

Original Research Article

PROMOTING AWARENESS ABOUT PROPER USE OF ANTIMICROBIALS AND ANTIMICROBIAL RESISTANCE AMONG SCHOOL CHILDREN

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ABSTRACT

Introduction: Antimicrobial resistance is increasing in India due to lack of knowledge about proper use of antimicrobials among general population. Proper knowledge of antimicrobial use is necessary before an individual has responsibility for using or buying such medicines. Unlike most other countries, education programs to promote appropriate use of antimicrobials are lacking in Indian Schools. The objectives of this study were to know the base level knowledge and to evaluate the efficacy of a teaching intervention to improve students' knowledge regarding proper antimicrobial use and antimicrobial resistance.

Methods: This was pre and post test design study using a questionnaire containing 10 questions. Total 500 school going children from three different schools were enrolled. Informed consent and ethics committee approval obtained. Intervention in the form of daily lectures for 15-20 minutes given for two weeks followed by post test was given. The statistical analysis was done by using SPSS version 15 and McNemar-Bowker Test was used to compare the data of post-tests to the baseline & $P < 0.05$ was considered significant. **Results:** Out of 500 school children participated in this study, 46% were boys and 54% were girls. Results of pre-test suggest that children's knowledge regarding antimicrobial resistance was extremely insufficient and they were having several misconceptions about antimicrobial usage. Statistically significant improvement observed regarding the knowledge of proper use of antimicrobials after the intervention.

Conclusion: The strategy used in this study seems promising and correct dissemination of information on antimicrobials can change their attitudes and behaviours regarding antimicrobial use. We believe it can be replicated in other schools, complemented by experimental activities, to promote long-term retention of knowledge.

KEY WORDS: Antimicrobial resistance, antimicrobial resistance awareness, appropriate use of antibiotics, high school students

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BACKGROUND

Antimicrobials have tremendously contributed to decrease in mortality as well as improvement in quality of life of the people ever since their introduction [1]. However over a period of time, bacteria have developed resistance to many life-saving antimicrobials because of the inappropriate use of antimicrobials [2].

Previous studies have shown that the lack of knowledge about the proper use of antimicrobials is the most important reason for inappropriate use of antimicrobials which poses a significant health hazard not only to the patient but also lead to development of antimicrobial resistance. In many developing countries, people lack access to the essential medicines and the

basic healthcare services, no stringent control over the distribution of antimicrobials i.e. availability of antimicrobials over the counter without prescription, pill for every ill attitude of the people which leads to consumption of antimicrobials even for viral infections like common cold, and more importantly the high cost of antimicrobials make the people to take the drug for lesser duration. All the above factors are responsible for the spread of antimicrobial resistance [3].

Proper knowledge of antimicrobial use is necessary before an individual has responsibility for using or buying such medicines. Although several countries have already started education programs to promote appropriate use of antimicrobials for middle-school students, it is still the most neglected domain of the school health curriculum in India [4].

Very few studies are available about the level of knowledge of school children regarding the antimicrobials. In a non-interventional study by Kotwani et. al. on school going children having age group 9-11 from New Delhi, focused group discussion were conducted with school children and results showed very poor awareness about antibiotics as well as antibiotic resistance among them. However children were very keen to learn more about antimicrobial resistance.⁵ Similarly, in another non interventional study by Almeida NM et.al. , a questionnaire based survey was conducted among high school children in Goa and results showed that majority of the students were unaware about the problem of the antimicrobial resistance [6].

Being the future medicine users it is important to know student's current level of knowledge and attitudes regarding antimicrobial use. As only few interventional studies for improving the knowledge about antimicrobial use are conducted previously, it will be important to know whether any intervention to increase the awareness about proper use of antimicrobials can result in some attitudinal changes among school children. Hence this study was planned, targeting the school going children as earlier the intervention, longer lasting health related behaviour can be successfully inculcated into them. The objectives of this study were to know the base level knowledge and to evaluate the

efficacy of a teaching intervention for improving students' knowledge regarding proper antimicrobial use and antimicrobial resistance.

METHODS

Design: This was an interventional study in which data were collected using a questionnaire. We tried to keep the questionnaire short and as simple as possible keeping in mind the age group of the participants. It was very important to accurately assess the level of knowledge about proper use of antimicrobials in school children, so based on the objectives of this study we included only 10 questions in the questionnaire. We tried to cover most aspects of the proper use of antimicrobials. The questionnaire was finalized only after peer reviewing by experts. To judge the aptness of the questionnaire in line with the study objectives, we pre-tested this questionnaire on a group of 15 students who were not included in this study. The study protocol was approved by Institutional Ethics Committee of Government Medical College, Nagpur. In this study level of awareness about proper use of antimicrobials among school children was compared before and after giving an intervention in the form of lectures to the school children.

Setting: This study was conducted in three different schools of Nagpur city among school children in the age group of 14-15 years were included. School children studying in IXth standards were included in this study.

Study Population: 500 high school children were included in this study after obtaining permission from school authorities and informed consent from their parents. Assent from school children was also obtained.

Interventions: The questionnaire was consisted of total 10 questions of objective type in which student needed to mark his choice out of three options as "Yes", "No" and "Don't Know". No time limit was given to answer the questionnaire but students were prohibited from discussing with others except with the concerned class teacher. Also it was specifically explained to students that this questionnaire carries no marks and not designed to test their general knowledge. Initially special one hour session was conducted to aware all the teachers helping to

conduct this study voluntarily. Purpose and procedure of the study was explained to them in that session. All the doubts related to proper use of medicines were answered during that session. After explaining about the research project to the school children, pretesting was done by administering a questionnaire containing 10 questions to assess children's base level knowledge about proper use of antimicrobials and antimicrobial resistance. Teaching material related to the study project was distributed to teachers and requested to teach children daily for 15-30 minutes for 15 days. Such small sessions were preferred to avoid encroachment on their regular studies. Information leaflet related to proper use of medicines were distributed to students. Also, posters related to proper use of antimicrobials as well as about harmful effects of antimicrobial resistance were displayed near the notice boards so that students could see them easily. Teachers were requested to constantly reinforce students to read the educational posters. After 15 days one hour lecture on proper antimicrobial use was given to school children. Post test was conducted again 30 days after the pretest to know the level of retained knowledge. The statistical analysis was done by using SPSS version 15 and McNemar-Bowker Test was used to compare the data of post-tests to the baseline & $P < 0.05$ was considered significant.

RESULTS

The present study was conducted to know the baseline knowledge about the proper use of antimicrobials and antimicrobial resistance in school children and the effect of intervention in the form of information, education and communication to the children. Out of 500 school children participated in this study, 46% were boys and 54% were girls. All the students completed both pre-test and post-test. Table No. 1 summarizes important characteristics of the antimicrobial usage. Many respondents (31.4%) agreed that they have leftover antimicrobials available at their home and nearly 18.8% respondents agreed that antimicrobials can be obtained without any prescription over the counter. Table no. 2 summarizes the responses to the pre-test and post-test questionnaire. From the results presented in table no. 2 it is clear that there is increased awareness about the

Table 1: Antimicrobial usage characteristics.

| | | n | % |
|---|------------|-----|------|
| Antimicrobial usage in last month | Yes | 60 | 12 |
| | No | 440 | 88 |
| Whether antimicrobials obtained without prescription | Yes | 94 | 18.8 |
| | No | 339 | 67.8 |
| | Don't Know | 67 | 13.4 |
| Are there any leftover antimicrobials available at your home? | Yes | 157 | 31.4 |
| | No | 259 | 51.8 |
| | Don't Know | 84 | 16.8 |

Table 2: Pre and Post-test responses of participants (All figures in percentages, n=500).

| S. N. | Questions | Pre-test | | | Post-test | | | P value |
|-------|---|----------|-------|------------|-----------|-------|------------|---------|
| | | Yes | No | Don't Know | Yes | No | Don't Know | |
| 1 | Antimicrobials are effective against bacteria as well as viruses. | 63.46 | 16.66 | 19.87 | 42.94 | 51.28 | 5.76 | <0.0001 |
| 2 | Newer and costly antimicrobials are more safe and effective | 46.79 | 33.33 | 19.87 | 52.56 | 39.74 | 7.69 | <0.05 |
| 3 | Antimicrobial resistance has become a problem in India | 40.38 | 41.02 | 18.58 | 67.95 | 23.07 | 8.97 | <0.0001 |
| 4 | Stop antimicrobials if symptoms disappear | 30.12 | 56.41 | 13.46 | 17.94 | 76.92 | 5.12 | <0.001 |
| 5 | We can share antimicrobials if similar complaints | 23.71 | 50.64 | 25.64 | 12.17 | 82.05 | 5.77 | <0.0001 |
| 6 | Use antimicrobials in cold and flu for early recovery | 58.97 | 23.07 | 17.95 | 20.51 | 77.56 | 1.92 | <0.0001 |
| 7 | Frequent use of antimicrobials will have no effect on efficacy of treatment | 28.84 | 38.46 | 32.05 | 39.1 | 57.69 | 2.56 | <0.0001 |
| 8 | One can use previously leftover antimicrobials if similar complaints | 17.95 | 59.61 | 22.43 | 19.87 | 76.92 | 3.2 | <0.0001 |
| 9 | Bacteria are becoming resistant to antimicrobials | 44.23 | 33.97 | 21.79 | 52.56 | 36.54 | 14.74 | 0.339 |
| 10 | Antimicrobial resistant bacteria could infect me or my family. | 46.15 | 21.15 | 32.69 | 68.59 | 20.51 | 10.9 | <0.0001 |

problem of antimicrobial resistance in India. Many misconceptions about antimicrobials such as costly and newer antimicrobials provide better results or use of antimicrobials in viral infections provide relief, were routed out. Significant difference was observed between pre and post-test results for the knowledge on correct use of antimicrobials such as harmful effects of early stopping of antimicrobial therapy ($P<0.001$), sharing of antimicrobials ($P<0.0001$), use of antimicrobial in cold and flu and use of leftover antimicrobials ($P<0.0001$). Although no significant difference found between the results of pre and post-test regarding the knowledge on severity of antimicrobial resistance, increased awareness was observed post intervention regarding dangers of frequent use of antimicrobials and the resultant antimicrobial resistance antimicrobial resistance ($P<0.0001$).

DISCUSSION

The objectives of this study were to know the base level knowledge and to evaluate the efficacy of a teaching intervention for improving students' knowledge regarding proper antimicrobial use and antimicrobial resistance. A convenience sample of 500 middle-school students was used to collect the pre-test data followed by which an intervention to increase the knowledge on correct use of antimicrobials was given. The teaching method selected here was a daily lecture for 15-30 minutes only so as to avoid disturbance to daily routine studies of the students and the main focus was given on teaching correct use of antimicrobials. Results of pre-test suggest that children's knowledge regarding antimicrobial resistance was extremely insufficient and they were having several misconceptions about antimicrobials including antimicrobials can be used in cold and flu for early recovery, antimicrobials are effective against viruses and sharing or use of leftover antimicrobials if similar complaints develop again. Similarly they were unaware about the problem of antimicrobial resistance in India. Regarding the awareness about the problem of antimicrobial resistance, we can see that the awareness about the problem improved significantly post intervention. In a similar study by Fonseca MJ et. al., involving 42 high school students (aged 15-16 years), students developed

more comprehensive knowledge about antimicrobial resistance and better conceptualizations of bacteria and antimicrobials after the teaching intervention.⁷ The children had misconceptions about the efficacy of antimicrobials against antimicrobials as well as diseases such as cold and flu which are most of the time viral infections. Similar results have been obtained in earlier studies in other part of the world [8,9]. Hameen-Anttila K et al. reviewed school children's attitudes, beliefs and knowledge about medicines from 17 countries in which authors asserted that the most common reason for deficient knowledge about medicines in school children is that in many countries, teaching about rational use of medicines is not included in the school curriculum. Moreover, may be due to busy schedule, physicians avoid giving any information to school children and so whatever the information, a child learn about antimicrobials is entirely obtained from the parents who themselves have deficient knowledge about antimicrobials [10]. Similarly, in another questionnaire based study by Zyoud SH et al. involving 385 participants; nearly 70% parents agreed that they would use antimicrobials in cold and flu for faster recovery of their child [11].

The awareness about antimicrobial is low among Indian population which is also reflected in our study. This issue has been discussed in a review about problems of antimicrobial resistance in India by Raghunath D, in which he pointed out lack of central monitoring agency as well as proper educational program for the general public for steadily increasing prevalence of antimicrobial resistance in India [12]. The misconceptions about sharing of antimicrobials or using the leftover antimicrobials in the incidence of similar complaints were routed out after the intervention. Earlier studies have shown, parents generally give antimicrobials to children if previous complaints reappear or give medicines of one child to the other. These practices could also influence the attitude of children as they mostly learn about medicines by observing their parents [13,14].

Awareness about spread of antimicrobial resistance after repeated unnecessary use was increased after the intervention. Similarly,

misconception that newer and costlier antimicrobials are always safe and effective was also changed post intervention. Previous study involving 36 doctors to explore the factors that influence primary care physicians to prescribe antimicrobials showed that many doctors prescribed antimicrobials to the children even for the viral infection due to the demand by the parents for newer and stronger antimicrobials. Although doctors were aware about the irrational prescription of antimicrobials, they agreed that they could not educate parents due to lack of time and for the fear of losing patients. This type of behaviour displayed by the parents can influence the child's attitude towards antimicrobial use [15].

A limitation of this study is the use of a convenience sample of ninth graders in three schools. While this facilitated the conduct of the study it may limit the generalization of the findings. Further study in other areas of the country with larger urban and rural populations will help to confirm the findings.

CONCLUSION

The results of this study strongly suggest that children have several misconceptions and a lack of awareness on antimicrobial use and resistance. These findings support the idea that there is need to educate children about proper use of antimicrobials. Considering the seriousness of the spread of antimicrobial resistance, it is time to develop health education programmes especially for school going children and healthcare professionals. Appropriate teaching activities on appropriate antimicrobial use are crucial to correct misconceptions on antimicrobial use. Understanding risks and limitations of correct antimicrobial use can impart sense of responsibility. Moreover, school children can become conduits of information about proper use of antimicrobials to their families. In addition, rules and regulations should be implemented strictly to control prescription of antimicrobials and to involve the pharmacists for creating awareness about proper antimicrobial uses and about the problem of increasing antimicrobial resistance in India.

In conclusion, the strategy used in this study seems promising and correct dissemination of

information on antimicrobials can change their attitudes and behaviours regarding antimicrobial use. We believe it can be replicated in other schools, complemented by experimental activities, to promote long-term retention of knowledge.

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