Original Research Article

Role of usage of antibiotics in pharyngitis: a prospective study

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ABSTRACT

Background: Antibiotic resistance is emerging as a global public health problem and is growing day by day in both developed and developing countries. This study aims at scientific investigation into the need for the use of antibiotics in cases of pharyngitis.
Methods: A prospective study of 2000 patients complaining of sore throat, randomly selected from outpatient department during 1 year period from August 2015 – 2016 .They were studied clinically and investigated for infectious etiology and the role of usage of antibiotics was analysed.
Results: Among 2000 patients, 1840 patients were relieved of sorethroat with only symptomatic treatment. Antibiotics were given only in 160 patients (8%) as throat swab demonstrated bacterial growth. Most common organisms were Group A beta haemolytic *Streptococci* and *E coli*. Allergic pharyngitis and laryngo pharyngeal reflux disease constituted the important causes of sore throat among middle age groups (20-40 years) and elderly age groups (50-60 years) respectively.
Conclusions: Antibiotics should not be given to patients unless there is documentary evidence of bacterial infection. Most of the patients (92%) did not require antibiotic prescription, the illness was self-limiting in acute cases and patients who demonstrated allergic and laryngo-pharyngeal reflux etiology required symptomatic medication. Inadvertent use of antibiotics will lead to spread of resistance in the community; this will limit the usage of higher antibiotics for complicated cases and ICU patients. This highlights opportunity to enhance physician's awareness for reducing inadvertent use of antibiotics among adult pharyngitis patients and optimizing Antibiotic therapy usage.

Keywords: Antibiotics, Pharyngitis, Antibiotic resistance

INTRODUCTION

Sore throat is a common presentation clinically .It accounts to 1.1% of primary care visits.[1] Most common causes of Sore throat in immunocompetent individuals are due to Acute pharyngitis, Chronic granular pharyngitis, Chronic simple pharyngitis, Allergic pharyngitis, laryngo-pharyngeal reflux disease. Most of Acute pharyngitis are caused by Viruses and only 5-15% of adult cases are caused by Group A beta haemolytic *Streptococci* (GABHS).[2] Illness is self-limiting in immunocompetent adults. It is very important to identify

GABHS infection as this is the only type of acute pharyngitis where antibiotic use is advisable as it prevents severity of disease and prevents suppurative complications.[3] It is difficult to differentiate Streptococcal pharyngitis clinically from non-Streptococcal pharyngitis. Culture of throat swab on sheep-blood agar plate is gold stardard to diagnose acute GABHS pharyngitis.[3] Rapid Streptococcal test (RST) helps in identifying Streptococcal infection in the clinic and helps to decide whether to prescribe antibiotics to the patient with pharyngitis.[4] By helping to identify bacterial infection, RSTs may help to limit the use of antibiotics in viral

illnesses, where they are not beneficial. Inappropriate antibiotic use contributes to development of drug resistant strains of bacteria.[4]

Centers for disease control and prevention (CDC) and the American college of physicians-american society of internal medicine (ACP-ASIM) gave the four point centor clinical scoring scale to diagnose GABHS and suggested its management in adults. The four criteria were fever more than 38˚C, absence of cough, tender anterior cervical lymphadenopathy and presence of tonsillar swelling or exudates.[5]

American college of physicians/centers for disease control and prevention guidelines for the management of pharyngitis.

Centor score is based on four criteria taking signs and symptoms into consideration. One point is given for each of the following if present.

- Fever - +1,
- Absence of cough - +1,
- Swollen, tender anterior cervical nodes - +1,
- Presence of tonsillar Swelling or exudates - +1.

Table 1: Centor Streptococcal score.

Centor score	American college of physicians/ centers for disease control and prevention guidelines
0	No throat swab or culture & No Antibiotics
1	No throat swab or culture & No Antibiotics
2	Rapid test /throat swab & culture are done, antibiotics if positive
3	Rapid test /Throat swab & culture are done, antibiotics given emperically
4	Culture all and Antibiotics are given emperically

Based on these signs and symptoms, the centor score is calculated by totaling all the four criteria. A score of (0-4) is given in Table 1.

The mcIsaac score is modification of centor's score, devised to diagnose GABHS. It is derived from 521 patients from a University-affiliated family practice in Toronto and validated on 621 patients from 49 Ontario communities. As GABHS is more common in younger patients than older patients, the mcIsaac score is calculated by adding one point to the centor score for patients ages 3-14 years, and subtracting one point for those age 45 years and above as shown in Table 2.[5-7] Total score is calculated by adding all the points and management is suggested according to the scored points.

Table 2: Mcisaac modification of centor Streptococcal score.

S.No	Symptom or sign	Points
1	Temperature > 38˚ C (100.4˚F)	1
2	Absence of cough	1
3	Tender anterior cervical adenopathy	1
4	Tonsillar swelling or exudates	1
5	Age less than 15 years	1
6	Age between 15 – 45 years	0
7	Age more than 45 years	-1

*Score: Calculated by totaling above points; 0-1 points: Strep throat ruled out (only a 2% risk); 1-3 points: Order rapid strep test, treat accordingly; 4-5 points: Diagnose probable strep throat (52%) risk, consider empiric antibiotic therapy.

Aims of study

To identify etiological distribution of sore throat, the role of usage of antibiotics, to focus the need to limit the inadvertent usage of antibiotics.

METHODS

This is a Prospective cohort study of 2000 patients complaining of sore throat, randomly selected from ENT outpatient department during the period of one year (i.e. from August 2015-2016. All immuno-competent individuals complaining of throat pain between the age group from 10-65 years are included in the study. Known cases of infective pathologies like tonsillitis, adenoiditis, gross deviated nasal septum, sinusitis, CSOM and granulomatous diseases, hospital acquired infections, immuno compromised individuals and those patients who were not willing for follow-up are excluded from the study.

All selected patients of sore throat were evaluated clinically. Throat swab is taken and sent for microbiological tests (staining, culture and sensitivity). All necessary blood investigations like CBP, ESR, absolute eosinophil count, serum IgE levels were done. In the patients of laryngo - pharyngeal reflux disease, upper gastrointestinal endoscopy was done.

Symptomatic treatment likes anti -inflammatory drugs, anti-allergics, local and systemic decongestants and anti-reflux medication were given. Antibiotics were given only if throat swab was positive for bacterial growth. Appropriate antibiotic was chosen from the culture and sensitivity report and results were analyzed.

RESULTS

Age distribution among the study group shows maximum number of patients (640) in the 10-20 year age group followed by 20-30 year (younger) age group and

minimum number of patients (80) was seen in 60-70 year (older) age group as shown in Figure 1.

Acute pharyngitis was present in 680 patients (34%) and was most common among younger age groups between 10-20 years. Chronic unspecified types of Sore throats were identified in 200 patients (10%) and were common among middle age groups (20-40 years). Laryngo-pharyngeal reflux disease was identified in 640 patients (32%) was common among middle and elderly (50-60 years) age groups. Allergic pharyngitis was present in 320 patients (24%) which were common in young and middle age groups and among females as shown in Figure 2.
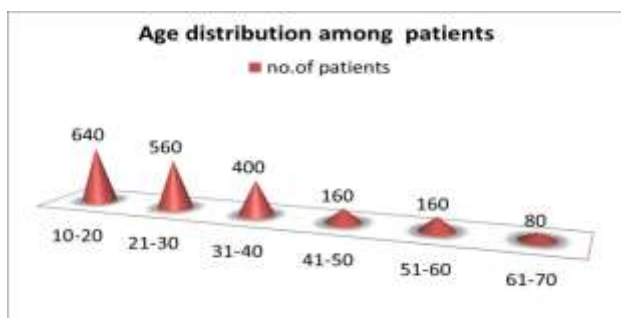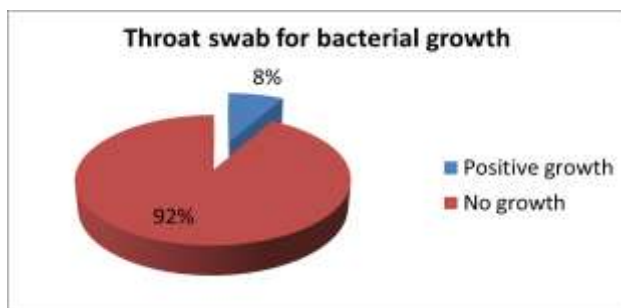

Figure 1: Age distribution among patients.
*Pharyngitis was common among younger age group.
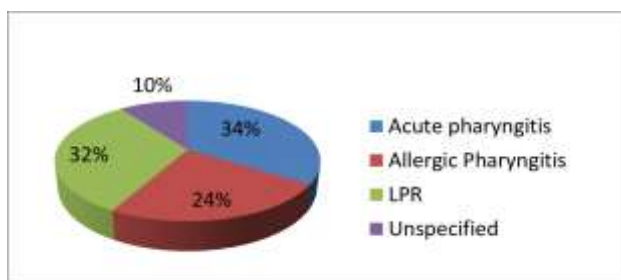
Figure 2: Etiological distribution among study population.
*This chart shows acute pharyngitis as the commonest aetiology followed by allergic pharyngitis.

Figure 3: Throat swab for bacterial growth.
*Throat swab was positive for bacterial growth in only 8% of patients.

Out of 2000 patients, throat swab was positive for bacterial growth in only 160 patients (8%) as shown in figure 3. Among them, most common organisms isolates were group a beta- haemolytic *Streptococci* (99 patients), *E coli* (18), non- group a *Streptococci* (32), others (11).

No bacterial growth was identified in throat swab taken from 1840 patients and they responded well with symptomatic treatment alone. Among them 38 patients (2%), remained non–responders to 2 weeks of symptomatic treatment. Throat swab was repeated in them after 2 weeks, reported bacterial growth. Appropriate antibiotic was given in accordance with the culture and sensitivity report. Most common organisms isolated among non-responders were non group a *Streptococci*. This is due to secondary bacterial infection.

DISCUSSION

Antibiotics when used inadvertently, resistance occurs as the ability of antibiotic to kill bacteria at therapeutic level is lost. Center for disease control and prevention (CDC) created guidelines for appropriate use of antibiotics in adult upper respiratory tract infections (URTI). These guidelines were published in 2001 and endorsed by American academy of family physicians, the American college of physicians-american society of internal medicine, and the infectious diseases society of America. But there is evidence that many health care professionals do not follow these guidelines.

A study from the data of national ambulatory care medical survey (NAMCS) found that 63% of adults with URTI seen during 1997-1999 received antibiotics inadvertently. Among them 46% were nonspecific URTI's and more than 60% were acute bronchitis who actually do not require antibiotic therapy as per the CDC guidelines.[8] Another retrospective cohort study between january 1, 1998 and march 31, 2003 in a national network of outpatient practices called as medical quality improvement consortium (MQIC) was done by James M.Gill et al. Among approximately 815,000 active patients in the MQIC database, which were distributed among practices in 17 institutions including multi-practice institutions, they identified 52,135 URTI episodes. 65% of them received antibiotics which is a very high percentage. Among them Antibiotics were prescribed for 78% of acute bronchitis episodes, 65% for acute pharyngitis episodes, 81% for acute sinusitis episodes, and 33% for nonspecific URTI episodes. None of these fit into the criteria given by CDC for antibiotic use. The proportion of broad spectrum antibiotics given for all URTI were 56%, for acute bronchitis were 68%,for acute sinusitis and for non-specific URTI were 55% each and for acute pharyngitis it was 40%.[8]

Wide spread use of antibiotics and for longer duration have lead to emergence of resistant strains of organisms. Currently, treatment of choice for acute GABHS is penicillin for 10 days. Many studies proved the equal efficacy of second and third generation cephalosporins and azithromycin in bacterial eradication with a short

course of 3-5 days.[9] Clinical studies and in-vitro models demonstrated longer the course of antibiotics administered, higher are the rates of resistance developed.[9] Misclassifying viral infections as "antibiotic appropriate" scale gives a wrong message on a broader public health perspective.[10]

When a particular antibiotic is prescribed, the susceptible bacteria have less survival advantage than the resistant bacteria. This creates a selective pressure and over a period of time only the resistant bacteria survive and multiply making the antibiotic ineffective for further use.[11]

Though there are other causes, the abuse of antibiotics is believed to be the main culprit for the current trends of resistance. There are two important ways in which bacteria may develop resistance, one is by mutation and the other is by acquiring it from other bacteria.

Mutations can occur as sudden changes in the genetic material. These mutations may affect and influence the way the antibiotics act on the bacterium.[12] The bacterium may go on to produce newer toxins that inactivate the antibiotics, some mutations block the entry points for the antibiotics while several other may cause pumping out of the antibiotics. Bacteria turn resistant by acquiring these genes from other bacteria simply by the process of conjugation or by the intermediation of viruses. Bacteria also have ability to acquire DNA from the surroundings.[13]

Antibiotic resistance spreads from one generation to another and also from one type of bacterium to the other. The resistant bacteria can spread through air, water and wind from one place to another by coughing, contact with fomites.

The happy part of the entire resistance story is that ,over a period of time resistance can also be lost but at a slower pace when the selective pressure is removed by the way of absence of antibiotic.[14]

"The get smart: know when antibiotics work" program is a government programme stresses upon the role played by healthcare providers in promoting appropriate antibiotic usage in outpatient departments. CDC estimates that each year at least two million illnesses and 23,000 deaths are caused by drug-resistant bacteria in the United States alone. To reduce the impact of antimicrobial resistance on public health consequences, world health assembly formulated a "Global action plan" to combat with Antimicrobial resistance, which outlines the need for five strategic objectives.[15]

- To improve awareness and understanding of antimicrobial resistance through effective communication, education and training.
- To strengthen the knowledge and evidence base through surveillance and research.

- To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures.
- To optimize the use of antimicrobial medicines in human and animal health.
- To develop the economic case for sustainable investment that takes account of the needs of all countries and to increase investment in new medicines, diagnostic tools, vaccines and other interventions.

These objectives are met by proper and systematic implementation by member states, secretariat, international and national partners across multiple sectors. By doing this the main goal of ensuring prevention and treatment of infectious diseases is achieved by quality assured, safe and effective medicines. Immediate action on global scale is warranted else world is heading towards post–antibiotic era with ongoing resistance to all antibiotics in which common infections could become deadly again.

CONCLUSION

Antibiotics should not be given to patients unless there is documentary evidence of bacterial infection. Clinically screen all the patients for centor criteria of Streptococcal throat. Centor score 2, 3, 4 should be screened by rapid Streptococcal antigen test and throat swab for culture and sensitivity. Appropriate antibiotic should be given to the patients with throat swab positive for GABHS. The preferred antibiotic of choice is penicillin or erythromycin in penicillin –allergic patients. Inadvertent use of antibiotics will lead to spread of resistance in the community; this will limit the usage of higher antibiotics for complicated cases and ICU patients

ACKNOWLEDGMENTS

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