

## USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE IN CHILDREN WITH RECURRENT ACUTE OTITIS MEDIA IN ITALY

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Controlling environmental factors, chemoprophylaxis, immunoprophylaxis and surgery are considered possible means of preventing recurrent acute otitis media (RAOM), but there are no available data concerning the paediatric use of complementary and alternative medicine (CAM). We evaluated the uses of CAM (homeopathy and/or herbal medicine) as means of preventing AOM in children with a history of RAOM. Eight hundred and forty Italian children with RAOM ( $\geq 3$  episodes in six months) aged 1-7 years were surveyed in 2009 using a face-to-face questionnaire, filled by parents or caregivers, that explored the prevalence, determinants, reasons, cost, and perceived safety and efficacy of CAM. About one-half (46%) of the children used CAM, significantly more than the number who used immunoprophylaxis (influenza vaccine 15%;  $p < 0.05$ ), PCV-7 34%;  $p < 0.05$ ) or chemoprophylaxis (2%;  $p < 0.001$ ). Use of CAM in the family was the only important factor positively associated with the use of CAM in children (adjusted OR 7.94; 95% CI: 5.26-11.99). The main reasons for using CAM were a fear of the adverse effects of conventional medicine (40%) and to increase host defences (20%). CAM was widely seen as safe (95%) and highly effective (68%). CAM prescribers were paediatricians in 50.7% of cases; self-initiation was reported by 23% of respondents. CAM expenditure was between €25 and €50/month in 27.6% of cases and  $\geq$  €50/month in 16%. Children with RAOM should be considered among the categories of subjects likely to be using CAM. Together with the fact that paediatricians are the main prescribers, this is worrying because of the current lack of evidence regarding the efficacy, safety and cost-effectiveness of CAM in the prevention of RAOM.

The use of complementary and alternative medicine (CAM) in paediatrics has grown dramatically in the Western world over recent years. It has been shown that approximately 20-40% of healthy children seen

in outpatient paediatric clinics (1-3) and more than 50% of children with chronic, recurrent or incurable conditions use CAM, almost always in conjunction with mainstream medicine (4-10). Most families use

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CAM services without spontaneously reporting the fact to their clinicians but, as paediatricians are responsible for advising families about safe, effective and age-appropriate health services and therapies (including CAM), this means that they need to include questions regarding the use of CAM when they examine their patients, and they themselves also need to keep informed about popular complementary therapies and evidence-based findings concerning them.

Recurrent acute otitis media (RAOM) is a common paediatric disease for which a number of measures aimed at reducing the risk of new episodes have been suggested, including the reduction/elimination of risk factors, the use of influenza and pneumococcal conjugate vaccines, the administration of antibiotics, adenoidectomy and the insertion of ventilation tubes (11-14). However, as not even the concomitant use of these measures definitely solves the problem, various attempts have been made to assess the possibility of using CAM. The available data cannot be considered conclusive because of the small numbers of enrolled subjects and methodological shortcomings, although some differences in efficacy between the different CAM measures have been reported. In prevention of RAOM, the administration of *Echinacea purpurea* or the use of manipulative osteopathic treatment (15), were found totally ineffective and potentially dangerous, whereas the use of xylitol, propolis and zinc was associated, at least in some studies, with slightly positive results (16-17). However, these differences underline the need for paediatricians to understand whether CAM is being used by families to treat otitis-prone children and, if so, what type of CAM and why. This is the only way in which paediatricians can appreciate the concerns of patients and their families, and offer them thoughtful and knowledgeable guidance.

The aim of this study is to assess the prevalence of the use of CAM among children with RAOM living in the area of Milan in Northern Italy, the characteristics of the users and their perception of CAM effectiveness and safety, the extent to which paediatricians are informed about the use of CAM, and the economic burden on the families.

## MATERIALS AND METHODS

### *Study design and participants*

This is a cross-sectional survey of the use of CAM in children with RAOM referred by primary care paediatricians

to the Otitis Media Centre of Milan between January and December 2009. The study was approved by the Ethics Committee of the University of Milan and conducted according to the standards of Good Clinical Practice for trials of medicinal products in humans. Parents or legal guardians gave their written informed consent before the children were enrolled. Potential subjects were the parents or caregivers of consecutive children with RAOM ( $\geq 3$  episodes of documented AOM in the previous six months or  $\geq 4$  episodes in the previous year) aged 1-7 years who had been referred to the Centre for the first time.

### *Questionnaire and its administration*

The questionnaire was anonymous but coded to be able to identify non-responders and ensure the elimination of multiple responses. It included 15 questions concerning demographics, the use of CAM to prevent RAOM in the previous 12 months, the type of CAM, the reasons for the use, the perceived effectiveness and safety of the treatments, the sources of information and/or prescriptions, the disclosure of CAM use to the child's attending paediatrician, the place of purchasing CAM products, and average monthly expenditure. The prescriptions were documented by reviewing the medical records and/or calling the paediatrician in charge of the child. The questions related exclusively to homeopathy and herbal remedies because a previous evaluation of the questionnaire designed to verify its applicability showed that these were the only CAM methods used by a substantial percentage of cases. The respondents were asked to rate the effectiveness of the treatments using a 4-point (very good, good, moderate, poor) scale. The questionnaire took approximately 10 minutes to complete. Although the parents were asked to complete the questionnaire autonomously, nurses and/or one of the investigators were always available to provide any explanations required.

### *Statistical analysis*

Descriptive statistics of the responses were generated. Categorical data were presented as numbers and percentages, with the corresponding 95% confidence intervals (CI), and were analyzed using the contingency table analysis with the *Chi*-square test. The odds ratio (OR) of CAM use and the corresponding 95% CIs were derived using unconditional multiple logistic regression models. The adjusted ORs included terms for sex, age, education of mother and father, working mother, foreign parents, having older siblings, history of breast feeding, history of allergy, history of vaccination with heptavalent conjugate pneumococcal vaccine (PCV7), history of vaccination with influenza vaccine, exposure to passive smoking, full-time child-care attendance, and use of CAM in the family. All of the analyses were two-tailed, and *p* values of  $\leq 0.05$  were

considered significant. Data analyses were conducted using SAS version 9.1 (Cary, NC, USA).

## RESULTS

A total of 850 questionnaires were distributed. Ten questionnaires (1%) were inadequately completed and discarded. As all of these were completed by parents who were not Italian citizens, it is reasonable to think that the inadequate completion was due to difficulties in understanding the questions. Consequently, the replies to 840 questionnaires were analysed.

Table I shows the general characteristics of the children with RAOM divided on the basis of their use of CAM. Three hundred and ninety-one children (46%) used CAM. Use of CAM in the family was positively associated with the use of CAM (adjusted OR=7.94; 95% CI 5.26-11.99;  $p<0.0001$ ). Homeopathy was administered in 180 (46%), herbal remedies in 105 (26%), and combined homeopathy and herbal remedies in 106 (27%) children. The most frequently prescribed herbal remedies were those based on *Echinacea purpurea* (84%). In adjusted multivariable regression analysis, use of CAM in the family remained the only important factor positively associated with the use of the three CAM modalities (homeopathy: adjusted OR =190.2; 95% CI 66.8-541.4;  $p<0.0001$ ; herbal remedies: adjusted=OR 88.1; 95% CI 32.1-242.1;  $p<0.0001$ ; homeopathy plus herbal remedies: adjusted OR=307.7; 95% CI 78.21-NS;  $p<0.0001$ ). The traditional methods of AOM prevention (i.e. antibiotic prophylaxis and vaccines) were little used by both CAM users and non-users, with no differences between the groups. Among the CAM users, they were used less than CAM (chemoprophylaxis 2%,  $p<0.001$ ; influenza vaccine 15%,  $p<0.05$ ; PCV-7 vaccine 35%,  $p<0.05$ ). The parents' education level did not influence CAM use.

Fig. 1 shows the parents' declared reasons for giving CAM to their children (1a) and their perception of the effectiveness of the various CAM modalities (1b). The main reason for using any modality was a fear of the potential adverse events of conventional medicine, especially for families using combined homeopathy and herbal remedies, but an important role was also played by the potential increase in host defences, particularly in the case of herbal remedies.

The effectiveness of CAM was judged to be good or very good by two-thirds of the parents (68%), and almost all of them (94%) considered CAM safe, regardless of the modality (homeopathy 94%, herbal remedies 92%, combined homeopathy and herbal remedies 92%).

Fig. 2 shows the data regarding the source of information and prescriptions. In about half of the cases (and with no significant difference between modalities), CAM was prescribed by the child's attending paediatrician; about one-quarter of the children received CAM because of their parents' self-prescription, which was influenced by friends or the mass media.

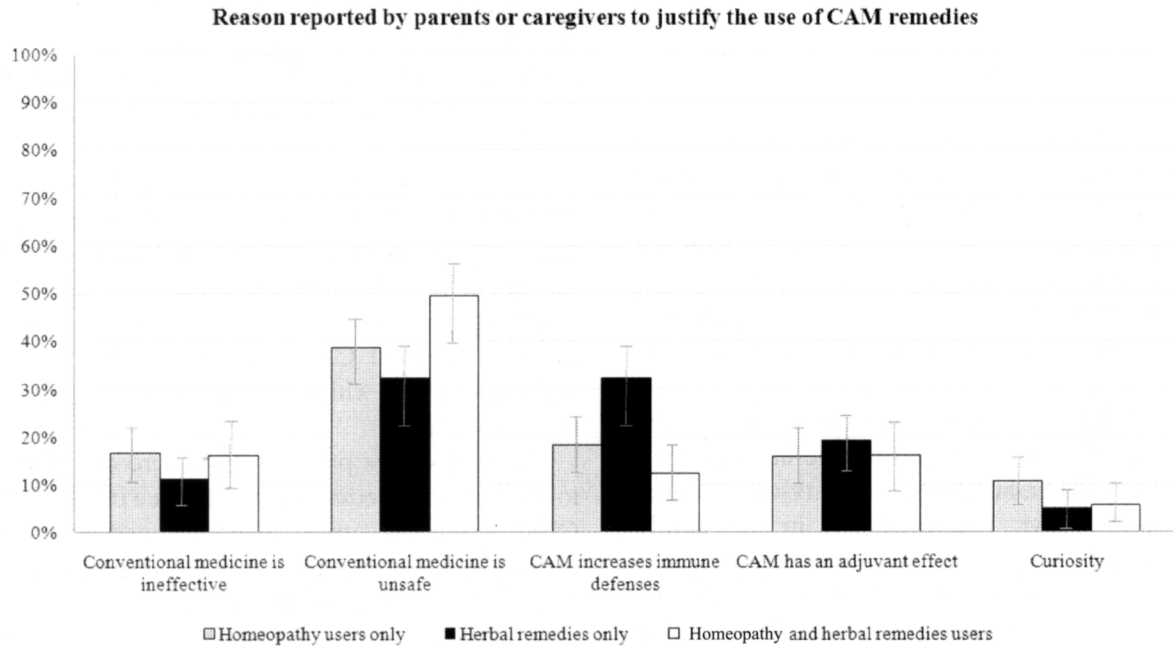
Table II shows parental disclosure of CAM use to their child's paediatrician, the place of purchasing CAM products, and average monthly CAM expenditure. Most of the parents had informed their child's paediatrician of the use of CAM. More than 80% of the products were purchased in a pharmacy, with no differences between CAM modalities. More than 25% of the families spent between €25 and €50 a month on CAM products, and 16% spent more than €50 a month, with homeopathy leading to a significantly greater economic burden than herbal remedies.

## DISCUSSION

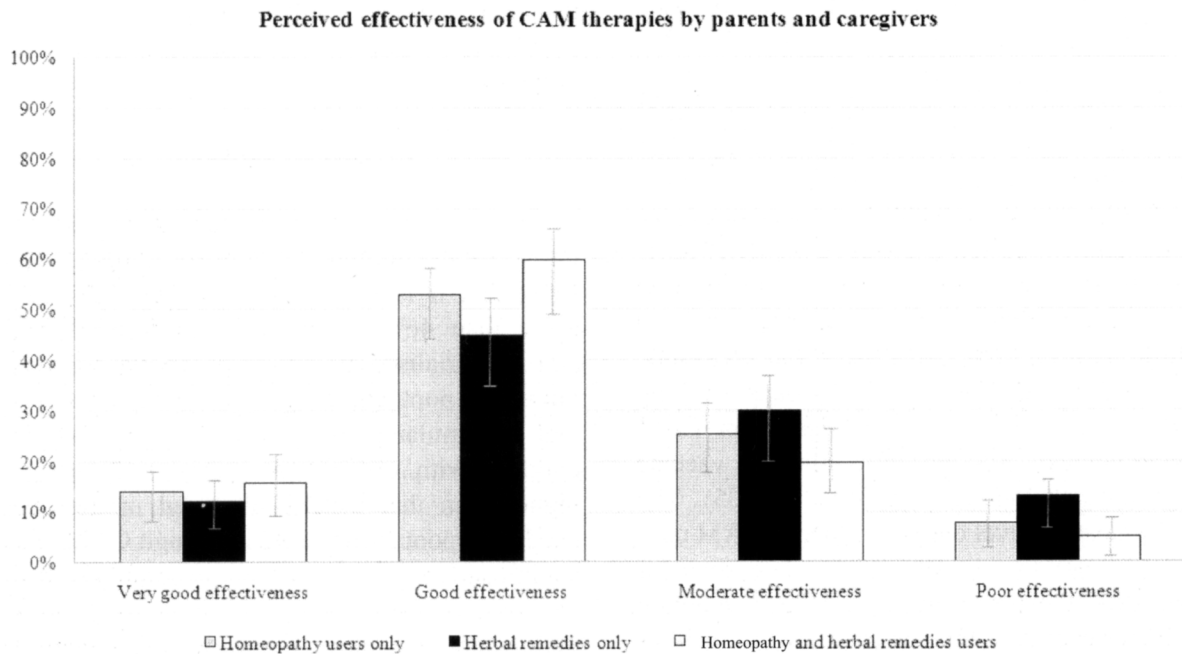
Ours are the first data relating exclusively to CAM use in children with a history of RAOM, and show that it is frequently used by such patients. More than 46% of the children from the urban and industrialised area of greater Milan making up our study population received CAM, a percentage that is similar to that found by other authors in children with chronic or recurrent diseases, and higher than that usually observed in the general paediatric population (1-9). Although CAM use can significantly vary from country to country so that the data derived from this study cannot be generalized, they seem to confirm the view that parents self-prescribe or agree with a paediatrician's prescription of CAM mainly when they have to face well-known clinical situations for which conventional medicine does not offer any definite solutions.

Living in a family already using CAM was the only factor significantly associated with CAM use

A

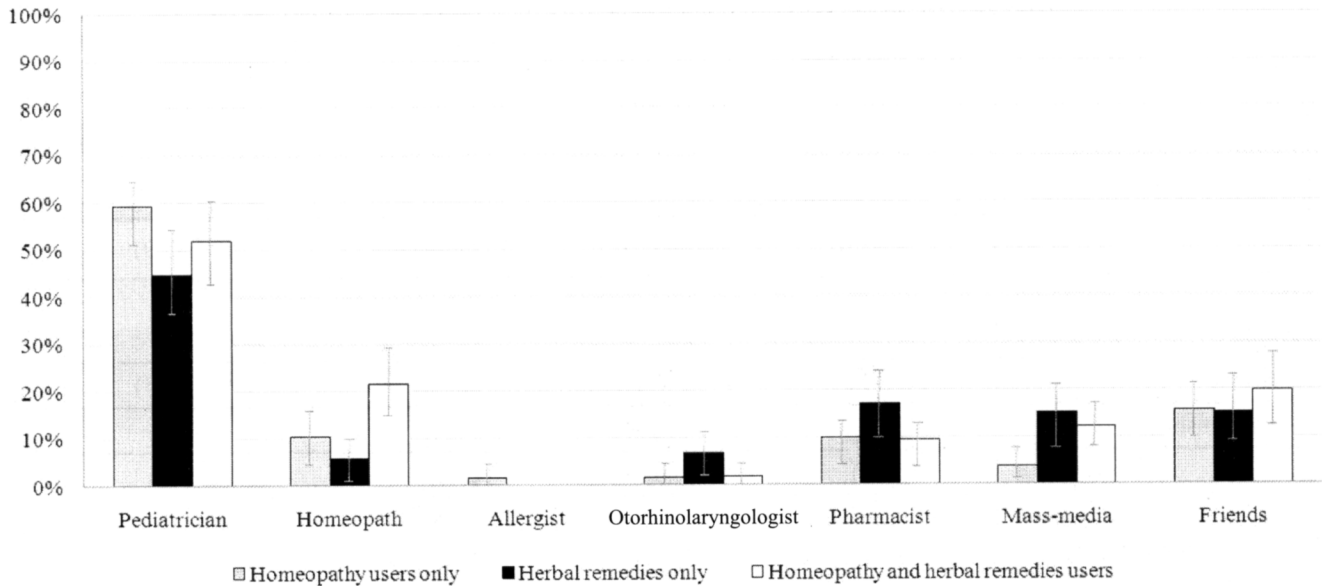


B



**Fig. 1.** *A)* Reasons reported by parents or caregivers to justify the use of CAM remedies, with 95% confidence interval. According to the type of treatment administered to children with RAOM, the answer “conventional medicine is unsafe” was significantly more common than any other reason for the use of any type of CAM ( $P < 0.05$ ). *B)* Perceived effectiveness of CAM therapies by parents and caregivers, with 95% confidence interval. Responses regarding good effectiveness were for all CAM remedies statistically significant more common than any other response ( $p < 0.05$ )

## Origin of CAM use by parents or caregivers to prevent RAOM



**Fig. 2.** Origin of CAM use by parents or caregivers to prevent RAOM. Data regarding paediatricians, homeopath, allergist, otolaryngologist and pharmacist indicate direct prescription of CAM by these health care workers. Those regarding mass-media and friend indicate source of information leading parents or caregivers to buy CAM remedies. Multiple answers were allowed. Prescriptions due to paediatricians were significantly more common than any other prescription ( $P < 0.001$ ).

**Table I.** Comparison of demographic and other characteristics in CAM users versus CAM non-users.

Characteristic	CAM users	CAM non-users	Crude OR (95% CI)	Adjusted <sup>^</sup> OR (95% CI)
N°	391 (46.6)	449 (53.5)	-	-
Males	195 (50.1)	252 (56.5)	1.29 (0.97-1.71)	1.16 (0.84-1.61)
Age $\leq 2$ years	139 (36.0)	177 (40.9)	1.23 (0.93-1.63)	1.30 (0.89-1.91)
Italian parents	356 (93.9)	398 (90.7)	0.63 (0.36-1.10)	0.71 (0.37-1.37)
Father with high level of education	312 (80.6)	349 (79.0)	1.11 (0.79-1.56)	0.92 (0.59-1.42)
Mother with high level of education	342 (88.2)	372 (83.6)	1.46 (0.98-2.17)	1.37 (0.82-2.30)
Working mother	319 (82.2)	371 (83.2)	0.93 (0.64-1.36)	1.02 (0.65-1.61)
Breastfeeding $\geq 3$ months	315 (80.8)	356 (79.3)	1.10 (0.77-1.56)	1.16 (0.78-1.74)
At least one older sibling	231 (60.3)	280 (64.1)	0.85 (0.64-1.13)	0.87 (0.56-1.35)
Exposure to passive smoking	92 (23.6)	98 (22.0)	1.10 (0.78-1.54)	1.13 (0.75-1.69)
Full-time day-care attendance <sup>^^</sup>	329 (84.8)	348 (78.2)	1.55 (1.07-2.26)	1.55 (0.96-2.50)
Use of CAM in the family	349 (89.7)	241 (54.4)	7.31 (4.94-10.86)	7.94 (5.26-11.99)
Previous influenza vaccine	60 (15.4)	65 (14.5)	1.07 (0.72-1.59)	0.98 (0.62-1.53)
Previous PCV-7 vaccine	137 (35.0)	134 (29.8)	1.27 (0.94-1.71)	1.01 (0.71-1.44)
Antibiotic prophylaxis	8 (2.1)	11 (2.5)	0.83 (0.33-2.08)	0.85 (0.31-2.08)
History of chronic disease	18 (4.6)	20 (4.5)	1.04 (0.52-2.09)	1.48 (0.68-3.21)
History of allergy	55 (14.3)	55 (12.4)	1.18 (0.77-1.80)	1.40 (0.86-2.27)

Numbers in parentheses = percentages

<sup>^</sup> ORs adjusted for all the variables considered

<sup>^^</sup> 5 days /week, 6- 8 hours /day

**Table II.** CAM users' attitude towards informing paediatricians about CAM use, place of CAM product purchases and monthly expenditure.

Question	All CAM users (n= 391)	Homeopathy users (n= 180)	Herbal remedies users (n= 105)	Homeopathy and herbal remedies users (n= 106)
Does your paediatrician know that you use CAM?				
Yes	317 (81.0)	153 (85.0)	76 (72.4)	89 (83.9)
Where do you buy CAM products?				
Pharmacy	358 (91.5)	156 (86.7)	84 (80.0)	97 (91.5)
Herbalist shop	28 (7.2)	15 (8.3)	13 (12.4)	7 (6.6)
Other	5 (1.3)	9 (5.0)	8 (7.6)	2 (1.9)
How much do you spend per month on CAM products?				
€ < 10	96 (24.6)	41 (22.8)	38 (36.1)	19 (17.9)
€ 10-24	123 (31.5)	55 (30.5)	31 (29.6)	32 (30.2)
€ 25-50	108 (27.6)	43 (23.9)	28 (26.7)	30 (28.3)
€ > 50	64 (16.3)	41 (22.8)	8 (7.6)	25 (23.6)

in children with RAOM. The association between CAM use in children and previous CAM use in the family has been found in many of the studies of pediatric CAM use, regardless of the disease for which it is administered (6). As found in some previous studies (but not others), CAM use in our study population was not related to the children's ages or their parents' education (18-19). However, the importance of parents' education levels in influencing CAM use requires further studies. In our survey most of the parents had a high education level and it is possible that parents with a lower education might have had a different attitude regarding the problem of CAM use.

Homeopathy was the most frequently prescribed CAM, being used by three-quarters of the children. This is not surprising because, unlike in countries in which only a minority of CAM prescriptions are homeopathic (1-2), homeopathy is frequently used for children in Italy, especially when they are aged < 5 years and suffer from respiratory complaints (20).

CAM was mainly used because of a fear of potential adverse events associated with conventional medicine. Almost all of the parents considered CAM safe, and most that it was highly or very highly effective, with percentages that were much higher than those found by other authors. The greater expected safety of CAM in comparison with conventional treatment is often reported as a determinant of its use (21), although a number of studies have highlighted the potential harmfulness of both homeopathy and herbal remedies (22-24). Surprisingly, no difference was found between the judgements of homeopathy and herbal remedies. Although homeopathy is cheaper than conventional therapy (25-26), there is no scientific evidence that it is beneficial in any of the diseases for which it is administered, and its usefulness is dismissed by leading experts in official medicine (27). On the contrary, if adequately selected, herbal remedies may play a role in preventing AOM. We previously demonstrated that the chronic administration

of propolis and zinc can have a positive effect without any real risk of severe adverse events (28). Furthermore, xylitol has been associated with a reduction in the risk of the recurrence of AOM in some (but not all) studies (16). Unfortunately, most of the remedies used by the children in our study were based on *Echinacea purpurea*, thus showing that parents and paediatricians are inadequately aware of the real efficacy of the different kinds of herbal remedies.

CAM was administered to most of the otitis-prone children in our study before conventional methods of prevention, as shown by the fact that the number of children who had received chemoprophylaxis and vaccines was significantly smaller than the number who had received CAM remedies. Moreover, unlike many previous studies, we found that paediatricians were informed about the use of CAM in almost all cases, and that they actually prescribed CAM (mainly homeopathy) in about 50%. These findings suggest that the paediatricians of the children participating in this study have an inadequate knowledge of the methods used to prevent RAOM. This is important because paediatricians who prescribe a useless and expensive treatment for children are not only giving to rise to medical problems, but also raising legal and ethical issues. Our findings indicate that more than 40% of the families with an otitis-prone child spend more than €25 a month on CAM: this is not a marginal question given the median monthly income of most Italian families (€ 2,174) (29) and the fact that conventional medicine is completely financed by the National Health System.

This study has a number of limitations. The questions concerning CAM use and the reasons for it may be subject to recall bias because they are retrospective but sampling bias was minimized by enrolling consecutive outpatients and reviewing medical charts. Another potential limitation is the fact that the study population came from a single geographical area; however, as the primary paediatric care system and pre- and post-residency teaching programs are similar throughout Italy, it is unlikely that this affected the findings. Finally, regrettably the questionnaire was not originally designed to analyze the use of other CAM modalities for diseases other than RAOM, which was chosen because is the most common reason for prescribing antibiotics.

Children with RAOM should be considered among the categories of subjects likely to be using CAM, which raises challenging risk-management issues that may lead to legal action for medical malpractice, disciplinary proceedings by licensing boards, or accusations of fraud or abuse from state or regional regulators. Furthermore, the integration of CAM into mainstream paediatric practice raises ethical issues. Paediatricians do not receive any systematic education concerning the safety and effectiveness of CAM therapies, which raises a number of concerns about patient safety and legal liability. All of these conclusions suggest that paediatricians need to be urgently involved in educational programmes specifically aimed at increasing their knowledge of evidence-based strategies for preventing AOM in order to reduce the number of new RAOM episodes in otitis-prone children.

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Prof. Marchisio and Prof. Principi designed the study and co-wrote the manuscript together with Prof. Esposito; Dr. Bianchini and Dr. Baggi presented the questionnaires to the families; Dr. Galeone performed the statistical analysis; Dr. Rossi and Dr. Albertario were responsible for data entry; Dr. Torretta, Prof. Pignataro and Prof. Esposito visited the patients. All the authors approved the text.

Conflict of interest disclosure. No conflict of interest was reported. All the authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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