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Characteristics of Pediatric and Adolescent Patients Attending a Naturopathic College Clinic in Canada

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ABSTRACT. *Objectives.* The use of complementary and alternative medicine (CAM) has grown substantially in North America and has drawn the attention of conventional-medicine practitioners. Conventional-medicine practitioners have expressed concern about the potential for unregulated CAM therapies to cause harm, the sometimes-uncertain cost-benefit ratios associated with these therapies, and the possibility that some CAM providers might advise against established conventional therapies, such as vaccination. These concerns are heightened with respect to the pediatric use of CAM products. To address this issue, we conducted a systematic audit of pediatric and adolescent case files at a large, college-based, Canadian naturopathic teaching clinic. We specifically sought to describe the demographic characteristics, reasons for presentation, use of CAM products, and vaccinations status of children presenting for naturopathic assessment. We also determined factors associated with the use of CAM products and vaccination status.

Methods. We identified all charts for children (<18 years of age) who presented to the Robert Schad Naturopathic Clinic, the teaching clinic of the Canadian College of Naturopathic Medicine, between February 1 and May 31, 2002. Data were abstracted directly from the standardized patient intake forms and from clinical notes recorded during the patient's initial visit to the clinic. The following data were obtained: age, gender, chief presenting complaints reported by parents, CAM product use at presentation, vaccination status, and reactions to vaccination. We conducted logistic regression analyses to identify factors associated with both CAM product use and vaccination status.

Results. A total of 482 charts were identified. The mean age of patients was 6.5 years (95% confidence interval [CI]: 1.6–11.4 years). The ratio of female subjects to male subjects was 1.09:1 (248:227). The most common reasons for presentation were skin disorders (23%), gastrointestinal complaints (17%), and psychiatric/behavioral disorders (15%). Thirty-five percent of children were using CAM products at presentation (21.2% when

both vitamins and minerals were excluded). Vitamins were the most commonly used products (34.6%), followed by herbal remedies (14.9%), oil blends/fats (7.2%), minerals (5.6%), probiotics (4.5%), and homeopathic remedies (3.7%). Of charts with vaccination information, 8.9% indicated that children had not been vaccinated; possible vaccine-associated adverse events were reported for 27% of those who had been vaccinated. Partial or unvaccinated status was associated with younger age, attending the Canadian College of Naturopathic Medicine for advice regarding vaccination, and greater use of CAM products. CAM product use was associated with unvaccinated or partially vaccinated status (odds ratio [OR]: 2.86; 95% CI: 1.46–5.63), presenting with poor energy or fatigue (OR: 3.36; 95% CI: 1.00–11.26), or presenting with throat or sinus infections (OR: 4.06; 95% CI: 1.23–13.04).

Conclusions. Children present for naturopathic assessment for diverse reasons, are high-level consumers of CAM products, and have lower rates of vaccination than population averages. The conventional-medicine community should work with naturopaths to address public health concerns in this population. *Pediatrics* 2005; 115:e338–e343. URL: www.pediatrics.org/cgi/doi/10.1542/peds.2004-1901; *naturopathy, pediatrics, medical records, complementary and alternative medicine, vaccination.*

ABBREVIATIONS. CAM, complementary and alternative medicine; CCNM, Canadian College of Naturopathic Medicine; OR, odds ratio; CI, confidence interval.

The use of complementary and alternative medicine (CAM) has grown substantially in North America.¹ This trend has drawn the attention of conventional-medicine practitioners, who have expressed concern regarding the potential for unregulated therapies to cause harm, the often-uncertain cost-benefit ratios associated with these therapies, and the possibility that some CAM providers might advise against established conventional therapies, such as vaccination.^{2,3} These concerns are heightened with respect to the pediatric use of CAM products.⁴

Many parents elect to pursue CAM therapies on behalf of their children.⁵ Estimates of pediatric CAM use range from 2% to 70%, depending on the type of treatment, time period, and study population, with greater use generally being reported in more recent surveys.^{5–17} This raises a number of ethical issues, because parents are entrusted with making health care decisions on behalf of their children¹⁸ and many individuals choose not to involve their allopathic physicians in this decision-making process.¹⁹

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Naturopathy is a popular CAM therapy, and licensing laws have been enacted in 12 US states and 4 Canadian provinces, although naturopaths also practice in jurisdictions that have no licensing laws.^{20–22} There were 1400 licensed naturopathic doctors in the United States in 1997, with this number being expected to reach 3500 by the year 2005.²² Currently, there are 642 practicing members of the Canadian Naturopathic Association.²³ Despite the rapidly increasing number of naturopathic doctors in North America, there are very limited data describing pediatric and adolescent patients who present for naturopathic care.²⁴ To address this issue, we conducted a systematic audit of pediatric and adolescent case files at a large, college-based, Canadian naturopathic teaching clinic. We also specifically sought to determine factors associated with CAM product use and vaccination status.

METHODS

Study Design

The Canadian College of Naturopathic Medicine (CCNM) is located in Toronto, Ontario, and at the time of this study was Canada's only accredited naturopathic college. The Robert Schad Naturopathic Clinic is attended by ~27 000 patients each year and treats 3000 to 4000 new patients annually. At the time of admission to the Robert Schad Naturopathic Clinic, patients must complete a standardized intake form and undergo a detailed history, a review of systems, and a physical examination in 2 or 3 visits. In addition to basic demographic information, parents are asked to list up to 7 presenting complaints for their child and to provide information on all CAM products in use.

With approval from the ethics board of the CCNM, one of us (A.G.) identified all charts for children and adolescents (<18 years of age) who presented to the Robert Schad Naturopathic Clinic, the teaching clinic of the CCNM, between February 1 and May 31, 2002. Data were abstracted directly from the standardized patient intake form and from clinical notes recorded during the patient's initial visit to the clinic. If the patient was presenting for a follow-up appointment, then the patient's chart was reviewed and data were obtained from the patient's initial assessment. The following data were obtained: age, gender, chief presenting complaints reported by parents, CAM product use at presentation, vaccination status, and reactions to vaccination.

We organized the data as follows. Presenting complaints were divided into major categories on the basis of disease characteristics or organ systems involved. CAM products were classified as vitamin, mineral, herbal product, oil or fat blend, probiotic, homeopathic preparation, or other product. Vaccination status was identified in 1 of 3 categories, ie, (1) fully vaccinated against all diseases as recommended, (2) partially vaccinated, or (3) not vaccinated. Reported reactions to vaccination were identified as either side effects or adverse events. Reports of the following were classified as potential side effects: fever, redness or swelling at the injection site, soreness or tenderness at the injection site, fussiness, tiredness, or poor appetite. Reports of autism, developmental problems, partial paralysis, seizures, or development of the disease targeted by the vaccine were considered possible adverse reactions to vaccination.

Statistical Analyses

We generated frequencies for all collected data, and we determined correlations between patient variables and use of CAM products and vaccination status by using Pearson correlation coefficients for normally distributed data and Spearman correlation coefficients for nonparametric data. For all correlations, *P* values of $\leq .05$ were considered statistically significant.

We created binary logistic regression models for our dichotomous outcome variables (use of CAM products and vaccination status). For our regression models, vaccination status was categorized as either (1) fully vaccinated or (2) partially vaccinated or unvaccinated. We tested each of the variables for significance in

univariate regression models, and any variable that resulted in a *P* value of $\leq .10$ was entered into a multivariate regression model, with the backward conditional model of variable entry. The elevated or reduced risk of outcome for a given variable, as determined in regression analyses, was reported as an odds ratio (OR) with an associated 95% confidence interval (CI). For the purpose of the multivariate regression model, significance was considered at *P* $\leq .05$. Goodness of fit for the multivariate regression model was determined with the Hosmer-Lemeshow test.²⁵ The Hosmer-Lemeshow test measures predictive reliability by comparing the expected results with the actual results for the dependent variable. Hosmer-Lemeshow test results are distributed approximately as χ^2 with 8 degrees of freedom. Hosmer-Lemeshow test values of <15.5 indicate a statistically good fit at the .05 level of significance. All data were analyzed with the SPSS Advanced Statistics software package, version 10.0 (SPSS Inc, Chicago, IL).

RESULTS

Patients

A total of 482 pediatric and adolescent charts were identified for data abstraction. The mean age of the patients was 6.5 years (95% CI: 1.6–11.4 years), and ages ranged from 4 days to 18 years. The ratio of female subjects to male subjects was 1.09:1 (248:227), with information on gender missing from 7 files.

Presenting Complaints

Of the 482 patients, 9.5% (46 of 482 patients) presented for "wellness" check-ups and 6 parents did not indicate a reason for attending the clinic. The remaining 430 reported a total of 819 presenting complaints (Table 1). Of these, skin disorders (23.4%)

TABLE 1. Presenting Complaints Reported by Parents

Category	No.	%
Skin disorders	113	23.4
Gastrointestinal	81	16.8
Psychiatric or behavioral concerns	70	14.5
Allergies and sensitivities (food and environmental)	59	12.2
Colds, coughs, and influenza	59	12.2
Ear infections	50	10.4
Disease prevention/nutritional counseling/general health counseling	46	9.5
Asthma	41	8.5
Musculoskeletal	31	6.4
Headaches/migraines	23	4.8
Immune dysfunction	21	2.7
Poor energy/fatigue	21	2.7
Throat infections, sinus infections, and swollen glands/tonsils	21	2.7
Infections or parasites/fungi	18	3.7
Renal	17	3.5
Gynecologic	16	3.3
Nerve/neurologic	15	3.1
Respiratory	14	2.9
Sleep disorders	14	2.9
Developmental delays	13	2.7
Cardiovascular	12	2.5
Weight reduction	11	2.3
Eye infections	9	1.9
Anorexia or poor appetite	9	1.9
Vaccination advice	7	1.4
Fevers	7	1.4
Autism	5	1.0
Other*	16	3.3

* This category includes 1 of each of the following: body odor, bruxism, dental caries, excessive appetite and thirst, fainting, hair loss, halitosis, "hormonal" problem, hypercalcemia, hypoglycemia, hypospadias, ingrown toenail, jaundice, nail biting, night sweats, and umbilical hernia.

were the most common, followed by gastrointestinal complaints (16.8%) and psychiatric or behavioral concerns (14.5%). The most common skin disorders were nonspecific rashes (46 of 113 cases) and eczema (42 of 113 cases), the most common gastrointestinal complaints were nonspecific stomach pains (23 of 81 cases) and constipation (22 of 81 cases), and the most common psychiatric or behavioral concern was attention-deficit/hyperactivity disorder (59 of 70 cases).

Pediatric Use of CAM Products

At presentation, 34.6% of children and adolescents were taking between 1 and 10 CAM products, for a total of 350 products (Table 2). This value was reduced to 23.7% when vitamins were excluded and to 21.2% when both vitamins and minerals were excluded. Vitamins were the most commonly used products (34.6%), followed by herbal remedies (14.9%), oil blends/fats (7.2%), minerals (5.6%), probiotics (4.5%), and homeopathic remedies (3.7%).

In our adjusted analysis, significant predictors of CAM product use included unvaccinated or partially vaccinated status (OR: 2.86; 95% CI: 1.46-5.63), presenting for poor energy or fatigue (OR: 3.36; 95% CI: 1.00-11.26), and presenting with throat or sinus infections (OR: 4.06; 95% CI: 1.23-13.04) (Table 3). Because vitamins and minerals are only sometimes included in definitions of CAM, we repeated the analysis with exclusion of these products. In that analysis, unvaccinated or partially vaccinated status (OR: 2.05; 95% CI: 1.03-4.09) and presenting with throat or sinus infections (OR: 4.33; 95% CI: 1.33-14.14) remained significant predictors of CAM product use.

Vaccination Status of Patients

A total of 65.6% of parents (316 of 482 parents) indicated their child's vaccination status on the intake form. Of this population, 86.7% reported that their child had been fully vaccinated, 4.4% reported partial vaccination status, 8.9% reported that their child was unvaccinated, and 0.1% of parents were uncertain of their child's vaccination status. Seven parents (1.5%) indicated on their child's intake form that their primary reason for attending the naturopathic clinic was to seek advice on vaccination, with 3 seeking alternatives to vaccination.

Of the parents who reported positive vaccination status, 66.6% (211 of 317) provided information on whether they thought their child had experienced a side effect or adverse event. Of the 27.0% of parents who noted vaccination events, 19.4% reported side effects and 7.6% reported adverse events. The following were reported: fever, lethargy, or drowsiness (26 of 211 patients); irritability or restlessness (6 of 211 patients); behavioral or developmental problems (6 of 211 patients); localized inflammatory reactions (6 of 211 patients); development of the vaccine-targeted disease (5 of 211 patients); and other reactions, including transient paralysis of the lower limbs (8 of 211 patients).

Factors associated with partial or unvaccinated status were younger age ($r = 0.14$, $P = .02$), greater

TABLE 2. Reported Use of CAM Products at Presentation

CAM Product	No. of Children Receiving Product
Vitamins	167
Multivitamins	103
Vitamin C	37
Vitamin B forms	7
Vitamin D	7
Vitamin E	6
Vitamin A	5
Vitamin K	2
Herbal remedies	69
Echinacea	21
<i>Hydrastis canadensis</i> (goldenseal)	4
<i>Calendula officianalis</i> L.	4
<i>Allium sativum</i> L. (garlic)	4
Eucalyptus	3
Goldenseal, Echinacea, and <i>Astragalus membranaceus</i> combination	2
<i>Plantago ovata</i> (psyllium)	2
<i>Glycyrrhiza glabra</i> (licorice)	2
Other*	27
Oil blends/fats	35
<i>Linum usitatissimum</i> (flaxseed oil)	11
Essential fatty acids	6
Halibut oil	4
Mineral oil	4
Salmon oil	2
<i>Oenothera biennis</i> (evening primrose oil)	3
<i>Dromiceius nova-hollandiae</i> (emu oil), <i>Borago officinalis</i> (borage seed oil), marine lipids, and cod liver oil	5
Minerals	27
Calcium-magnesium	9
Calcium	7
Iron	6
Multiminerals	2
Zinc	2
Magnesium	1
Probiotics	22
Homeopathic remedies	20
Other natural health products	10
Greens plus	3
Bioflavonoid complex	3
Quercetin	2
Bee pollen	2

* This category includes 1 of each of the following: *Achillea millefolium* (yarrow), *Alethea officinalis* (marshmallow), *Aveena sativa* (oats), *Capsicum frutescens* (cayenne), *Centella asiatica* (gotu kola), Chinese herbal (did not specify), *Eleutherococcus senticosus* (Siberian ginseng), *Euphrasia officinalis* (eyebright), *Foeniculum vulgare* (fennel), *Ginkgo biloba*, *Hordeum distychnum* (barley green), *Juglans nigra* (black walnut), *Matricaria recutita* (chamomile), *Medicago sativa* (alfalfa), *Melaleuca alternifolia* (tea tree oil), *Morinda citrifolia* (noni), *Panax ginseng* (Asian ginseng), *Panax quinquefolius* (American ginseng), *Rumex crispus* (yellow dock), *Silybum marianum* (milk thistle), St. Francis, Swedish Bitters (brand-name product that contains aloe, myrrh, saffron, senna leaf, camphor, rhubarb root, zedoary, manna, theriacal venezian, carline root, and angelica root), *Tilia tormentosa* (silver linden), *Trifolium pratense* (red clover), *Valerian officinalis*, *Verbascum densiflorum* (mullein drops), and *Vitis vinifera* (grape seed).

use of CAM products ($r = 0.16$, $P < .01$), and attending CCNM for advice on vaccination ($r = 0.25$, $P < .01$). Reports of vaccination reactions were significantly correlated with presenting complaints of immune dysfunction ($r = 0.14$, $P = .04$) or autism ($r = 0.32$, $P < .01$).

DISCUSSION

Our study indicated that parents brought their children and adolescents to a naturopathic clinic pri-

TABLE 3. Predictors of CAM Product Use

Variable	Univariate Analysis		Multivariate Analysis	
	OR (95% CI)	<i>P</i> Value	OR (95% CI)	<i>P</i> Value
Partially vaccinated or unvaccinated	2.60 (1.34–5.04)	<.01	2.86 (1.46–5.63)	<.01
Presenting complaint				
Skin disorders	1.65 (1.02–2.66)	.04		.14
Immune dysfunction	2.54 (1.04–6.20)	.04		.07
Poor energy/fatigue	2.70 (1.04–7.02)	.04	3.36 (1.00–11.26)	.05
Throat infections, sinus infections, and swollen glands/tonsils	2.45 (0.96–6.25)	.06	4.06 (1.23–13.40)	.02

Age, gender, reporting a reaction to vaccination, and all other presenting complaints listed in Table 1 were also tested in univariate models but were not significant.

marily because of dermatologic, gastrointestinal, or psychiatric concerns. Approximately one third of children and adolescents were using CAM products at the time of presentation. A relatively high percentage (8.9%) of parents had elected not to have their children vaccinated, compared with Canadian national averages,²⁶ and approximately one quarter of parents who had pursued vaccination for their children reported that reactions had resulted. To the best of our knowledge, this study is the first to determine characteristics of pediatric and adolescent patients presenting for naturopathic care directly from a large consecutive sample of clinic records, thus avoiding the issue of selection bias that is inherent in surveys of CAM use.

The most common complaints reported by parents of children presenting for naturopathic care in our study were skin rashes, nonspecific abdominal pain, and attention-deficit/hyperactivity disorder. These findings are consistent with previous surveys that found high levels of use of CAM therapies among patients with these specific conditions.^{11,27–32} Although the reasons why individuals elect to pursue CAM therapies are not completely understood, there is some evidence that consumers find these health care alternatives to be more congruent with their own values and beliefs.³³ Other studies have suggested that the decision to continue with CAM therapies is largely the result of positive experiences with such therapies, rather than prior beliefs.³⁴ Some parents elect to pursue CAM therapies for their children because they are dissatisfied with conventional-medicine approaches or they think that CAM products are “natural” and therefore less likely to cause harm.^{4,35} In a survey conducted in Quebec, Canada, parents’ decisions to pursue CAM therapies for their children were associated with a fear of side effects of conventional-medicine treatments and having a child with persistent health problems.⁵

Our finding that 34.6% of pediatric and adolescent patients who presented for care were already consuming ≥ 1 CAM product is noteworthy. Americans spent more than \$6.8 billion on herbal products and dietary supplements in 1997, and these products are being marketed increasingly toward children.¹ There is little evidence available to guide the use of CAM products in pediatrics,³⁶ and existing studies have been criticized for low quality and lack of specific information on safety.^{37,38} Lay sources of information available to parents, such as health food store

attendants or the Internet, have been found to provide information on CAM products that has been characterized as misleading at best and dangerous at worst.^{39,40} Furthermore, there are no mandatory quality standards for many CAM products,¹⁴ and a number of such products can be harmful when taken by children.^{4,41,42} Interactions between CAM products and prescription drugs exist and can have serious clinical consequences,^{43–45} and this issue has not been examined formally in pediatrics.^{46,47} Some of the products that parents reported their children were taking have the potential to produce adverse effects, and excess use of any vitamin supplements can produce toxicity.⁴

In 1995, the Canadian goal for national immunization coverage was 97% by 2 years of age,⁴⁸ which was achieved for measles, mumps, and rubella by 1998.²⁶ Our study found that vaccination rates for children and adolescents who presented for naturopathic care were below this level (8.9% had not received any vaccines). However, caution must be used in interpreting these data, because only 66% of charts reported vaccination status. Among parents in our study who had their children vaccinated, there was substantial reporting of possible vaccine-related reactions (26.3%), including the development of conditions (such as autism) that public health workers would not consider to be a consequence of vaccination. This suggests that parents may already be sensitized to vaccination concerns before seeking treatment from a naturopathic physician. There is an opportunity for naturopathic doctors to be sources of education for their patients regarding vaccination, and some authorities have suggested that CAM providers be licensed to provide immunizations.⁴⁹ This is supported by the fact that presenting to the clinic for advice on vaccination was correlated with not being fully vaccinated. However, vaccination remains a contentious issue for some naturopathic doctors and students.^{50,51} A recent survey of attitudes toward vaccination, conducted at CCNM (59.4% response rate; 312 of 525 subjects), found that only 12.8% of students were willing to advise full vaccination, with 74.4% willing to advise partial vaccination and 12.8% unwilling to recommend any vaccines.⁵⁰ In our multivariate analysis, we determined that “alternative” health behaviors appear to cluster together. In particular, CAM product usage and not-fully vaccinated status were correlated, which suggests that, when physicians become aware of one of

these factors for their patients, they should inquire about the other.

There are some important limitations to this study that should be noted. Our sample population was taken from a large, Canadian, academic center, and our results may not be generalizable to other naturopathic clinics. Our data are limited to self-report at the initial visit, and parents' reports of their children's clinical concerns were not validated. This study also does not provide information on why parents chose to access naturopathic care for their children or on treatment received through the Robert Schad Naturopathic Clinic.

Despite these limitations, the information in this review is of importance to conventional-medicine providers. A survey of randomly sampled CAM providers practicing in 4 American states found that children and adolescents constituted >10% of all visits to naturopathic physicians, compared with only 1% to 4% for other CAM providers.⁵² This fact, combined with the general increase in the use of naturopathic medicine and the high rate of patient satisfaction with naturopathic care,⁵³ suggests that increasing numbers of parents will be seeking naturopathic treatments for their children. Naturopathic physicians are seen as health care providers of first contact by many of their patients,²¹ and previous evidence suggests that parents' disclosure of pediatric CAM use to their physicians is low.^{19,32} Given this situation, conventional-medicine providers and CAM providers, such as naturopaths, should be encouraged to work together to identify more effective mechanisms of communication.⁵⁴ More effective interactions could reduce the likelihood that children continue taking potentially harmful products or could ensure that they are monitored carefully when they make use of CAM products.

CONCLUSIONS

This study suggests that children presenting for naturopathic care are high-level consumers of CAM products and their rates of positive vaccination status are lower than population averages. Conventional-medicine practitioners should inquire about CAM use among pediatric and adolescent patients and should develop open lines of communication with naturopaths to optimize care for this population.

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