Original Paper

Antibiotic use: do parents act differently for their children?

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Summary

Background: Many children in the community take antibiotics inappropriately. Previous studies comparing parents with other adults suggest that parents are more judicious with antibiotics for their children. This study aims to explore the difference between parents’ use of antibiotics for themselves and for their children.

Methods: The study adopted a combined qualitative and quantitative approach. Eight focus groups were conducted with 56 participants purposively recruited from community centres and of different socio-economic strata. The qualitative data collected were used to construct a questionnaire for the telephone survey, which recruited 2471 adults randomly selected from the local household directory, of whom 547 had ever brought their children or grand children for medical consultation.

Results: Both the qualitative and quantitative approaches showed that parents were more cautious with antibiotics for children than for themselves. The main reason was their concern for the side effects. Fever was the most important drive for their desire of antibiotics for children. The misconception of antibiotics’ effectiveness for sore throat was another determinant of the desire. These attitudes and behaviour were not affected by the respondents’ sex, age, education or household income.

Conclusion: On the whole, parents did to their children what they would do for themselves, but to a lesser extent. Parents’ better knowledge and attitudes will lead to more appropriate use of antibiotics for their children.

Introduction

Antibiotic prescription for upper respiratory tract infection (URTI) is common in the community. The worldwide misuse of it is an important cause of antibiotic resistance (1–3). The large proportion of prescribed antibiotics in the community is to children and adolescents (≤ 19 years). According to a systematic review of surveys between the year 2000 and 2005, the average prevalence of antibiotic use was 34% in this age group (4). Furthermore, up to 46% of paediatric visits for URTI resulted with antibiotics (5,6). This high rate of antibiotic use in children accounted significantly for the increase in antibiotic resistance (7).

Do parents use antibiotics more appropriately with their children than with themselves? What are the factors influencing their decisions? The answers to these questions are important in the prevention of antibiotic resistance and useful in planning future public education and campaigns. A few studies of the misuse of antibiotics compared the adults with the parents. It appeared that parents were less likely to misuse antibiotics to their children. Mitsi et al. found that adults were more likely to use non-prescribed antibiotics (74.6% vs. 22.7%), to be non-compliant (46.7% vs.18.7%) than the parents, and to keep the leftovers (54.6% vs. 7.3%) (8). Balongia et al. found that 28% adults asked for antibiotics from their doctors while 15% parents did so (9). Braun et al. found that 50% adults wanted antibiotics, but 30% parents did so (10). However, these studies were done with separate groups of adults and parents; they did not directly compare between what parents did for their own selves and for their children.

To explore the knowledge, attitudes and practice (KAP) of parents about antibiotics with specific reference to their children, we included relevant questions in our survey of the public’s KAP. The aims were to find if parents were more judicious with antibiotic use for their children and to elicit the factors that determined the use. For simplicity, we use ‘children’ to include also the grandchildren.

What’s known

• Many children in the community take antibiotics inappropriately for URTI.
• Studies comparing parents with other adults suggest that parents are more judicious with antibiotics for their children.

What’s new

• Parents are more cautious with antibiotics for children than for themselves. The main reason is their concern for the side effects of antibiotics.
• Fever is the most important drive for their desire of antibiotics for children.
• The misconception of antibiotics’ effectiveness for sore throat is another determinant of the desire.
• Parents’ attitudes and behaviour towards antibiotics for their children are similar to that for themselves, but to a lesser extent except on getting rid of fever.

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Disclosures

The authors declare no conflict of interest.
Methods

This is part of the larger study on the general public’s KAP with antibiotics. Ethics approval was obtained from the local Institutional Review Board (UW 07-359). A combined approach of qualitative and quantitative parts was adopted. For the qualitative part, we wrote to 236 community centres to invite their members to join the focus groups at their venues. Eight focus groups of adults purposively recruited from different socio-economic strata and age groups were finally held between November 2009 and June 2010. The discussions were conducted by a research assistant experienced in qualitative research and with a semi-structured guide. The discussions were audio-taped and transcribed verbatim. Two researchers coded the transcripts and drew themes separately; the final themes were reached after rounds of discussion.

A questionnaire was designed with the information from the focus groups and revised after testing with a convenience sample of lay-people and university tutors in family medicine. It was again pilot-tested with 50 randomly selected household-telephone holders. The telephone survey was conducted by the Social Sciences Research Centre of the University of Hong Kong (an institute specialised in local telephone surveys) in November and December 2010. The interviewers were experienced in similar surveys and were standardised with the questionnaire before the data collection. The target sample was adults aged 18 years or above speaking the local dialect. Telephone calls were made to households in the evening randomly selected from the latest directory using computer software. In the questionnaire, the respondents were asked if they had ever brought their children or grandchildren to see doctors.

Statistical analysis

Our main research objective was to investigate whether the attitudes and behaviour of parents’ use of antibiotics for themselves were different to that for their children. Viewing the two response variables for the parents themselves and for their children as two independent assessments of the parents, the Kappa coefficient $\kappa$ was used to measure the level of agreement. The magnitude of $\kappa$ reflects the strength of agreement. A $\kappa = 1$ is associated with a complete agreement between the two responses while a $\kappa = 0$ when the two responses are independent. An approximate test for $\kappa = 0$ was also considered in the analysis against the alternative that the $\kappa > 0$ (one-sided test). The McNemar’s Chi-squared test was used to test whether the proportions of giving a yes response to a question on antibiotics use for themselves and for their children are the same in the dependent sample. Pearson Chi-squared test was used to compare the subgroups of parents who did or did not ask antibiotics for their children. Logistic regression was then used to determine the significant factors for requesting antibiotics after adjusting for the potential effects of basic demographic characteristics such as age, sex, education and income levels. For all tests, $p < 0.05$ was taken as statistically significant.

Results

Participants recruited

Focus groups

A total of 56 participants, aged 20–73 years, took part in eight focus groups. There were 21 men and 35 women; 28.8% had completed tertiary education, 46.2% secondary and 25.0% primary or below. They were housewives, young adults, elderly people, retirees or secondary school teachers.

Telephone survey

Of 3996 successful calls to households, 813 refused, 336 did not complete the interview and 376 were excluded because of language problems or under age. Of the 2471 who completed the interviews (response rate 68.3%), 547 had ever brought their children or grandchildren to see doctors. Of these 547 respondents, 432 (79.0%) were aged below 50, and only 4.1% were aged 65 or above; 408 (74.6%) were attending a regular doctor and 441 (80.6%) attended private doctors. Their demographic characteristics are shown in Table 1.

| Table 1 Demographic characteristics of questionnaire respondents (missing data because of refusals) |
|---------------------------------------------------------------|
| **Frequency (%)**                                              |
| **Sex**                                                        |
| Male                                                          | 181 (33.1) |
| Female                                                        | 366 (66.9) |
| **Age (years)**                                                |
| Below 40                                                      | 217 (40.9) |
| 40–64                                                         | 292 (55.0) |
| ≥ 65                                                          | 22 (4.1)  |
| **Education**                                                  |
| Primary or below                                              | 64 (11.9)  |
| Secondary                                                     | 303 (56.1) |
| Tertiary                                                      | 171 (31.8) |
| **Income**                                                     |
| Below $10,000                                                  | 73 (16.5)  |
| $10,000–< 25,000                                               | 160 (36.1) |
| ≥ $25,000                                                     | 210 (47.4) |
Focus-groups discussions
Most focus-group participants would avoid antibiotics for their children. The common reason was the concept that children’s body resistance was weak for the strong side effects of antibiotics.

“... I do not give my children antibiotics because these drugs are potent.” (FG1_P8_p18)

“... I do not give my children antibiotics, I worry that my grandson cannot tolerate antibiotics.” (FG1_P7_p8)

“I did not give my daughter antibiotics last time. I was concerned about the side effects too.” (FG4_P1_p6)

The concern of side effects was also the main factor for non-compliance. The attributed side effects were mostly not caused by the antibiotics, but could be by other drugs (e.g. antihistamines, cough mixtures) prescribed together.

“My child was drowsy and somnolent, and sweated a lot after the antibiotic. He was off colour and kept on sleeping.” (FG2_P6.p6)

“I stopped the antibiotic when I thought the child was recovering.” (FG5_P1.p11)

“Towards the last day or two [of the course of antibiotic], my son insisted of stopping the antibiotic.” (FG4_P5.p4)

Parents wanted and would overtly ask for antibiotics when the children were feverish. Fever was often taken as a sign of serious illness and fast recovery was urgently wanted. Antibiotics were thought to be effective and fast in treating fever.

“If there is no fever, ordinary drug is suffice. But if I perceive serious illness, like having been sick for long time, I will ask [for antibiotics]. I am impatient as I do not wish my child to suffer. You must be fast. The fastest and most effective treatment is antibiotic.”

(FG6_P6.p9,p2)

“Once the child is feverish, we wish to see a doctor who could relieve the fever with one or two doses of drugs.” (FG2_P2.p5)

“Fever damages the brain; brain damage is most worrying.” (FG4_P2.p27)

Questionnaire responses

Behaviour for self and children
Of the whole sample of 2471 questionnaire respondents, 216 (8.7%) had ever asked the doctors for antibiotics and 467 (18.9%) expected antibiotics though not having asked. Of the 547 respondents who had brought their children to see doctors, 43 (7.9%) asked and 97 (19.3%) expected antibiotics for their children, whereas 57 (10.4%) asked and 117 (23.9%) expected for themselves. Comparisons of their behaviours and the reasons for asking and not asking for antibiotics are shown in Table 2. As to the reasons of asking antibiotics, parents were significantly more likely for getting rid of children’s fever.

Table 2 Frequency of responses to the use of antibiotics by 547 respondents who brought children to see doctors*

| Response | Yes | No | NS | NA |
|----------|-----|----|----|----|
| **Wanted antibiotics** | | | | |
| Have you ever asked the doctor to prescribe antibiotics for your children? | 43 (7.9) | 502 (91.8) | 2 (0.4) | 0 |
| Have you ever asked the doctor to prescribe antibiotics for yourself? | 57 (10.4) | 490 (89.6) | 0 | 0 |
| You did not ask antibiotic for your children, but you expected for it | 97 (19.3) | 395 (78.7) | 10 (2.0) | 45† |
| You did not ask antibiotic for yourself, but you expected for it | 117 (23.9) | 361 (73.7) | 12 (2.4) | 57† |
| **Reasons for asking antibiotics** | | | | |
| You asked antibiotics for your children to get rid of the fever | 33 (76.7) | 9 (20.9) | 1 (2.3) | 504‡ |
| You asked antibiotics for yourself when you had fever | 21 (36.8) | 32 (56.1) | 4 (7.0) | 490‡ |
| You asked antibiotics for children for faster recovery | 31 (72.1) | 10 (23.3) | 2 (4.7) | 504‡ |
| You asked antibiotics for yourself for faster recovery | 53 (93.0) | 3 (5.3) | 1 (1.8) | 490‡ |
| **Reasons for not asking antibiotics** | | | | |
| You did not ask antibiotics for your children because you worried about the side effects | 281 (56.0) | 202 (40.2) | 19 (3.8) | 45† |
| You did not ask antibiotics for yourself because you worried about the side effects | 249 (50.8) | 218 (44.5) | 23 (4.7) | 57† |
| You did not ask antibiotics for your children because you trusted the doctor’s decision | 473 (94.2) | 22 (4.4) | 7 (1.4) | 45† |
| You did not ask antibiotics for yourself because you trusted the doctor’s decision | 439 (89.6) | 35 (7.1) | 16 (3.3) | 57† |

*Percentages are calculated by excluding Not Applicable category by denominators. †Parents who had asked antibiotics for themselves or their children did not answer these questions. ‡Parents who did not ask antibiotics for themselves or their children did not answer these questions. NS, not sure; NA, not applicable; RR, relative risk; CI, confidence interval.
($\chi^2 = 12.945$, $p < 0.001$) and less likely for a fast recovery ($\chi^2 = 5.839$, $p = 0.016$) when compared with themselves.

The yes/no responses for children and the parents themselves of the 547 respondents who had ever brought children to doctors were analysed. The kappa coefficients were all significantly greater than 0 (Table 3). For the request of antibiotics, the level of agreement is moderate ($\kappa = 0.407$). The proportions of asking for antibiotics for self and for children were insignificantly different (McNemar’s test, $p = 0.057$); the proportion of asking for self but not for children was 6.2% (34/545) and that of asking for children but not for self was 3.7% (20/545). For the expectation of antibiotics, the level of agreement was moderately strong ($\kappa = 0.576$). The proportion of expecting antibiotics for self but not for children was significantly higher than the proportion of expecting for

| Table 3 | Kappa coefficients of attitudes and behaviour for the children and themselves by 547 respondents who brought children to doctors |
|---------|---------------------------------------------------------------------------------------------------------------------|
|         |                                                                                                                     | McNemar | $\kappa$ [p-value]  |
|         |                                                                                                                     | (95% CI) |                        |
| **Wanted antibiotics**                                                                 |                                                      |          |                        |
| Asked antibiotic for self                                                                 |                                                      |          |                        |
| Yes                                               | 23                                                  | 34       | $\chi^2 = 3.630$       | 0.407 [< 0.001] |
| No                                                | 20                                                  | 468      | $p = 0.057$            | (0.278, 0.535) |
| Expected antibiotics for children                  |                                                      |          |                        |
| Yes                                               | 65                                                  | 44       | $\chi^2 = 8.138$       | 0.576 [< 0.001] |
| No                                                | 21                                                  | 321      | $p = 0.004$            | (0.485, 0.668) |
| **Reasons for asking antibiotics**                 |                                                      |          |                        |
| Antibiotics to relieve fever for children          |                                                      |          |                        |
| Yes                                               | 10                                                  | 0        | $\chi^2 = 8.000$       | 0.263 [0.038]  |
| No                                                | 8                                                   | 3        | $p = 0.005$            | (0.000, 0.535) |
| Antibiotics for fast recovery for children         |                                                      |          |                        |
| Yes                                               | 16                                                  | 5        | NA                     | NA             |
| No                                                | 0                                                   | 0        | NA                     | NA             |
| **Reasons for not asking antibiotics**             |                                                      |          |                        |
| Worried about side effects for children            |                                                      |          |                        |
| Yes                                               | 210                                                 | 22       | $\chi^2 = 7.896$       | 0.686 [< 0.001] |
| No                                                | 45                                                  | 155      | $p = 0.005$            | (0.617, 0.754) |
| Trust doctor’s decision for children               |                                                      |          |                        |
| Yes                                               | 415                                                 | 2        | $\chi^2 = 10.889$      | 0.634 [< 0.001] |
| No                                                | 16                                                  | 17       | $p = 0.001$            | (0.479, 0.789) |

NA, not applicable.
children but not for self (McNemar’s test, \( p = 0.004 \)). These data showed that they were more likely to ask for or expect antibiotics for their own self than for their children.

Regarding the reasons for asking or not asking antibiotics, as none of the 547 respondents had requested antibiotics for fast recovery for themselves, this behaviour between for themselves and for children could not be compared. For the other reasons, the proportions of ‘yes’ for self but ‘no’ for children were significantly smaller than the proportions of ‘yes’ for children but ‘not’ for self (Table 3). These results suggested that the respondents were more concerned about the illness of their children than of themselves. They were more worried about the side effects on their children, and they trusted the doctor’s decision for the children more than for their own.

Factors for requesting antibiotics

Positive scores were given to the correct answers to the questions on the knowledge of antibiotics and the total score was calculated for each respondent. Logistic regression showed that whether a respondent would ask antibiotics for children was independent of age, sex, education, income and the total knowledge score.

Whether the parents requested antibiotics for their children or not had no statistically significant association with attitudes of (i) fewer courses of antibiotics taken would reduce antibiotic resistance, (ii) antibiotic resistance was a serious local problem or (iv) the respondents could help preventing antibiotic resistance (Table 4).

Among the beliefs that (i) antibiotics were effective for common cold, (ii) antibiotics were effective for sore throat and (iii) antibiotics would weaken the body’s resistance, only the belief of effectiveness for sore throat was significantly associated with whether or not to ask antibiotics for the children (odds ratio = 4.28, 95% CI: 1.428–18.450, \( p = 0.021 \)).

The concept that antibiotics were useful for sore throat was significantly associated with requesting antibiotics (Table 4, OR = 6.335, 95% CI: 1.829, 26.265). None of the 37 parents who agreed that antibiotics were not useful for bacterial infection asked antibiotics for their children (Table 4). However, there was no significant association between the ideas of antibiotics’ usefulness for sore throat and that for bacterial infection. Of the 402 respondents who answered both questions, no matter whether the 273 parents who agreed that antibiotics were useful for sore throat or those 129 who disagreed, a similarly high proportion (92.3% and 89.1% respectively) thought that antibiotics were useful for bacterial infections (\( \chi^{2} = 0.739, p = 0.390 \)).

Discussion

The focus groups revealed that parents were mostly cautious with antibiotics for their children. This was because antibiotics were conceived as potent drugs
with side effects too strong for children. This concern of side effects was also the main cause of non-compliance. Fever was the major reason for the expectation of antibiotics for their children. The questionnaire survey substantiated these observations. The parents were less likely to request/expect antibiotics for their children than for themselves. Fever was again the forceful reason for antibiotics. Parents wanted antibiotics because of the false belief that antibiotics were effective for sore throat.

The findings of this study confirmed other studies comparing parents with other adults: parents being more discreet with antibiotics for their children (8–10). We further found that the reason for this discretion was the concern of perceived side effects on children. These side effects, however, such as drowsiness, could be caused by other drugs prescribed concomitantly for URTI rather than the antibiotics proper. Antibiotic resistance was not considered as a reason for discreet use, as shown in: (i) the focus groups did not mention antibiotic resistance as the side effect, but ventilated their emotional disturbance with the drowsiness, loss of appetite, sweating in children mistakenly caused by the antibiotics, (ii) the questionnaire respondents did not differ much in their attitudes with antibiotic resistance between those who requested antibiotics for their children and those who did not (Table 4).

Parents’ desire for antibiotics was based on poor knowledge about the drug. Braun et al. found that parents who wanted antibiotics for their children were more likely than other parents to believe that antibiotics helped cold symptoms (10,11). Parents who requested antibiotics in this study, however, believed that antibiotics were effective for sore throat rather than for common cold. The misconception of the harm by fever drove our parents to seek antibiotics. It was perhaps unexpected that parents did not demand fast recovery for children as for themselves. This could be explained by the concerns of harmful effects from antibiotics and children’s ‘weaker body resistance’. This study supports the notion that adequate knowledge and correct concepts are associated with parents’ appropriate use of antibiotics (12,13).

The fact that parents were more discreet with antibiotics for their children was only relative to themselves. Furthermore, this study showed that what parents believed and did for themselves strongly influenced what they did for their children (Table 3). If they were more likely to ask antibiotics for themselves, they were also more likely to ask antibiotics for their children. Public campaigns and education programmes on antibiotics seldom cover the correct concepts relevant to children. Parents were left to rely on their own knowledge and attitudes, which have been commonly shown to be grossly unsatisfactory among the general public (4,14–17). Future public education should not leave out the children’s aspects.

Strengths and limitations
Unlike previous studies, this study focused on the sole population of parents instead of separate groups of parents and adults. We believe that this approach better revealed any discrepancy in the use of antibiotics between for themselves and for their children. Incorporating qualitative approach made better understanding of the parents’ concerns and worries.

One limitation of this study is the recruitment of higher proportion of questionnaire respondents with higher income. Income was shown by some studies to be a factor influencing people’s KAP with antibiotics (11,18,19). But in our regression model on the factors for parents’ request of antibiotics, household income did not have significant association. High proportions of the recruits attended the private doctors (80.6%) and had regular doctors (74.6%). These might explain the high proportion of recruits trusting their doctors and did not ask antibiotics.

Another limitation is that the findings were based on self-reported data from the parents. Although triangulation was applied to collect data from questionnaire survey and focus-group interviews, there could still be discrepancy between the reported data from the survey and the actual behaviour of the respondents. Nonetheless, our comparisons of the responses were based on the same set of questionnaire. Significant differences in attitudes and practices were observed between the responses for parents and their children.

Moreover, we did not ask if the parents who requested or expected antibiotics did actually receive them. Medical literature demonstrated that patients who expected antibiotics were more likely (even more than three times) to receive one (20–22). Parental expectations that an antibiotic prescription would be given also increased the probability of receiving one (23,24).

Finally, it is uncertain whether there is a difference between parents’ caring for children and parents’ caring for grandchildren. This study did not separate children from grandchildren. As 79.0% of our recruited parents were below age 50 years, our study most likely applied to children rather than grandchildren.

Conclusion
Parents were more cautious in the use of antibiotics with their children compared with their own. Their own knowledge and attitudes with antibiotics (often unsatisfactorily) guided their behaviour of using the
Drug use for their children. Their misconception of the effectiveness of antibiotics for sore throat especially in the presence of fever led to the overuse of antibiotics. Their concern of the side effects led to the misuse of antibiotics like non-compliance. Parents need more information on the appropriate use of antibiotics for their children.

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Author contributions

All authors participated in the design of the study. TP Lam, YT Wun and KF Lam wrote the protocol. TP Lam and KS Sun coordinated the study. KF Lam and YT Wun undertook the statistical analysis, while TP Lam and KS Sun managed the qualitative analysis. YT Wun wrote the first draft. All authors participated in the drafting and approval of the final version of the manuscript.

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