

Analysis of how the Healthy Population Handles Flu and Pharyngitis in Jeddah, Saudi Arabia

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Received: February 15, 2017; Published: February 23, 2017

Abstract

Background: Majority of flu with pharyngitis is caused by viruses and some by Group A streptococcus bacteria, but due to fear of long term complication (e.g. rheumatic heart disease), patients tend to take antibiotic empirically. This in turn is directing towards a greater problem of antibiotic resistance. This study tries to give a picture of how patients generally deal with flu and pharyngitis in Jeddah, Saudi Arabia.

Objectives of the study: Our objective was to get a bigger picture of how the general people in Jeddah deal with flu and pharyngitis. We paid the most attention towards the prescription and use of antibiotic for flu and sore throat. Our aim from this study is to analyze how widely the antibiotics are being prescribed by doctors, or pharmacists, or by the people themselves who are excessively using them over-the-counter.

Methodology: The study was conducted in King Abdulaziz University Hospital & Oncology Center among the healthy individuals in Jeddah, Saudi Arabia, with no chronic diseases, with help of a questionnaire to enable us to reach to the analysis.

Conclusion: The analysis showed that although bacteria is not the major cause of pharyngitis (less than 25%) the use of antibiotic is extensive (67.7%), with barely any assistance to Rapid Strep Test kits. Also, a big percentage of people who seek direct help from pharmacies are given out antibiotics (83.7%) of the time without a valid doctor prescription.

Keywords: Pharyngitis; Group A Streptococci; Antibiotic Over-Use; Penicillin Resistance

Introduction

Most cases of pharyngitis are caused by viruses, and about less than one-fourth (~20%) is caused by bacteria, mostly Group A streptococcus. In general, if a patient has clear symptoms of viral pharyngitis, for example common cold, no test is recommended. If a bacterial infection is suspected, a rapid antigen detection by rapid strep test (RST) must be recommended, also known as the throat swab [1]. Other lesser causes of pharyngitis can be infectious mononucleosis, gastro-esophageal reflux disease, neoplasia, and trauma.

Group A streptococcus (GAS) or *Streptococcus pyogenes* is a gram positive coccus that can cause a wide variety of symptoms ranging from relatively mild symptoms like pharyngitis, tonsillitis, impetigo and otitis media to severe forms like streptococcal toxic shock syn-

drome (STSS), necrotizing fasciitis, acute glomerulonephritis and rheumatic fever [1,2,3]. It causes more than 600 million cases per year [4] and it is the most common cause of bacterial pharyngitis in children [5].

Clinically GAS can be predicted using the Centor criteria, which includes: Fever, anterior cervical lymphadenopathy, tonsillar exudate, and absence of cough- giving one point to each. A score of 4 makes it highly likely [2,3]. According to the US guidelines, the RTS must be recommended before prescribing antibiotic, and would be most beneficial to the third world, where complications like rheumatic heart disease, are most prevalent [6]. Group A streptococcus is treated mainly with Beta-Lactams like penicillin but multiple treatment failure has been most probably caused by bacterial resistance [6].

Antibiotic resistance is resistance of the bacteria against the medication that previously used to be effective in treating its infection [4]. The rate of developing resistance is influenced by rate of de novo mutations. Another problematic cause of resistance is overuse of antibiotic, which by selection pressure, causes the more resistant microbe to survive, reproduce, and hence, difficult to treat. This in turn, requires higher doses of the same medication, or a stronger antibiotic to treat, which can be both costly and more toxic [7].

Amoxicillin are antibiotics, derived from ampicillin, classified under the second generation of broad spectrum penicillin under the broader class of beta-lactam antibiotics [8]. The mechanism of action of beta-lactam antibiotics is by inactivating the high molecular-weight penicillin-binding proteins (PBP) which are required for the last stages of peptidoglycan biosynthesis [9]. These drugs inhibit the cross-linkage between the linear peptidoglycan polymer chains which constitute a major component of the cell wall of gram positive bacteria and minor component of gram negative bacteria thus inhibiting bacterial cell wall synthesis [10,11]. Therefore, this binding stops the bacterial growth, not directly causing it to die.

As these are the most frequently prescribed antibiotic worldwide, resistance to them is also a very complex problem. The most common way of bacteria developing the resistance is by their ability to produce beta-lactamase, which was overcome by addition of beta-lactamase inhibitors. Other forms of resistance to beta-lactam drugs were emerged through alteration of targets of the drugs, the PBPs, and through alteration in outer membrane permeability of organism to drugs. In order for the bacteria to develop resistance, it must acquire multiple mechanisms mentioned earlier [12]. Al-Ghamdi, *et al.* reported 5.6% resistance of GAS to penicillin in eastern Saudi Arabia [14]. However, resistance to Penicillin has been reported as being as high as 20% while cefuroxime, clarithromycin, and azithromycin are said to provide a better response [15].

The commonly used penicillin are Amoxicillin and amoxicillin-clavulanic acid, commonly known in Saudi Arabia as Augmentin. The purpose of adding the clavulanic acid to the penicillin is to overcome the antibiotic resistance in bacteria with beta-lactamase activity [11]. However, for patients with penicillin allergy, a macrolide (clarithromycin, azithromycin), or clindamycin may be used [12].

The greatest challenge is to find the fine line between preventing resistance development, and the complication that can arise by the bacteria if untreated. Streptococcal pharyngitis is a benign illness, but it can be associated with suppurative tonsillopharyngeal complications or non-suppurative immune mediated complications such as acute rheumatic fever (ARF), rheumatic heart disease (RHD), and post streptococcal glomerulonephritis. Other sequelae include streptococcal toxic shock syndrome, pediatric autoimmune neuropsychiatric disorders associated with streptococcal infection (PANDAS), autoimmune dystonia, reactive arthritis, and Sydenham's chorea and other autoimmune movement disorders [13].

Method

Study setting: King Abdulaziz University Hospital & Oncology Center-- Jeddah, Saudi Arabia

Study design: Cross-sectional study was conducted among the common people of Jeddah, who do not have any chronic medical illnesses.

Variables: Random people were asked about personal data like age, and sex. Detailed history to rule out chronic diseases was taken.

Out of 150 people who were interviewed to fill out the questionnaire, 124 were completely healthy with no chronic diseases; no pre-existing lung condition (asthma, cystic fibrosis) and no known allergies. Their age range was from 4 years old to 50 years old.

The data collection was done in time duration of two months, from March 2016 till May 2016. The participants were asked few simple questions.

1. When was the last time you had flu-like symptoms (runny nose, fever, cough)
2. Were those symptoms accompanied with sore throat?
3. Did you call or see a doctor? Did you go to a pharmacy directly instead?
4. If you saw a doctor, was a throat swab or rapid strept test taken?
5. What medications were you prescribed.
6. If it was an antibiotic, what was it called?

Knowledge assessment for flu and antibiotics

- Knowledge of flu symptom awareness (coryza, cough, fever, body pain, sore throat)
- Knowledge about causes of flu and pharyngitis (virus/ bacteria/ neoplasia/ trauma/ infectious mono nucleosis)
- Knowledge about complication of antibiotic (acute side effect such as allergy, GI upset; chronic effect of kidney; long term increase in antibiotic resistance)

Results

In the data collected from 124 healthy individuals, without any chronic diseases like diabetes mellitus, hypertension, or any predisposing respiratory illnesses, such as asthma, cystic fibrosis, or chronic bronchitis, the following results were obtained.

Figure 1 shows the time of the year in which the flu symptoms appeared. 65.9% of the time it occurred during the months November, December, and January, while 22% they occurred during August, September, and October. The remainder months May- July and February to April were 6.5% and 4.1% respectively.

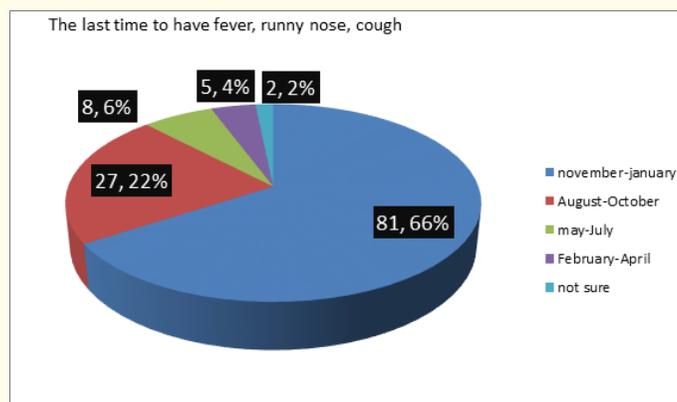


Figure 1

Figure 2 shows whether the flu symptoms were accompanied by sore throat. It that (70.2%) 87 people answered yes, (21%) 26 people answered no, and (8.9%) 11 people were not sure.

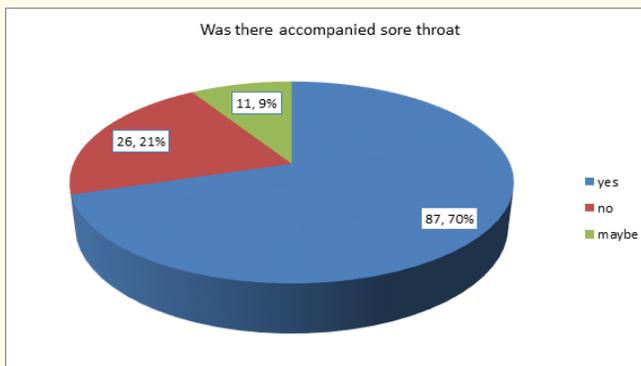


Figure 2

Figure 3 demonstrates that only (39%) 48 people actually went or called the doctor. (22.8%) 28 people went straight to pharmacy, and (38.2%) 47 people did not take medical advice.

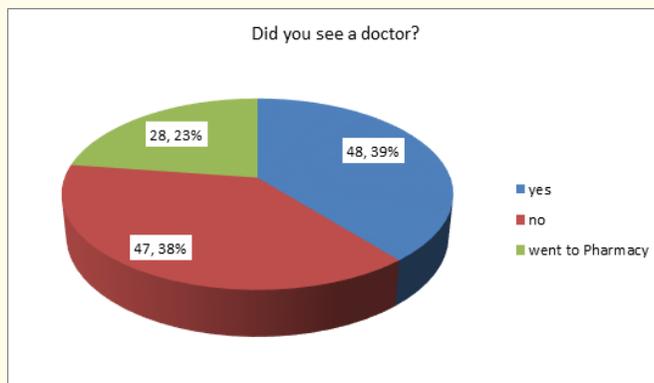


Figure 3

Figure 4 shows, among those who saw a doctor, only 11 (22.9%) were done RST or throat culture. In total, 112 (90.3%) never did a RTS or culture, 62 (50%) among them due to not seeing a doctor in the first place.

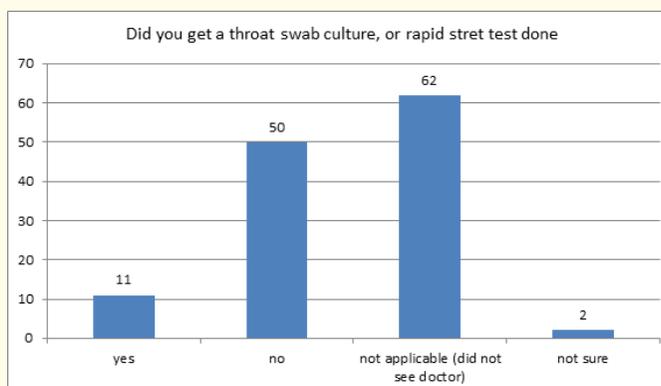


Figure 4

Figure 5 shows what medications were taken by this population. (67.7%) 84 took an antibiotic. (83.9%) 104 took an analgesic, (23.4%) 26 people used nasal decongestants, (46.8%) 58 people took anti histamine, and (6.5%) 8 people took some additional drugs, namely Flutab, Nasonex.

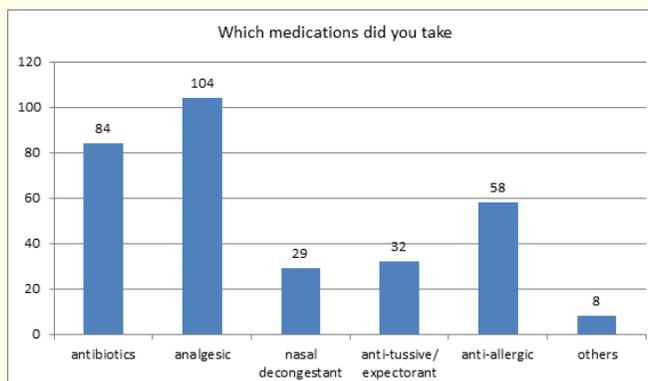


Figure 5

Table 1 shows that from those who had sore throat (91.9) 80 of them took antibiotics, and those that didn't have sore throat (15%) 4 took antibiotic. There only symptoms were runny nose and cough.

| | Flu with sore throat | Flu without sore throat |
|-------------------------|----------------------|-------------------------|
| Took antibiotic | 80 (91.1%) | 4 (15%) |
| Did not take antibiotic | 7 (8.9%) | 22 (85%) |

Table 1: Percentage of patients who took antibiotic with respect to having a sore throat.

Table 2 demonstrates who prescribes the most antibiotics. (75%) 36 were prescribed by the doctor, (83.7%) 24 were prescribed by the pharmacist, and (63.8%) 24 self-prescribed, and bought it over-the-counter. From the 75% times when a doctor prescribed antibiotic, a throat swab or RST was done only 8.9% of the time.

| | Physician | Pharmacist | Self-prescribed |
|----------------------------|-----------|------------|-----------------|
| Number of patients who saw | 48 | 28 | 47 |
| Antibiotic prescribed | 36 (75%) | 24 (83.7%) | 24 (63.8%) |

Table 2: The prescription of antibiotics.

Lastly, table 3, to have a look at what antibiotics were taken, mostly Augmentin (amoxi-clav) 47.8%, Amoxicillin and Maxim (moxifloxacin-hydrochloride) 14% each, cefuroxime 7%, macrolide 10%, and 11% did not remember what they had taken.

| Antibiotic taken | Number of patients |
|----------------------------|--------------------|
| Amoxi-clav | 40.7% |
| Amoxicillin | 14% |
| Moxifloxacin-hydrochloride | 14% |
| Clarithromycin | 7% |
| Azithromycin | 3% |
| Cefuroxim | 7% |
| Don't remember | 11% |

Table 3

Figure 6 demonstrates the awareness among the people interviewed about the symptoms of flu. All 124 (100%) are aware of coryza (runny nose, watery eyes), 111 (89.5%) believe flu comes with cough, 114 (91.9%) understand fever is a symptom, 78 (62.9%) agree with body pain, 73 (58.9%) believe sore throat comes with flu.

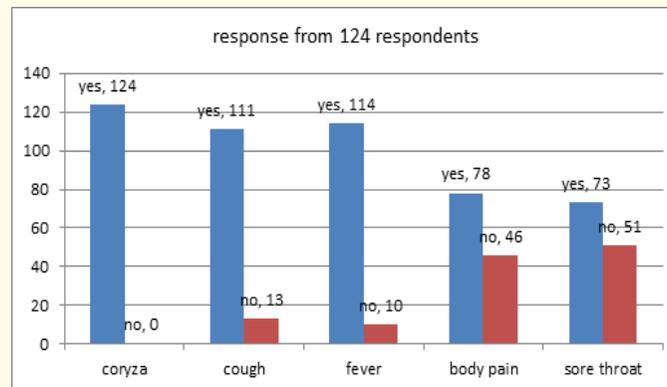


Figure 6: General knowledge of awareness of the symptoms of flu.

Figure 7 shows the people’s knowledge about what they think can be a cause of pharyngitis. 78 (62.9%) believe its viral, 120 (96.8%) say it could be bacterial, only 3 (2.4%) knew it could be infectious mono nucleosis, 13 (10.5%) agree it can be neoplastic, and 27 (21.8%) agree with trauma.

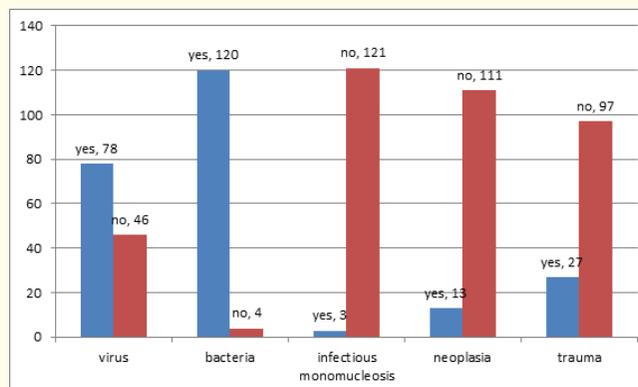


Figure 7: General knowledge about the causes of pharyngitis from 124 respondents.

Figure 8 shows awareness of complication and adverse effects of taking antibiotic. 101 (81.5%) agree on allergic reaction, 78 (62.9%) are aware of gastro-intestinal upset symptoms, 33 (26.6%) believe kidney injury can occur, 12 (9.7%) were aware of development of resistance.

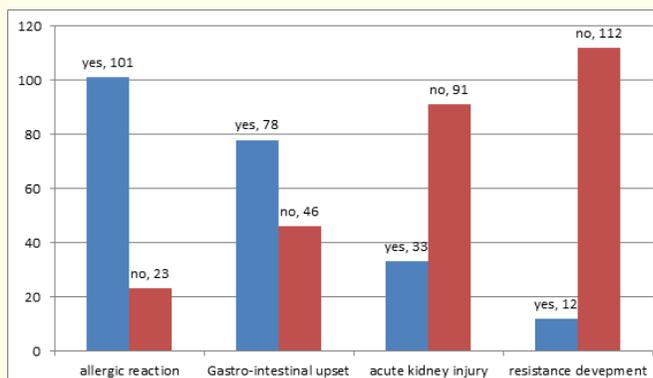


Figure 8: General knowledge about complications/ adverse effect of antibiotics.

Discussion

Pharyngitis and flu are very common infections that the healthy population goes through almost every year. Most the time it is self-limited, but rarely can cause complications such as suppurative tonsillopharyngeal or non-suppurative immune mediated such as acute rheumatic fever (ARF), rheumatic heart disease (RHD), and post streptococcal glomerulonephritis, and streptococcal toxic shock syndrome.

In order to prevent these complications, proper antibiotic therapy must be encouraged, however, the results show overuse of the antibiotics, which lead to the other big complication-resistance. Although < 25% of pharyngitis is caused by bacteria, we see in this report that antibiotics are used to treat it 67.7% of the time. Unfortunately, rapid strept test is not routinely used in the hospitals/ clinics to rule out viral causes. 75% of the doctors prescribe antibiotic, and among them Amoxicillin-clavulanic acid (Augmentin) prescription is the highest. Moxifloxacin-hydrochloride (Maxim) is also increasingly being used due to easy dosage method; that is one tablet a day for five days. Additionally, flu and sore throat complains, if taken to the pharmacist, brings worse result of 83% occasions of antibiotic prescription. Also, 63% of people self-prescribe amoxicillin or Augmentin for sore throat, by demanding them over-the-counter.

As shown in the study of Abdulwahab MA., *et al.* the resistance to penicillin G has reached as high as 48%, which indeed is alarming [17]. We recommend routine rapid strept test for all cases of pharyngitis, tonsillitis, or suspected cases with high fever before prescription of antibiotic, to make the treatment for GAS appropriate. Also it is very much required that the pharmacies be monitored for not prescribing or giving out antibiotics without clear prescription from the patients' respective doctors.

Acknowledgment

We, the authors, would like to extend our thanks to all the participants and respondents, who made an effort to share from their experiences and helped us to reach to this analysis.

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Volume 2 Issue 5 February 2017

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