allergic disorders in Japan. A total of 229 patients with various allergic disorders aged between 0 and 15 years were enrolled. Supplements were defined as preparations that provided nutritional content in the form of a tablet, capsule, powder, liquid, or jelly. The parents of each subject were asked to complete a questionnaire on their child's use of supplements over the previous year. Demographic information, parents' perceived view of the child's health status over the previous month, and family history of both allergic disorders, and supplement use were collected. Four hundred eight age- and sex-matched healthy children served as the controls. Twenty-nine (12.7%) patients had used supplements. This frequency was not significantly different from that in the control group (15.0%). The types of supplements most commonly used were vitamins, followed by minerals, probiotics, and chlorella. Univariate analysis revealed that older age and a positive family history of supplement use were associated with patients' supplement use. The types of allergic disorders, health status from the point of view of the parents, and a family history of allergic disorders did not show any significant association. To our knowledge, this is the first cross-sectional study to demonstrate the frequency and the factors affecting supplement use in pediatric patients with allergic disorders.

© 2012 Elsevier Inc. All rights reserved.

1. Introduction

In recent years, the use of complementary and alternative medicines by children and adolescents has increased [1,2]. Kemper et al [2] reported that approximately 20% to 40% of healthy children seen in outpatient pediatric clinics and more than 50% of children with chronic diseases including allergic disorders [3,4] use complementary and alternative medicines.

Among healthy children and adolescents, the frequency of supplementation is reported to be as high as 30% to 50% in the United States [5,6] and European countries [7,8], whereas in Japan, the frequency was found to range from 15% to 20% [9,10]. In a study conducted by Ball et al [11], 62% of the 505 chronically ill children and adolescents used dietary supplements, and other previous studies also demonstrated use of probiotics in patients with allergic disorders [12,13]. However,

* Corresponding author. Tel.: +81 742 20 3453; fax: +81 742 20 3560.

E-mail address: masaru_kubota@chime.ocn.ne.jp (M. Kubota).

although the above studies provide data regarding supplement use of children and adolescents, comparisons regarding the frequency and characteristics of supplement use in patients with allergic disorders and healthy children are still quite limited. To address this deficiency in the available data, we hypothesized that young Japanese patients with allergic disorders use more supplements and have different overall backgrounds of supplement use in comparison with healthy children. Based on this hypothesis and the results of the present study, evidence suggests that caregivers and parents of pediatric patients with allergies should consider supplements for nutrition support.

2. Methods and materials

2.1. Study design and subjects

This study was performed from April to June 2010 at 5 different hospitals in the outpatient allergy clinics for children. Parents and guardians of the patients were asked to complete a questionnaire during the clinical visit. Allergic disorders included food allergy, bronchial asthma, atopic dermatitis, and allergic rhinitis/conjunctivitis (allergic rhinitis and conjunctivitis were classified as one category). Initially, 330 questionnaires were distributed to the parents who agreed to participate in the present study, and completed questionnaires were collected from 255 parents. Questionnaires were excluded for any of the following reasons: (i) the patient had a chronic disorder other than an allergic disorder, (ii) 1 or more items in the questionnaire were unanswered, and/or (iii) the reported supplements did not meet the definition of the present study (ie, over-the-counter medicines). A total of 229 patients between the ages of 0 and 15 years were available for the analysis (final recovery rate, 69.4%). Before the start of the study, informed consent allowing inclusion of the children's data was obtained from all parents/guardians. As a control group, we recruited healthy children aged 4 to 15 years from our previous study [10]. Because our previous study did not contain children younger than 4 years, 60 children from 0 to 3 years of age were newly enrolled to establish an age- and sex-matched control group. This project was approved by the ethical and epidemiologic committee at Nara Women's University.

2.2. Questionnaire

The questionnaire included inquiries regarding subject's use of any type of supplement during the previous year, types of supplements that were used, and family history of supplement use. Demographic features, diagnoses of allergic disorders, and perceived health status of the child over the previous month (good, moderate, or poor) were attained. The questionnaire defined "supplements" as any preparation that provided nutritional content in the form of a tablet, capsule, powder, liquid, or jelly.

2.3. Statistical analyses

Differences in demographic characteristics or supplement use between the patient and control groups were tested using the

χ^2 test. Univariate analysis for the association of supplement use in the patient and control group with various variables was also done using the χ^2 test. A statistical analysis was performed using "StatMate III" (ATMS, Tokyo, Japan). *P* values less than .05 were considered significant.

3. Results

3.1. Comparison of demographic and supplement use characteristics among the patient and control group

The sex, age, present health status, and family history of supplement use were almost identical between the patient and control groups (Table 1). A total of 29 patients (12.7%) with allergic disorders had taken a supplement in the past year, whereas in the healthy control children, the frequency of supplement use was 15.0%. However, the difference between the groups was not statistically significant. Univariate analysis demonstrated that the frequency of supplement use was slightly greater in the older subjects of the patient group and also slightly greater in the subjects with a positive family history of supplement use. Both trends were also observed in the control group. However, sex, type of allergic disorder, health status, and family history of allergic disorders were not significantly associated with supplement use in the patient group.

3.2. Types of supplements used

Table 2 shows the types of supplements used by patients with allergy. When multiple answers were allowed, the most frequently used supplements were vitamins (multivitamins, vitamin B, and vitamin C), followed by minerals (iron, calcium, and zinc). Conversely, in the control group, minerals were the most frequently used supplement, followed by vitamins. Probiotics and chlorella were also frequently used supplements in the patients with allergic disorders, but these supplements were not widely consumed in the control group.

4. Discussion

Dietary supplements, initially developed to compensate for shortages of specific nutrients, are now widely used in chronically ill pediatric patients [11]. Although their benefits are not fully defined, supplements are expected to have a beneficial effect on various functions in the body and bring improve overall health and well-being [14]. However, the effectiveness and safety of supplement use still need to be clarified because of the lack of a large cohort study on the issue.

According to the present study, as well as in previous studies, vitamins/minerals and probiotics were the 2 major categories of supplements commonly used in patients with allergic disorders [12,13,15]. Notably, vitamins and minerals are 2 representative supplements used in healthy children [5–10]. Marmsjö et al [15] demonstrated that initiating multivitamin use before or at 4 years of age decreased the risk of sensitization to food allergens; however, another study reported that multivitamin supplementation in early infants actually augments the risk for food allergy and asthma [16]. Therefore, the role of vitamin

Table 1 – Association of supplement use in allergy patients and control subjects

	Patients				Control subjects			
	No. of patients	Supplement use	No supplement use	P ^a	No. of controls	Supplement use	No supplement use	P
Total number ^b	229	29 (12.7)	200 (87.3)		408	61 (15.0)	347 (85.0)	
Sex				.37				.065
Male	149	21 (14.1)	128 (85.9)		251	44 (17.5)	207 (82.5)	
Female	80	8 (10.0)	72 (90.0)		157	17 (10.8)	140 (89.2)	
Age (y)				<.05				<.001
0-3	55	5 (9.1)	50 (90.9)		60	7 (11.7)	53 (88.3)	
4-6	76	4 (5.3)	72 (94.7)		152	11 (7.2)	141 (92.8)	
7-9	44	8 (18.2)	36 (81.8)		88	15 (17.0)	73 (83.0)	
10-12	39	8 (20.5)	31 (79.5)		78	18 (23.1)	60 (76.9)	
≥13	15	4 (26.7)	11 (73.3)		30	10 (33.3)	20 (66.7)	
Present health status				.55				.88
Good	148	17 (11.5)	131 (88.5)		296	43 (14.5)	253 (85.5)	
Moderate	67	9 (13.4)	58 (86.6)		96	15 (15.6)	81 (84.4)	
Poor	14	3 (21.4)	11 (78.6)		16	3 (18.8)	13 (81.2)	
Family history of supplement use				<.001				<.001
Yes	89	23 (25.8)	66 (74.2)		183	40 (21.9)	143 (78.1)	
No	140	6 (4.3)	134 (95.7)		225	21 (9.3)	204 (90.7)	
Allergic disorders								
Food allergy				.19				
Yes	151	16 (10.6)	135 (89.4)					
No	78	13 (16.7)	65 (83.3)					
Bronchial asthma				.41				
Yes	95	10 (10.5)	85 (89.5)					
No	134	19 (14.2)	115 (85.8)					
Atopic dermatitis				.21				
Yes	109	17 (15.6)	92 (84.4)					
No	120	12 (10.0)	108 (90.0)					
Allergic rhinitis/conjunctivitis				.43				
Yes	43	7 (16.3)	36 (83.7)					
No	186	22 (11.8)	164 (88.2)					
Family history of allergic diseases				.27				
Yes	167	25 (15.0)	142 (85.0)					
No	55	5 (9.1)	50 (90.9)					

Values are numbers within each parameter followed by percentages in parentheses. Comparison performed by χ^2 test between the patients and the control subjects (see “Statistical analyses” section).

^a χ^2 Test.

^b Number in parentheses indicates percentage.

supplements in patients with allergic disorders will require further investigation.

In randomized control trials, probiotics have been shown to have a beneficial effect in adult patients with allergic rhinitis [17]. In children, the efficacy of probiotics has been documented in patients with eczema or atopic dermatitis [12,13]. However, currently, the number of clinical trials in pediatric patients with allergic disorders has not been sufficient to recommend probiotics as a standard treatment [18].

Our present study demonstrated that the frequency of supplement use in allergic patients was not statistically different from that in the control group. This result was unexpected because we initially thought that allergic children used supplements more frequently than healthy children did. This result may be partly due to the difference in the age distribution between the 2 groups. Although the age between

the patient and control group was matched statistically, the control group still contained more subjects at higher ages who tended to use supplements more frequently [9,10]. In addition, parents of allergic children were thought to be more fearful regarding the adverse effects of supplements. Timbo et al [19] reported that 4% of the supplement users in their study experienced adverse effects, but only 1 patient had a rash after taking probiotics. In our present study, univariate analysis indicated that older age and a positive family history were associated with higher supplement use. This was consistent with previous reports involving healthy populations, including ours [5–10]. No specific types of allergic disorder were associated with the frequency of supplement use. Use of chlorella as a supplement is thought to be unique to Japan. The widespread use of this supplement may be attributable to the influence of the Japanese mass media because this

Table 2 – Types of supplements used as reported by the parents or caregivers of the patients and control subjects

	Patient	Control
Total number ^a	42	145
Types of supplements		
Vitamin ^b	14 (33.3) ^d	42 (29.0)
Minerals ^c	6 (14.3)	54 (37.2)
Probiotics	4 (9.5)	2 (1.4)
Chlorella	3 (7.1)	0 (0)
Blueberry	2 (4.8)	23 (15.9)
Amino acids	2 (4.8)	11 (7.6)
Docosahexaenoic acid	1 (2.4)	6 (4.1)
Propolis	1 (2.4)	5 (3.4)
Garlic	0 (0)	4 (2.8)

^a Multiple answers were allowed.

^b Vitamins included multivitamins, vitamin A, vitamin D, and ascorbic acid.

^c Minerals included multiminerals, calcium, iron, and zinc.

^d Number in parentheses indicates percentage.

compound is often advertised as an effective remedy for allergies despite the dearth of actual scientific evidence.

There are several limitations in the present study. First, the chief physicians at the 5 different outpatient clinics in our study might have different attitudes about the use of supplements, which could have had an impact on supplement use of the enrolled patients. Second, this was a cross-sectional study in which parents were questioned regarding their children's supplement use in the previous year. Therefore, a follow-up study during a longer-period should be conducted. Finally, no investigation of the income or education level of the parents was performed. Other studies indicate that higher education and higher income are associated with greater frequency of supplement use in healthy children [5,6]. However, despite these weaknesses, we believe that our present study is beneficial for understanding the present status of supplement use in patients with allergic disorders. Mehta et al [20] demonstrated that only one-third of adult dietary supplement users disclosed their use to their conventional health care providers, and in our present study, the disclosure rate was less than 30%. Nevertheless, no matter what the evidence suggests, patients and their families should consult medical professionals before making any decision regarding the use of supplements.

Acknowledgment

KN International (Hoffman Estates, IL, USA) was helpful throughout this study. Support for this study was from Nara Women's University.

REFERENCES

[1] Madsen H, Andersen S, Nielsen RG, Dolmer BS, Høst A, Damkier A. Use of complementary/alternative medicine among paediatric patients. *Eur J Pediatr* 2003;162:334–41.

[2] Kemper KJ, Vohra S, Walls R. The use of complementary and alternative medicine in pediatrics. *Pediatrics* 2008;122:1374–86.

[3] Anderson PC, Dinulos JG. Atopic dermatitis and alternative management strategies. *Curr Opin Pediatr* 2009;21:131–8.

[4] Braganza S, Ozuah PO, Sharif I. The use of complementary therapies in inner-city asthmatic children. *J Asthma* 2003;40:823–7.

[5] Picciano MF, Dwyer JT, Radimer KL, Wilson DH, Fisher KD, Thomas PR, et al. Dietary supplement use among infants, children, and adolescents in the United States, 1999–2002. *Arch Pediatr Adolesc Med* 2007;161:978–85.

[6] Shaikh U, Byrd RS, Auinger P. Vitamin and mineral supplement use by children and adolescents in the 1999–2004 national health and nutrition examination survey: relationship with nutrition, food security, physical activity, and health care access. *Arch Pediatr Adolesc Med* 2009;163:150–7.

[7] Marjamäki L, Rasanen M, Uusitalo L, Ahonen S, Veijola R, Knip M, et al. Use of vitamin D and other dietary supplements by Finnish children at the age of 2 and 3 years. *Int J Vitam Nutr Res* 2004;74:27–34.

[8] Sichert-Hellert W, Kersting M. Vitamin and mineral supplement use in German children and adolescents between 1986 and 2003: results of the DONALD study. *Ann Nutr Metab* 2004;48:414–9.

[9] Sato Y, Yamagishi A, Hashimoto Y, Virgona N, Hoshiyama Y, Umegaki K. Use of dietary supplements among preschool children in Japan. *J Nutr Sci Vitaminol* 2009;55:317–25.

[10] Mori N, Kubota M, Hamada S, Nagai A. Prevalence and characterization of supplement use among healthy children and adolescents in a Japanese urban city. *Health* 2011;3:135–40.

[11] Ball SD, Kertesz D, Moyer-Mileur LJ. Dietary supplement use is prevalent among children with a chronic illness. *J Am Diet Assoc* 2005;105:78–84.

[12] Niers L, Martin R, Rijkers G, Sengers F, Timmerman H, van Uden N, et al. The effects of selected probiotic strains on the development of eczema (the Panda study). *Allergy* 2009;64:1349–58.

[13] Torii S, Torii A, Itoh K, Urisu A, Terada A, Fujisawa T, et al. Effects of oral administration of *Lactobacillus acidophilus* L-92 on the symptoms and serum markers of atopic dermatitis. *Int Arch Allergy Immunol* 2011;154:236–45.

[14] Mullie P, Guelinckx I, Clarys P, Degraeve E, Holens M, Vansant G. Cultural, socioeconomic and nutritional determinants of functional food consumption patterns. *Eur J Clin Nutr* 2009;63:1290–6.

[15] Marmström K, Rosenlund H, Kull I, Håkansson N, Wickman M, Pershagen G, et al. Use of multivitamin supplements in relation to allergic disease in 8-y-old children. *Am J Clin Nutr* 2009;90:1693–8.

[16] Milner JD, Stein DM, McCarter R, Moon RY. Early infant multivitamin supplementation is associated with increased risk for food allergy and asthma. *Pediatrics* 2004;114:27–32.

[17] Vilagoftis H, Kouranos VD, Betsi GI, Falagas ME. Probiotics for the treatment of allergic rhinitis and asthma: systematic review of randomized controlled trials. *Ann Allergy Asthma Immunol* 2008;101:570–9.

[18] Pan SJ, Kuo CH, Lam KP, Wang WL, Hung CH. Probiotics and allergy in children—an update review. *Pediatr Allergy Immunol* 2010;21:e659–66.

[19] Timbo BB, Ross MP, McCarthy PV, Lin CT. Dietary supplements in a national survey: prevalence of use and reports of adverse events. *J Am Diet Assoc* 2006;106:1966–74.

[20] Mehta DH, Gardiner PM, Phillips RS, McCarthy EP. Herbal and dietary disclosures to health care providers by individuals with chronic conditions. *J Alter Com Med* 2008;14:1263–9.