

## Observational Study

## Parental acceptability of the watchful waiting approach in pediatric acute otitis media

Arnon Broides, Olga Bereza, Noga Lavi-Givon, Yariv Fruchtman, Eli Gazala, Eugene Leibovitz

Arnon Broides, Yariv Fruchtman, Eugene Leibovitz, Pediatric Emergency Department, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva 84140, Israel

Olga Bereza, Family Medicine Department, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva 84140, Israel

Noga Lavi-Givon, Pediatric Infectious Disease Unit, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva 84140, Israel

Eli Gazala, Child Health Community Center, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva 84140, Israel

**Author contributions:** Broides A, Bereza O and Leibovitz E contributed to research design, research performing, data analysis, manuscript preparation; Lavi-Givon N contributed to research design, data analysis; Fruchtman Y and Gazala E contributed to research design, research performing, data analysis.

**Institutional review board statement:** The study was approved by the Institutional Review Board of the Soroka University Medical Center, Beer-Sheva, Israel (protocols WW 001 FROM 02/07/2006).

**Informed consent statement:** All involved parents gave their informed consent (verbal, as accepted by the hospital Helsinki committee) prior to study inclusion. All details that could disclose the identity of the subjects under study were omitted/anonymized.

**Conflict-of-interest statement:** The authors declare no conflicts of interest.

**Data sharing statement:** Technical appendix, statistical code, and dataset available from the corresponding author at [eugenel@bgu.ac.il](mailto:eugenel@bgu.ac.il). Participants gave verbal informed consent for data sharing and the presented data were anonymized and risk of identification is low.

**Open-Access:** This article is an open-access article which was

selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

**Correspondence to:** Eugene Leibovitz, MD, Professor, Pediatric Emergency Department, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, 1 Rager Blvd, Beer-Sheva 84140, Israel. [eugenel@bgu.ac.il](mailto:eugenel@bgu.ac.il)  
**Telephone:** +972-8-6232334  
**Fax:** +972-8-6232334

**Received:** July 26, 2015  
**Peer-review started:** July 27, 2015  
**First decision:** September 22, 2015  
**Revised:** December 26, 2015  
**Accepted:** January 21, 2016  
**Article in press:** January 22, 2016  
**Published online:** May 8, 2016

### Abstract

**AIM:** To determine parental knowledge about acute otitis media (AOM) and its antibiotic therapy, antibiotic resistance and the willingness to comply with the watchful waiting (WW) approach in primary care settings in southern Israel.

**METHODS:** The study was conducted in 3 primary care clinics and the pediatric emergency room of Soroka University Medical Center. Questionnaires (20 questions on education background, previous AOM experience, knowledge on antimicrobial resistance and attitude vs the WW approach) were filled by 600 parents (150 at each centers) of children < 6 years of age.

**RESULTS:** Mothers represented 69% of parents; 2% had an education of < 10 school years, 46% had high-school education and 17% had an academic degree. 69% parents reported previous experience with AOM and 56% thought that antibiotics represent the only treatment for AOM. Knowledge on bacterial resistance to antibiotics was reported by 57% of the parents; 86% parents were willing to accept/probably accept the WW approach for their children. Logistic regression analysis revealed a significant association between parental education and knowledge about bacterial resistance to antibiotics and that previous experience with AOM was significantly associated with reluctance to accept the WW approach. More parents with knowledge on bacterial resistance were willing to accept the WW approach compared with parents without such knowledge. No correlation was found between the education level and willingness to accept the WW approach.

**CONCLUSION:** A significant correlation was found between previous parental education and experience with AOM and the knowledge about antibiotic use, bacterial resistance and acceptance of the WW approach.

**Key words:** Acute otitis media; Children; Antibiotics; Parents; Watchful waiting; Bacteria; Resistance

© **The Author(s) 2016.** Published by Baishideng Publishing Group Inc. All rights reserved.

**Core tip:** The 2004 and 2013 guidelines of the American Academy of Pediatrics suggest the use of a watchful waiting (WW) approach to antibiotic therapy in a selected group of children with acute otitis media (AOM). We determined the parental knowledge about AOM and its antibiotic therapy, antibiotic resistance and the willingness to comply with the WW approach in primary care settings and found a significant correlation between parental education level, previous experience with AOM, knowledge about antibiotic use and about bacterial resistance and the acceptance of the WW approach.

Broides A, Bereza O, Lavi-Givon N, Fruchtman Y, Gazala E, Leibovitz E. Parental acceptability of the watchful waiting approach in pediatric acute otitis media. *World J Clin Pediatr* 2016; 5(2): 198-205 Available from: URL: <http://www.wjgnet.com/2219-2808/full/v5/i2/198.htm> DOI: <http://dx.doi.org/10.5409/wjcp.v5.i2.198>

## INTRODUCTION

Acute otitis media (AOM) is the most common cause of pediatric physician visits and for antibiotic therapy and is common in children between the ages of 6-24 mo<sup>[1]</sup>. Although, spontaneous recovery from AOM has been documented in 70% of AOM cases, it is acceptable

to treat AOM with antibiotics at the time of diagnosis, mainly since it is very difficult distinguish between the AOM cases that will resolve spontaneously and those that will not<sup>[2]</sup>.

In the past few years, antibiotic therapy for AOM has been complicated by emergence of bacterial resistance to antibiotics<sup>[2]</sup>. In 2004, the American Academy of Pediatrics published its guidelines on antibiotic therapy for AOM<sup>[3]</sup>; these guidelines were later accepted by the Israeli Pediatric Association<sup>[4]</sup>. The guidelines suggest the use of a watchful waiting (WW) approach to antibiotic therapy in a selected group of children with AOM, an approach reinforced by the 2011 guidelines<sup>[5]</sup>. The WW approach distinguishes between a positive diagnosis of AOM, and AOM severity: mild, moderate and severe. This approach is still controversial; it was first developed by the Dutch College of General practitioners during the 1980's, and in principle allows for withholding immediate antibiotic therapy from children with a mild to moderate severity-AOM and > 2 years of age, and in children who have a mild to moderate severity-AOM with an uncertain diagnosis and aged between 6-24 mo<sup>[6-10]</sup>. The WW approach can be implemented only if medical supervision is available, with a re-evaluation 24-48 h after the initial diagnosis and prompt initiation of antibiotic therapy in patients who did not improve.

The consequences of this WW approach include a substantial decrease in expenses related to AOM therapy as a result of less antibiotic prescription, and a possible decrease in development of bacterial resistance in pathogens associated with AOM<sup>[3,5,11-14]</sup>.

The aim of this study is to delineate parental knowledge about antibiotic therapy of AOM and the WW approach in the primary care setting and the Pediatric Emergency Room. We also studied the effect of parental education, prior experience with AOM and prior information on the WW approach, on these parameters.

## MATERIALS AND METHODS

The overall population of the southern Israel was > 700000 inhabitants in 2012, of them > 250000 children < 18 years of age. The city of Beer-Sheva has a population of > 200000 inhabitants with a pediatric population > 50000 children < 18 years of age. The community pediatric medical services are provided by 1 central child health center and numerous regular community clinics. The Soroka University Medical Center is the only medical center providing medical services to the whole population of Southern Israel. The PER of the Soroka University Medical Center accepts around 36000 visits/year.

Questionnaires were filled by parents of children <6 years of age, in the waiting rooms of 4 primary care clinics in Southern Israel: (1) the child health center (Center A); (2) one community clinic (Center B), both

**Table 1** Characteristics of the groups of parents enrolled *n* (%)

Characteristic	Total <i>n</i> = 600	Center A <i>n</i> = 150	Center B <i>n</i> = 150	Center C <i>n</i> = 150	Center D <i>n</i> = 150
Enrolled parent					
Mother	414 (69)	105 (70)	96 (64)	116 (77)	97 (65)
Father	186 (31)	45 (30)	54 (36)	34 (23)	53 (35)
Mother age					
20-30 yr	150 (36)	44 (42)	42 (44)	36 (31)	28 (29)
31-40 yr	214 (52)	53 (51)	48 (50)	65 (48)	57 (59)
> 40 yr	50 (12)	8 (7)	6 (6)	24 (21)	12 (12)
Father age					
20-30 yr	31 (17)	5 (11)	14 (26)	5 (15)	7 (13)
31-40 yr	116 (62)	35 (78)	30 (56)	16 (47)	35 (66)
> 40 yr	39 (21)	5 (11)	10 (18)	13 (38)	11 (21)
Working mothers	316 (76)	82 (78)	75 (78)	86 (74)	73 (75)
Housewives	98	23 (22)	21 (22)	30 (26)	24 (25)
Working fathers	171	41 (91)	51 (94)	30 (88)	49 (92)
Unemployed fathers	15 (8)	4 (9)	3 (6)	4 (12)	4 (8)
Parental education					
< high school	13	2 (1)	0	6 (4)	5 (3)
High school	278	68 (45)	54 (36)	88 (59)	68 (45)
College	209	55 (37)	62 (41)	42 (28)	50 (34)
> college	100	25 (17)	34 (23)	14 (9)	27 (18)
Parental past experience with otitis					
Yes	411	112 (75)	101 (68)	100 (67)	98 (65)
Not	181	37 (25)	47 (31)	48 (32)	49 (33)
"I don't know"	8	1 (1)	2 (1)	2 (1)	3 (2)

in Beer-Sheva; (3) the Ofakim community clinic (Center C) in the development town of Ofakim; and in (4) the Pediatric Emergency Room (PER, Center D) of Soroka University Medical Center, Beer-Sheva. The study was conducted between September 2006 and May 2007. The parents were asked about the number of children in the family, previous experience with a child with AOM, level of education, knowledge on AOM, antibiotic resistance, the acceptance of the WW approach to antibiotic therapy in AOM and the source of acquisition of this knowledge.

The study was approved by the institutional review board of the Soroka University Medical Center, Beer-Sheva, Israel (protocol WW 001 from 02/07/2006).

### Statistical analysis

The data were analyzed using the Statistical Package for Social Sciences 16.0 (SPSS 16.0) software. The data were analyzed using the chi square test and the Fisher's exact test as appropriate, a *P* value below 0.05 was considered significant. Multivariate analysis for willingness to accept the WW approach was performed. Variables that were found to be with a *P* value < 0.05 were included, with exclusion of confounding variables. The statistical review of the study was performed by a biomedical statistician.

## RESULTS

A total of 600 parents were enrolled (150 in every one of the 4 locations of the study). None of the parents approached in the 4 centers refused to complete the questionnaire. The characteristics of the 4 groups of

parents enrolled are presented in Table 1. All parents were from 20 to 45 years old; 414 (69%) were mothers. The age of the mothers was similar except for more mothers > 40 years old in Center C (*P* < 0.02 compared with Centers A and B). Most of the mothers, 316/414 (76%), were employed. Out of the 600 parents, 12 (2%) had an education of < 10 school years, 278 (46%) had high school education and 100 (17%) had an academic degree. Experience with a previous child who had AOM was reported by 441/600 (69%) of parents without a significant difference between the locations of the study.

The data on parental knowledge on AOM therapy are presented on Table 2. A total of 441 (69%) reported some previous experience with AOM, with no statistical difference between the 4 centers. Only 55/600 (9%) parents reported no knowledge on the topic of AOM. Most of the parents, 332/600 (56%), thought that antibiotics were the only therapeutic modality for AOM. Only 14/600 (2%) of the parents believed that there was no need for any type of therapy for AOM. The possibility of spontaneous resolution of AOM without any therapy was known by 269/600 (45%) of the parents without statistically significant differences between parents from the 4 locations of the study. However, 162/600 (27%) of the parents believed that resolution of AOM was not possible without therapy and that AOM must be treated with antibiotics. Knowledge about bacterial resistance to antibiotics was reported by 344/600 (57%) of the parents (Table 2). Pain (reported by 30% of the parents who expressed concerns on unsuccessful outcomes without antibiotic therapy) and

**Table 2 Parental knowledge on acute otitis media treatment *n* (%)**

CCCCC treatment/statement	Total <i>n</i> = 600	Center A <i>n</i> = 150	Center B <i>n</i> = 150	Center C <i>n</i> = 150	Center D <i>n</i> = 150
Antibiotics <sup>1</sup>	332 (56)	82 (55)	100 (60) <sup>a</sup>	74 (50) <sup>a</sup>	76 (51)
Ear drops <sup>1</sup>	147 (25)	55 (37)	26 (17)	31 (21)	35 (23)
Tympanocentesis <sup>1</sup>	26 (4)	4 (2)	2 (1)	9 (6)	11 (8)
Paracetamol <sup>1</sup>	6 (1)	0	3 (2)	2 (1)	1 (1)
Homeopathic drops <sup>1</sup>	20 (3)	0	7 (4)	6 (4)	7 (4)
No need to treat	14 (2)	0	4 (2)	5 (3)	5 (3)
"I don't know"	55 (9)	9 (6) <sup>c</sup>	8 (5) <sup>c</sup>	23 (15) <sup>c</sup>	15 (10) <sup>c</sup>
Recovery w/o antibiotics is possible					
Yes	269 (45)	61 (41)	70 (47)	64 (43)	74 (50)
No	162 (27)	32 (21)	32 (21)	54 (36)	44 (29)
"I don't know"	169 (28)	57 (38)	48 (32)	32 (21)	32 (21)
Knowledge on antibiotic resistance					
Yes	344 (57)	117 (78) <sup>b</sup>	89 (59)	58 (39) <sup>b</sup>	80 (53)
No	144 (24)	14 (9)	29 (19)	64 (43)	37 (25)
"I don't know"	112 (19)	19 (13)	32 (22)	28 (18)	33 (22)
Parental concern on unsuccessful outcome w/o antibiotics					
Yes	442 (74)	111 (74)	110 (73)	101 (67)	120 (80)
Not	158 (26)	39 (26)	40 (27)	49 (33)	30 (20)
Parental concern on unsuccessful outcome w/o antibiotics	<i>n</i> = 442	<i>n</i> = 111	<i>n</i> = 110	<i>n</i> = 101	<i>n</i> = 120
Pain and suffering	131 (30)	37 (33)	28 (25)	35 (35)	31 (26)
High fever	110 (25)	21 (19)	26 (24)	32 (32)	37 (31)
Other complications	201 (45)	53 (48)	56 (51)	34 (33)	52 (43)

<sup>1</sup>"Only"; <sup>a</sup> $P < 0.05$  ( $\chi^2$ ); <sup>c</sup> $P < 0.05$  ( $\chi^2$ ); <sup>b</sup> $P < 0.001$  ( $\chi^2$ ).

**Table 3 Parental knowledge about the watchful waiting approach for acute otitis media therapy *n* (%)**

Statement	Total <i>n</i> = 600	Center A <i>n</i> = 150	Center B <i>n</i> = 150	Center C <i>n</i> = 150	Center D <i>n</i> = 150
Physician recommendation in the past					
Yes <sup>1</sup>	194 (40)	69 (61) <sup>b</sup>	41 (37) <sup>b</sup>	40 (32) <sup>b</sup>	44 (32) <sup>b</sup>
Not <sup>1</sup>	291 (60)	44 (39)	69 (63)	85 (68)	93 (68)
Not relevant	115 (19)	37 (25)	40 (27)	25 (17)	13 (9)
Acceptance of WW recommendation					
Yes	337 (55)	79 (52)	70 (47) <sup>a</sup>	92 (61)	95 (63) <sup>a</sup>
Probably yes	178 (30)	45 (30)	51 (34)	46 (31)	36 (24)
No	5 (9)	22 (15)	17 (11)	5 (3)	7 (5)
"I don't know"	33 (6)	4 (3)	12 (8)	7 (5)	12 (8)
Want to be included in physician decisions					
Yes	552 (92)	135 (90)	129 (86)	143 (95)	145 (97)
Probably yes	36 (6)	11 (7)	17 (11)	6 (4)	2 (1)
No	5 (1)	3 (2)	0	0	2 (1)
"I don't know"	7 (1)	1 (1)	4 (3)	1 (1)	1 (1)

<sup>1</sup>From all parents with past experience with otitis media; <sup>a</sup> $P < 0.05$  ( $\chi^2$ ); <sup>b</sup> $P < 0.001$  ( $\chi^2$ ). WW: Watchful waiting.

prolonged fever (25%) were the two major concerns amongst the parents in respect to AOM outcome without antibiotic therapy.

The data on parental knowledge about the WW approach for AOM treatment are presented in Table 3. The WW approach was reported to have been previously offered to 194/485 (40%) of parents. WW was offered significantly more in Center A (69/113, 61%) vs 41/110 (37%), 40/125 (32%), and 44/137 (32%) of the parents in Centers B, C and D, respectively,  $P < 0.001$ . The willingness to use the WW approach in AOM was reported in 337/600 (55%) parents, while another 178/600 (30%) reported that

they would probably agree to this approach, leading to a total of 507/600 (85%) parents that would be willing or probably willing to accept this approach. Nearly all parents, 576/600 (98%), expressed the willingness to take part in the decision making process concerning treatment in AOM, without significant differences between the 4 centers.

Only 214/600 (35%) of the parents knew about the association between antibiotic resistance and antibiotic therapy. The main side effects of antibiotic therapy that were known to the parents were: Diarrhea (revealed in 27% of all questioned parents), "weakening of the immune system" (23%), rash (22%), abdominal pain

**Table 4** Logistic regression analysis: Parameters influencing the parental willingness to accept the watchful waiting approach

Parameters	P value	OR	(95%CI)	
			Lower	Upper
Previous AOM history	0.012	0.341	0.148	0.778
Knowledge on antibiotic resistance	0.026	2.001	1.087	3.685
Parental education	0.028	1.461	0.789	2.706
Parental age	0.607	0.986	0.936	1.040

AOM: Acute otitis media.

(21%), and vomiting (17%); 12% of the parents did not know about any possible adverse effects of antibiotics.

The primary care physicians were the most common source of parental knowledge about AOM (357/600, 59%). In addition, friends and relatives, television and the internet were common sources of information (304/600, 50%; 291/600, 48% and 289/600, 48% respectively). Written journals, pamphlets and well-baby care centers were less common sources of information (161/600, 27%; 90/600, 15% and 55/60, 9% respectively).

### Statistical analysis

Pearson correlation revealed a significant association between parental education and knowledge about bacterial resistance to antibiotics (71.1% of the parents with an academic degree had such knowledge compared with only 41% in parents with high school education or < 10 years of education,  $P < 0.01$ ,  $r = 0.283$ ). A significant inverse correlation was found between previous experience with AOM and willingness to accept the WW approach: 86.3% of the parents that did not have experience with a child with AOM were willing to accept the WW approach vs only 70.6% of parents who had previous experience with AOM,  $P = 0.017$ ,  $r = -0.101$ . A significant correlation was found between parental knowledge about bacterial resistance to antibiotics and willingness to accept the WW approach: 93.4% of the parents with this knowledge were willing to accept the WW approach vs only 87.4% of the parents who did not know about bacterial resistance to antibiotics,  $P = 0.015$ ,  $r = 0.102$ . There was a nonsignificant trend towards correlation between the level of parental education and willingness to accept the WW approach; 93.1% of the patients with academic degrees were willing to accept the WW approach vs 88.7% of parents without academic education,  $P = 0.068$ ,  $r = 0.077$ .

Logistic regression analysis (including the following parameters: previous experience with AOM, parental knowledge on antibiotic resistance, parental education and parental education) revealed that the willingness to accept the WW approach was significantly inversely correlated with previous experience with AOM ( $P = 0.012$ ) and directly correlated with parental knowledge on antibiotic resistance ( $P = 0.026$ ) (Table 4).

## DISCUSSION

AOM is the most common bacterial disease in children and AOM treatment accounts for more than 50% of antibiotic prescriptions for children, and approximately 5 billion dollars in annual costs in the United States<sup>[15-19]</sup>. Many studies have shown relatively low efficacy for antibiotic therapy in AOM<sup>[7,20-25]</sup>. Since there is a spontaneous recovery rate of 70%-90% in AOM, only one patient out of 7-14 children with AOM will have a substantial benefit from antibiotic therapy<sup>[22,26,27]</sup>. Furthermore, the advantages of antibiotic therapy in children with AOM may be offset by side effects of antibiotic therapy, costs, increased bacterial resistance and the loss of the opportunity to include the parents in the medical decisions regarding antibiotics for their children<sup>[28]</sup>. In accordance to these drawbacks related to the indiscriminate use of antibiotics, recent data from United States showed major declines in antibiotic prescribing in children, as a result of educational campaigns aimed at both parents and clinicians<sup>[29-31]</sup>.

The increase in bacterial antibiotic resistance is causing considerable concern<sup>[32,33]</sup>. This concern, together with the possible other side effects of antibiotic therapy, makes the WW approach for the treatment of AOM interesting and attractive<sup>[3-6,8-10,14,34,35]</sup>. However, most of the parents in USA believe that antibiotics are necessary for the treatment of AOM<sup>[36]</sup> and many physicians think that the parents want antibiotics for treatment of AOM in their children, and this is reflected in antibiotic prescriptions<sup>[37,38]</sup>.

Since AOM has been traditionally treated with antibiotics, the willingness of primary care physicians and parents to accept the WW approach requires careful evaluation. In a study that included 16 medical centers in Massachusetts, 2054 parents and 160 physicians were asked about their willingness to accept the WW approach for treatment of AOM<sup>[39]</sup>. Only 32% of the parents were willing to fully or partially accept the WW approach, with an increase in acceptance in parents with a higher education and in those who received prior explanations about this approach. Amongst physicians, 38% reported that they never or almost never used the WW approach in children with AOM older than 2 years, 39% used this approach rarely, 17% often and 6% used this approach most of the time<sup>[39]</sup>. Therefore, it is obvious that there is a need for significant changes in knowledge and attitude toward the WW approach in parents and physicians as well.

Pshetizky *et al.*<sup>[40]</sup> studied in southern Israel the willingness of the parents of 81 children aged 3 mo-4 years diagnosed with AOM to take part in the therapeutic decision making process together with their physicians<sup>[37]</sup>. The authors reported that after short explanations about the likelihood of spontaneous recovery and the possible problems that may be associated with antibiotic therapy, the shared decisions

could result in a 50% decrease in antibiotics use<sup>[40]</sup>.

In this study we examined knowledge and attitude in parents of young children towards therapy in AOM. We focused on antibiotic therapy, its efficacy in AOM, possible complications, and antibiotic resistance to antibiotics. Furthermore, we also studied parental willingness and knowledge about the WW approach in AOM, their previous experience with AOM, level of education, and correlated these variables with the approach towards WW. We recruited parents from 3 primary care clinics in southern Israel, and from the pediatric ER of the only medical center in the area. The pediatric population of Southern Israel is extremely heterogeneous in terms of its ethnic composition and socioeconomic status and therefore the findings presented in this study cannot be extrapolated to other geographic areas of the country and of course not to the whole Israel population.

We found that parental knowledge about AOM therapy (in general) and antibiotic therapy (specifically) is unsatisfactory. Our study revealed that around half of the parents believed that antibiotics are the only therapeutic option in AOM or perceived the disease as a self limited disease. Furthermore, only 36% of the parents knew that bacterial antibiotic resistance was associated with widespread antibiotic therapy. A vast majority of the parents, 85%, were willing to accept or probably accept the WW approach in a shared decision with their primary care physician. Nearly all of the parents, 98%, wanted to take an active part in the decision about antibiotic therapy in AOM. Logistic regression analysis revealed a significant correlation between parental education and knowledge about bacterial resistance to antibiotics. Previous experience with AOM was found to be significantly associated with unwillingness to accept the WW approach in AOM.

Previous experience with AOM was found to be significantly associated with unwillingness to accept the WW approach in AOM. The willingness to accept the WW approach in AOM in relation to previous parental experience with AOM has not been studied previously; we were somewhat surprised to discover that parents with previous experience with AOM were less willing to accept the WW approach. Although, the finding that a higher level of education is associated with knowledge about bacterial resistance to antibiotics has been previously reported<sup>[39,41-43]</sup>, parents in this study showed a much higher acceptance of the WW approach in AOM (85% in this study vs 34% in another study<sup>[39]</sup>). This finding raises many questions and requires further studies to clarify the possibility of effective implementation of the WW approach in AOM, at least in southern Israel. On the other hand, we are certain that educational programs about the proper use of antibiotics and concerns about increasing bacterial resistance to antibiotics can change the opinions and knowledge that we have examined in this study regarding antibiotic therapy for AOM.

In summary, our study determined the parental knowledge about AOM and its therapy, antibiotic resistance and the willingness to comply with the WW approach in primary care settings and found a significant correlation between parental education and experience with AOM and the knowledge about antibiotic use, bacterial resistance and acceptance of the WW approach.

## COMMENTS

### Background

The observation option ("watchful waiting", WW) in the treatment of acute otitis media (AOM) was reconsidered during the last years as an appropriate management option for certain children. The diseases management is based on diagnostic certainty, age, severity of illness and assurance of follow-up. The American Academy of Pediatrics and other medical associations around the world recommend this option in children > 6 mo of age who do not present with severe illness, or in whom the diagnosis is uncertain. In contrast, immediate antibiotic therapy is recommended for children < 6 mo of age and for all those with a severe form of the disease. Nevertheless, for children in the desired age ranges, previous reports have consistently shown that most children do well, without serious adverse sequelae, even without antibiotic therapy. Furthermore, the implementation of the WW method strategy could reduce substantially the use of antibiotics in children and play a major role in decreasing the antibiotic resistance.

### Research frontiers

Since AOM has been traditionally treated with antibiotics, the willingness of primary care physicians and parents to accept the WW approach requires careful evaluation. A majority of physicians reported using at least occasionally the WW method, but few use it frequently. Many parents have concerns regarding the WW method, but acceptability was found increased among those more educated and those feeling included in the therapeutic decision process. Information on knowledge and attitude of parents of young children towards therapy in AOM in southern Israel is limited. The objectives of the present study were to determine parental knowledge about AOM and its antibiotic therapy, antibiotic resistance and the willingness to comply with the WW approach in primary care settings in southern Israel

### Innovations and breakthroughs

The present study enrolled parents from 3 primary care clinics in southern Israel, and from the pediatric ER of the only medical center in the area. The study revealed that around half of the parents believed that antibiotics are the only therapeutic option in AOM or perceived the disease as a self-limited disease. Only one third of the parents knew that bacterial antibiotic resistance was associated with widespread antibiotic therapy. A vast majority of the parents were willing to accept or probably accept the WW approach in a shared decision with their primary care physician. Nearly all of the parents wanted to take an active part in the decision about antibiotic therapy in AOM. Logistic regression analysis revealed a significant correlation between parental education and knowledge about bacterial resistance to antibiotics. Previous experience with AOM was found to be significantly associated with unwillingness to accept the WW approach in AOM.

### Applications

The data presented in this study suggest that the WW option is a valuable and accepted treatment for AOM not only from the point of view of the medical practitioners, but also from the parents of the children sick with this extremely common pediatric condition. Since the pediatric population of southern Israel is extremely heterogeneous in terms of its ethnic composition and socioeconomic status, the findings presented in this study cannot be extrapolated to other geographic areas of the country and of course not to the whole Israel population. Further studies on knowledge and attitude of parents of young children and also of medical practitioners towards therapy in AOM and the WW option in Israel may provide additional information leading to a broad

implementation of the WW policy in the country.

### Terminology

The WW approach to antibiotic therapy of AOM in children refers to withholding immediate antibiotic therapy from children with a mild to moderate severity-AOM and > 2 years of age, and also in children aged 6-24 mo who have a mild to moderate severity-AOM; The WW approach can be implemented only if medical supervision is available, with a re-evaluation in 24-48 h after the initial diagnosis and prompt initiation of antibiotic therapy in patients who did not improve.

### Peer-review

The central research question is to describe parental knowledge and opinions about the watchful waiting approach in AOM. The settings are 3 primary care centers and one pediatric emergency room in southern Israel.

## REFERENCES

- 1 Teele DW, Klein JO, Rosner B. Epidemiology of otitis media during the first seven years of life in children in greater Boston: a prospective, cohort study. *J Infect Dis* 1989; **160**: 83-94 [PMID: 2732519 DOI: 10.1093/infdis/160.1.83]
- 2 Dagan R, Leibovitz E. Bacterial eradication in the treatment of otitis media. *Lancet Infect Dis* 2002; **2**: 593-604 [PMID: 12383609 DOI: 10.1016/S1473-3099(02)00394-8]
- 3 American Academy of Pediatrics Subcommittee on Management of Acute Otitis Media. Diagnosis and management of acute otitis media. *Pediatrics* 2004; **113**: 1451-1465 [PMID: 15121972 DOI: 10.1542/peds.113.5.1451]
- 4 Israeli Professional Committee on Behalf of the Pediatric, Family Medicine and ENT Societies; Clinical diagnostic and therapeutic guidelines for acute otitis media in children. Israel Medical Association 2004. Available from: URL: <http://www.health.gov.il>
- 5 Lieberthal AS, Carroll AE, Chonmaitree T, Ganiats TG, Hoberman A, Jackson MA, Joffe MD, Miller DT, Rosenfeld RM, Sevilla XD, Schwartz RH, Thomas PA, Tunkel DE. The diagnosis and management of acute otitis media. *Pediatrics* 2013; **131**: e964-e999 [PMID: 23439909 DOI: 10.1542/peds.2012-3488]
- 6 van Buchem FL, Peeters MF, van 't Hof MA. Acute otitis media: a new treatment strategy. *Br Med J (Clin Res Ed)* 1985; **290**: 1033-1037 [PMID: 3921097 DOI: 10.1136/bmj.290.6483.1744-a]
- 7 Little P, Gould C, Williamson I, Moore M, Warner G, Dunleavy J. Pragmatic randomised controlled trial of two prescribing strategies for childhood acute otitis media. *BMJ* 2001; **322**: 336-342 [PMID: 11159657 DOI: 10.1136/bmj.322.7282.336]
- 8 Spiro DM, Tay KY, Arnold DH, Dziura JD, Baker MD, Shapiro ED. Wait-and-see prescription for the treatment of acute otitis media: a randomized controlled trial. *JAMA* 2006; **296**: 1235-1241 [PMID: 16968847 DOI: 10.1001/jama.296.10.1235]
- 9 Vouloumanou EK, Karageorgopoulos DE, Kazantzi MS, Kapaskelis AM, Falagas ME. Antibiotics versus placebo or watchful waiting for acute otitis media: a meta-analysis of randomized controlled trials. *J Antimicrob Chemother* 2009; **64**: 16-24 [PMID: 19454521 DOI: 10.1093/jac/dkp166]
- 10 Tähtinen PA, Laine MK, Ruuskanen O, Ruohola A. Delayed versus immediate antimicrobial treatment for acute otitis media. *Pediatr Infect Dis J* 2012; **31**: 1227-1232 [PMID: 22760531 DOI: 10.1097/INF.0b013e318266af2c]
- 11 Kaplan B, Wandstrat TL, Cunningham JR. Overall cost in the treatment of otitis media. *Pediatr Infect Dis J* 1997; **16**: S9-11 [PMID: 9041621 DOI: 10.1097/00006454-199702001-00003]
- 12 Takata GS, Chan LS, Shekelle P, Morton SC, Mason W, Marcy SM. Evidence assessment of management of acute otitis media: I. The role of antibiotics in treatment of uncomplicated acute otitis media. *Pediatrics* 2001; **108**: 239-247 [PMID: 11483783 DOI: 10.1542/peds.108.2.239]
- 13 Little P, Gould C, Moore M, Warner G, Dunleavy J, Williamson I. Predictors of poor outcome and benefits from antibiotics in children with acute otitis media: pragmatic randomised trial. *BMJ* 2002; **325**: 22; discussion 22 [PMID: 12098725 DOI: 10.1136/bmj.325.7354.22]
- 14 Johnson NC, Holger JS. Pediatric acute otitis media: the case for delayed antibiotic treatment. *J Emerg Med* 2007; **32**: 279-284 [PMID: 17394992 DOI: 10.1016/j.jemermed.2006.07.029]
- 15 Berman S, Byrns PJ, Bondy J, Smith PJ, Lezotte D. Otitis media-related antibiotic prescribing patterns, outcomes, and expenditures in a pediatric medicaid population. *Pediatrics* 1997; **100**: 585-592 [PMID: 9310510 DOI: 10.1542/peds.100.4.585]
- 16 Dowell SF, Marcy SM, Phillips WR, Gerber MA, Schwartz B. Otitis Media-principles of judicious use of antimicrobial agents. *Pediatrics* 1998; **101**(suppl): 165-171
- 17 Finkelstein JA, Metlay JP, Davis RL, Rifas-Shiman SL, Dowell SF, Platt R. Antimicrobial use in defined populations of infants and young children. *Arch Pediatr Adolesc Med* 2000; **154**: 395-400 [PMID: 10768680 DOI: 10.1001/archpedi.154.4.395]
- 18 Bondy J, Berman S, Glazner J, Lezotte D. Direct expenditures related to otitis media diagnoses: extrapolations from a pediatric medicaid cohort. *Pediatrics* 2000; **105**: E72 [PMID: 10835085 DOI: 10.1542/peds.105.6.e72]
- 19 Fromm J, Culpepper L, Green LA, de Melker RA, Grob P, Heeren T, van Balen F. A cross-national study of acute otitis media: risk factors, severity, and treatment at initial visit. Report from the International Primary Care Network (IPCN) and the Ambulatory Sentinel Practice Network (ASPEN). *J Am Board Fam Pract* 2001; **14**: 406-417 [PMID: 11757882]
- 20 Kaleida PH, Casselbrant ML, Rockette HE, Paradise JL, Bluestone CD, Blatter MM, Reisinger KS, Wald ER, Supance JS. Amoxicillin or myringotomy or both for acute otitis media: results of a randomized clinical trial. *Pediatrics* 1991; **87**: 466-474 [PMID: 2011422]
- 21 Rosenfeld RM. An evidenced-based approach to treating otitis media. *Pediatr Clin North Am* 1996; **43**: 1166-1181 [DOI: 10.1016/S0031-3955(05)70512-5]
- 22 Damoiseaux RA, van Balen FA, Hoes AW, Verheij TJ, de Melker RA. Primary care based randomised, double blind trial of amoxicillin versus placebo for acute otitis media in children aged under 2 years. *BMJ* 2000; **320**: 350-354 [PMID: 10657332 DOI: 10.1136/bmj.320.7231.350]
- 23 Le Saux N, Gaboury I, Baird M, Klassen TP, MacCormick J, Blanchard C, Pitters C, Sampson M, Moher D. A randomized, double-blind, placebo-controlled noninferiority trial of amoxicillin for clinically diagnosed acute otitis media in children 6 months to 5 years of age. *CMAJ* 2005; **172**: 335-341 [PMID: 15684116 DOI: 10.1503/cmaj.1040771]
- 24 Wald ER. Acute otitis media: more trouble with the evidence. *Pediatr Infect Dis J* 2003; **22**: 103-104 [PMID: 12586970 DOI: 10.1097/00006454-200302000-00001]
- 25 McCormick DP, Chonmaitree T, Pittman C, Saeed K, Friedman NR, Uchida T, Baldwin CD. Nonsevere acute otitis media: a clinical trial comparing outcomes of watchful waiting versus immediate antibiotic treatment. *Pediatrics* 2005; **115**: 1455-1465 [PMID: 15930204 DOI: 10.1542/peds.2004-1665]
- 26 Del Mar C, Glasziou P, Hayem M. Are antibiotics indicated as initial treatment for children with acute otitis media? A meta-analysis. *BMJ* 1997; **314**: 1526-1529 [PMID: 9183201 DOI: 10.1136/bmj.314.7093.1526]
- 27 Rosenfeld RM, Vertrees JE, Carr J, Cipolle RJ, Uden DL, Giebink GS, Canafax DM. Clinical efficacy of antimicrobial drugs for acute otitis media: metaanalysis of 5400 children from thirty-three randomized trials. *J Pediatr* 1994; **124**: 355-367 [PMID: 8120703 DOI: 10.1016/S0022-3476(94)70356-6]
- 28 Butler CC, Rollnick S, Pill R, Maggs-Rapport F, Stott N. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. *BMJ* 1998; **317**: 637-642 [PMID: 9727992 DOI: 10.1136/bmj.317.7159.637]
- 29 Grijalva CG, Nuorti JP, Griffin MR. Antibiotic prescription rates for acute respiratory tract infections in US ambulatory settings. *JAMA* 2009; **302**: 758-766 [PMID: 19690308 DOI: 10.1001/jama.2009.1163]

- 30 **Centers for Disease Control and Prevention.** Office-related antibiotic prescribing for persons aged  $\leq 14$  years--United States, 1993-1994 to 2007-2008. *MMWR Morb Mortal Wkly Rep* 2011; **60**: 1153-1156 [PMID: 21881545]
- 31 **Greene SK,** Kleinman KP, Lakoma MD, Rifas-Shiman SL, Lee GM, Huang SS, Finkelstein JA. Trends in antibiotic use in Massachusetts children, 2000-2009. *Pediatrics* 2012; **130**: 15-22 [PMID: 22732172 DOI: 10.1542/peds.2011-3137]
- 32 **Duchin JS,** Breiman RF, Diamond A, Lipman HB, Block SL, Hedrick JA, Finger R, Elliott JA. High prevalence of multidrug-resistant *Streptococcus pneumoniae* among children in a rural Kentucky community. *Pediatr Infect Dis J* 1995; **14**: 745-750 [PMID: 8559622 DOI: 10.1097/00006454-199509000-00004]
- 33 **Tenover FC,** Hughes JM. The challenges of emerging infectious diseases. Development and spread of multiply-resistant bacterial pathogens. *JAMA* 1996; **275**: 300-304 [PMID: 8544270 DOI: 10.1001/jama.1996.03530280052036]
- 34 **Little P.** Delayed prescribing--a sensible approach to the management of acute otitis media. *JAMA* 2006; **296**: 1290-1291 [PMID: 16968855 DOI: 10.1001/jama.296.10.1290]
- 35 **Leibovitz E.** Antibiotic treatment of acute otitis media in children; to wait or not to wait? *Clin Invest* 2011; **1**: 1-4 [DOI: 10.4155/cli.11.73]
- 36 **Palmer DA,** Bauchner H. Parents' and physicians' views on antibiotics. *Pediatrics* 1997; **99**: E6 [PMID: 9164802]
- 37 **Mangione-Smith R,** McGlynn EA, Elliott MN, Krogstad P, Brook RH. The relationship between perceived parental expectations and pediatrician antimicrobial prescribing behavior. *Pediatrics* 1999; **103**: 711-718 [PMID: 10103291 DOI: 10.1542/peds.103.4.711]
- 38 **Watson RL,** Dowell SF, Jayaraman M, Keyserling H, Kolczak M, Schwartz B. Antimicrobial use for pediatric upper respiratory infections: reported practice, actual practice, and parent beliefs. *Pediatrics* 1999; **104**: 1251-1257 [PMID: 10585974 DOI: 10.1542/peds.104.6.1251]
- 39 **Finkelstein JA,** Stille CJ, Rifas-Shiman SL, Goldmann D. Watchful waiting for acute otitis media: are parents and physicians ready? *Pediatrics* 2005; **115**: 1466-1473 [PMID: 15930205 DOI: 10.1542/peds.2004-1473]
- 40 **Pshetizky Y,** Naimer S, Shvartzman P. Acute otitis media--a brief explanation to parents and antibiotic use. *Fam Pract* 2003; **20**: 417-419 [PMID: 12876113 DOI: 10.1093/fampra/cm414]
- 41 **Kuzujanakis M,** Kleinman K, Rifas-Shiman S, Finkelstein JA. Correlates of parental antibiotic knowledge, demand, and reported use. *Ambul Pediatr* 2003; **3**: 203-210 [PMID: 12882598]
- 42 **Finkelstein JA,** Dutta-Linn M, Meyer R, Goldman R. Childhood infections, antibiotics, and resistance: what are parents saying now? *Clin Pediatr (Phila)* 2014; **53**: 145-150 [PMID: 24137024 DOI: 10.1177/0009922813505902]
- 43 **Vaz LE,** Kleinman KP, Lakoma MD, Dutta-Linn MM, Nahill C, Hellinger J, Finkelstein JA. Prevalence of Parental Misconceptions About Antibiotic Use. *Pediatrics* 2015; **136**: 221-231 [PMID: 26195539 DOI: 10.1542/peds.2015-0883]

**P- Reviewer:** Gisselsson-Solen M, Sillanpaa S **S- Editor:** Ji FF  
**L- Editor:** A **E- Editor:** Wang CH





Published by **Baishideng Publishing Group Inc**

8226 Regency Drive, Pleasanton, CA 94588, USA

Telephone: +1-925-223-8242

Fax: +1-925-223-8243

E-mail: [bpgoffice@wjgnet.com](mailto:bpgoffice@wjgnet.com)

Help Desk: <http://www.wjgnet.com/esps/helpdesk.aspx>

<http://www.wjgnet.com>

