

Antibiotics prescription pattern and compliance for common childhood illnesses – an observational study

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Abstract

Introduction: Antibiotics are generally overused in children. Frequent inappropriate use of antibiotics and poor compliance contributes to antibiotic resistance. An observational study was undertaken to determine the pattern of antibiotic use and compliance for common ailments in children attending a tertiary care hospital in Puducherry, South India. **Methods:** Data was obtained from 197 consecutive children who had visited a health care provider during the previous two weeks for any ailment, in a pretested semi structured questionnaire. Data was entered on MS Excel spreadsheet and analysed using Stata14.0 (Stata Corp, College Station, Tx). Chi square test with Fisher's modification and logistic regression models were used in the analysis. **Results:** Acute respiratory infections were the most common infections in all age groups followed by diarrheal disorders in infants and fever in older children. Proportion of illnesses which received antibiotics was 75% for respiratory illnesses, 78% for fever, 50% for diarrheal disorders and 64% for other infections, there being no statistically significant difference between them. Out of 143 children who were prescribed antibiotics, 127 (89%) gave the medicines as prescribed. However, only 53 (37%) completed the full course of antibiotics. Compliance with treatment was not associated with age or the type of illness. Most of the parents (73%) discontinued antibiotics because of worsening of symptoms. Adverse reaction to antibiotics was seen in 32 (22%) children. **Conclusion:** Overuse of antibiotics for common ailments and poor compliance with treatment were perhaps important contributory causes for development of antimicrobial resistance in this region.

Key words: Antibiotic resistance, Prescription, Patient Compliance, Diarrhea, Fever, Respiratory Tract infection

Introduction

Antibiotics are one of the most widely used medications in children, prescribed by both public and private health care providers. However, their use is not always rational. Problem of over-prescription exists globally. Studies across the globe have revealed overuse of antibiotics in a sick child [1, 2]. Prescription of antibiotics for a sick child is influenced by several factors and shows a wide variation across countries, health care settings, age of the child, season, type of practice, prescribing physicians etc.[3-5]. It has been observed that a higher proportion of sick children are prescribed antibiotics compared to sick adults [2, 6].

Frequent inappropriate use leads to the emergence of drug-resistant micro-organisms [1,7,8]. Poor compliance to prescribed antibiotics also contributes to the same. Antimicrobial resistance is thus a great challenge to health care providers.

It necessitates the identification of various contributory factors and interventions to prevent the emergence of drug resistance, particularly due to inappropriate antibiotic usage.

Several interventions including auditing, training on rational use of drugs, framing guidelines and so on are being taken all over the world to regulate the use of antibiotics [9-11].

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Besides the problem of antibiotic resistance, adverse reactions and economic burden has to be addressed. Since the pattern of antibiotic usage in children varies across the globe, it has to be addressed regionally and locally so that suitable interventions can be planned to restrict antibiotic usage.

Therefore, we have undertaken this prospective study to determine the pattern of antibiotic use and compliance for common ailments in children attending a tertiary care hospital in Puducherry, South India.

The common childhood illnesses encountered and drugs prescribed for them by both public and private practitioners was investigated. The compliance and reasons for poor compliance if any was studied.

Materials and Methods

Study Design: An observational study

Place of study: The study was conducted in the Paediatric department of Indira Gandhi Medical College and Research Institute, a tertiary care hospital in Puducherry, South India after approval from Institute Ethics Committee

Inclusion criteria: Children who had visited a hospital or a physician in the previous two weeks for any ailment.

Results

Data was obtained from 200 children. Three were excluded due to incomplete information and 197 children were included in the final analysis. Out of 197 children, 53 (27%) were ≤ 1 year of age, 87 (44%) between 1-5 years of age and 57 (29%) ≥ 5 years of age. Sample distribution is similar to the proportion of children attending the Paediatrics department in our hospital. The mean maternal and paternal ages were 27.6 \pm 4 years and 33.2 \pm 5 years respectively. The literacy rate was 94% among parents.

Illnesses seen in various age groups is given in Table 1.

Table-1: Common illnesses seen in different age groups.

Age	Common illnesses			
	ARI n (%)	Fever n(%)	Diarrheal disorders n (%)	Others n(%)
≤ 1 year (n=53)	36 (68)	5 (9)	9 (17)	3 (6)
1-5 years (n=87)	54 (62)	22 (25)	7 (8)	4 (5)
≥ 5 years (n=57)	29 (51)	19 (33)	2 (4)	7(12)

ARI = Acute Respiratory Infections.

Acute respiratory infections were the most common infections in all age groups. While this was followed by diarrheal disorders in infants, fever was the next common illness in older children. The point of primary care was the private sector in 162 (82%) children and the public sector in 35(18%).

Sample size: was calculated as 196, using estimated prevalence of medication errors in children as 15%, a precision limit of 5% and 95% confidence interval.

Sampling methods and sample collection: Data was obtained on consecutive children who had visited a hospital or a physician in the previous two weeks for any ailment. Only those children whose parents were willing and gave written consent for the study and could give details of medications were included in the study.

Detailed information on the medications given to children during the previous two weeks for any illness, the educational status and occupation of their parents was collected using a predesigned, pretested, semi-structured questionnaire.

Statistical methods used: Data was entered in Microsoft Excel spreadsheet and analysed using Stata14.0 (Stata Corp, College Station, Tx). The proportion of patients receiving antibiotic strata were compared using the Chi-square test with Fisher's modification when appropriate.

Logistic regression models were used to determine odds ratios (OR) and 95% confidence intervals (CI) for each stratum in comparison to the reference group.

Out of 197 children, 143(73%) were prescribed antibiotics. Proportion of children receiving antibiotics were 68% (36/53), 72% (63/87) and 77% (44/57) in the age groups ≤ 1 year, 1-5 years and ≥ 5 years respectively.

Antibiotic prescription rates were 72% (116/162) and 74% (26/35) respectively in the private and public health care facilities with no statistically significant difference between them.

Antibiotics prescribed for various illnesses are given in Table 2.

Table- 2: Proportion of various illnesses prescribed antibiotics.

Illness	Number prescribed antibiotics n(%)	p value	OR	95% CI
ARI (n=119)	89 (75)	0.35	2.97	1.08 – 8.16
Fever (n=46)	36 (78)	0.030	3.6	1.13 – 11.48
Diarrheal disorders (n=18)	9 (50)	Reference	1.0	-
Others (n=14)	9 (64)	0.42	1.80	0.40 – 2.52

ARI = Acute Respiratory Infections

Although a higher proportion of patients with respiratory illness and fever were prescribed antibiotics compared to diarrheal disorders, this difference was not statistically significant. (p=0.105).

Out of 143 children who were prescribed antibiotics, 127 (89%) gave the dose as prescribed by the doctor.

The others gave less than the prescribed dose for they felt that the child may not tolerate a high dose.

The proportion of children given the prescribed dose of antibiotics is similar in the three age groups being 83%, 90% and 91% respectively.

However, it was observed that only 53 (37%) children out of 143 completed the full course of antibiotics (Tables 3 and 4).

Table- 3: Proportion of children in different age groups who have completed full course of antibiotics.

Age (n= no. prescribed antibiotics)	Completed antibiotic course n(%)	p value	OR	95% CI
≤ 1 year (n=36)	16 (44)	Reference	1.0	
1-5 years (n=63)	23 (37)	0.44	0.72	0.31 – 1.65
≥ 5 years (n=44)	14 (32)	0.25	0.58	0.23 – 1.45

Table- 4: Proportion of children with different types of illnesses who have completed full course of antibiotics.

Illness	Number given antibiotics	No. Completed course n (%)	p value	OR	95% CI
ARI	89	33 (37)	0.38	2.06	0.40 – 10.52
Fever	36	16 (44)	0.24	2.8	0.51 – 15.38
Diarrheal disorders	9	2 (22)	Reference	1.0	-
Others	9	2 (22)	1	1.0	0.11 – 9.23

ARI = Acute Respiratory Infections

There was no association between completing the course of antibiotics and different age groups or type of illness. The reasons for not completing the course of antibiotics were worsening of symptoms in 66 (73%), adverse reaction to drugs in 17 (19%) and improvement in symptoms in seven (8%).

Adverse reaction to antibiotics was seen in only 32 (22%) children. These were vomiting, diarrhoea and skin rashes in 28 (20%), three (2%) and one (1%) respectively. Out of 36, 63 and 44 children in the age groups ≤ 1 year, 1-5 years and ≥ 5 years respectively the corresponding number of children developing adverse reactions were 11 (31%), 12 (19%) and 9 (20%) with no statistically significant difference between them ($p=0.39$).

Discussion

This study has shown that 73% of children who seek health care are prescribed antibiotics. Although this is less than over 80% reported by some investigators, it is higher than that observed in some studies, where the antibiotic prescription rates range from 35% to 65% [12-14].

The difference in the prescription rates observed in various studies could be due to differences in the severity of illness, health care settings, prescribing doctors etc which have a bearing on prescription practices.

It has been observed that antibiotic prescription rates are higher with general practitioners as compared to specialists [3] [15,16].

However, we found similar rates of prescription by both public and private health care providers being 72% and 74% respectively.

Common reasons for which children seek health care are respiratory infections, fever and diarrheal illness [13] [17,18]. The most common indication for antibiotic prescription was fever in this study which is similar to that reported by Kumar et al [7].

However, it is at variance with several other studies where acute respiratory infection was the commonest indication for antibiotic prescription [2,14,19].

This again could be due to the difference in the prevalence of illnesses in different regions. While respiratory infection in general and otitis media in particular seem to be the common infections for which antibiotics are prescribed in developed countries, supposed blood stream infections like salmonella, malaria seem to be more common for antibiotic prescription in developing countries [7].

Our study showed that 75% of children with respiratory infections were prescribed antibiotics which is similar to 79.9% observed by Barathyraja et al [20]. Prescription rate for respiratory infections shows a wide variation ranging from 10% - 50% [21, 22].

Although there are guidelines for prescribing antibiotics for acute respiratory infections, these were not strictly adhered to in many instances resulting in over prescription [1]. High prescription rate of antibiotics for respiratory infections could be because of the perceived severity of the illness by both physician and parent [22].

The lowest rate of antibiotic prescription seen in this study was for diarrheal illnesses being 50%. This is higher than that observed by some, where 44% of diarrheal illnesses received antibiotics, but much lower than over 70% reported by some investigators [23, 24].

Despite World Health Organization (WHO) guidelines for managing diarrheal illness being in practice for several decades, our findings suggest that there continues to be overuse of antibiotics for this condition.

We observed that only 38% of those given antibiotics completed the course. This is lower than that observed in Bangladesh where more than 60% of patients had completed their full course of antibiotics [25].

There are several reasons for not complying with treatment such as intolerance, dosing frequency, and clinical improvement. However, we found that the most common reason for non-compliance was worsening of symptoms. It is possible that parents get alarmed when a child does not show immediate

response to treatment and keep hopping from doctor to doctor without realizing the implications of not completing the course of antibiotic prescribed. Non-compliance is perhaps due to both overanxious parents and doctors who are not prepared to wait and watch.

WHO has launched antibiotic stewardship program on world health day in 2011 to restrict the use of antibiotics [11].

Several measures are being taken for restricting the use of antibiotics such as judicious use of lab investigations, interventions that include educating parents and changing clinicians' behavior, enforcing strict adherence to guidelines which have significantly reduced the use of antibiotics [9,10] [21].

Conclusion

This study shows overuse of antibiotics for acute illnesses in children and poor patient compliance, both of which significantly contribute to development of antibiotic resistance. There was no significant difference in the prescription rates of antibiotics between private and public health care providers.

The need of the hour is launching educational and professional campaigns in the community targeting both physicians and parents to limit antibiotic usage and improve compliance.

This could go a long way in making optimum use of antibiotic in children and may help in combating antimicrobial resistance.

Key words: Antibiotic resistance, Prescription, Patient Compliance, Diarrhea, Fever, Respiratory Tract infections

What is already known- Antibiotics are generally overused in children

What this study adds

- Proportion of common childhood illnesses such as fever, respiratory infections and diarrheal disorders that are prescribed antibiotics
- Compliance with antibiotic use and reasons for non-compliance

Abbreviations used

OR- Odd's ratio, **CI-**Confidence interval, **ARI-** Acute respiratory infections, **WHO-**World Health Organisation

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Authors' contribution

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1. Concept, Design of the work, Data acquisition, Data analysis, drafting the work, editing and revising it critically and final approval of the version
2. Design of the work, Data acquisition, Data analysis, drafting the work, editing and revising it critically and final approval of the version
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4. Data acquisition and data analysis

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