Susceptibility Of Streptococcus Pyogenes Against Various Antibiotics

Imran Khan, Hayat Ullah, Shahzad Ahmad, Muhammad*, Saqib, Sobia Nisa, Muhammad Irshad, Muhammad Idrees and Anwar Saeed

1. Department of Environmental Science, University of Haripur,
2. Department of Zoology, Hazara University Mansehra,
3. Department of Microbiology, Hazara University Mansehra,
4. Centre of Biotechnology and Microbiology, University of Peshawar,
5. Department of Microbiology, University of Haripur,
6. Department of Biotechnology, Bacha Khan University of Charsada,
7. Department of Botechnology and Genetic Engineering Kohat University of Science and Technology. Khyber Pakhtunkhwa, Pakistan.

Correspondence author: dir.muhammad@gmail.com

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Abstract

Streptococcus pyogenes is a gram positive bacterium, which causes mild illness (e.g. tonsillitis, impetigo and pharyngitis) to severe infection (e.g. toxic shock syndrome and necrotizing fascititis). The present study aims to find out the susceptibility of the species against various antibiotics in Abbottabad area. The study stated that the mention species was found sensitive to Ampicillin, Amoxicillin Pipracillin, Cephradine, Ofloxacin and Erythromycin, while found resistive to Cloxacillin, Oxacillin, Gentamycin, Sulfamethoxazole and Cefoparazone. The maximum mean zone of inhibition was noted against Ampicillin and Amoxicillin. From this work it was concluded that Ampicillin and Amoxicillin is the best drug of choice against Streptococcus pyogenes in mentioned area.

Introduction

Group A Streptococcus (GAS) consists of a single species, Streptococcus pyogenes (S. pyogenes) (Ozturk et al., 2004). It is called as Group A beta-hemolytic Streptococci (GABHS) because it is beta-hemolytic and belongs to Lancefield group A (Ananthanarayan et al., 2000). It can also be obtain in absence of any evidence of acute infection from oropharynx and nasopharynx (Lloyd et al., 2006). Disease causing ability of GAS depends on various factors. Streptolysin ‘O’ toxin is one of these factors, which damages cell membrane and perform hemolysis conformed on sheep blood agar (Ozturk et al., 2004). Disease caused by S. pyogenes or Group A Streptococcus (GAS) ranges from mild infection as tonsillitis, impetigo and pharyngitis to life frightening infection like toxic shock syndrome and necrotizing fascititis. These infections are almost followed by rheumatic heart disease, post streptococcal acute glomerulonephritis, and post infective sequelae of rheumatic fever (Capoor et al., 2006).

GAS infection mostly spread through person to person contact, e.g. through saliva, contaminated fingers, nasal secretion, fomites or dust (Arguelles et al., 2004). Among the pathogenic bacteria, Streptococcus pyogenes (group A streptococcus) is one of them (Bisno et al., 1997). Apart from severe form of disease it has been detected in various form of the world (Givner, et al 1991; Stevens et al 1994). Although this species is delicately sensitive to penicillin and erythromycin has been the drug of choice for all those who have allergic to penicillin. However in lots of incidence erythromycin resistance of S. pyogenes has been reported in various parts of the world (Maruyama et al., 1979; Cornaglia et al., 1998). Due to these observations it is necessary to find out sensitivity of S. pyogenes against the antibiotics.

Methodology

For the present study a total of 110 patient samples were collected from Ayub Teaching Hospital Abbottabad during May to August 2010, after the written permission of the hospital authority. The samples were collected through swab, from the
patients of different ages voluntarily. These samples were immediately transported to Microbiology Laboratory, Hazara University Mansehra for further analysis. Mueller-Hinton agar with 5% sheep blood was prepared and autoclaved for sterilization. In order to solidify the media were transferred to Petri plates and were kept open for about five minutes. Streaking of the culture were done in aseptic condition (in presence of spirit lamp in laminar flow hood (LFH)), followed by incubation at 37°C for 24 hours. After incubation growth of the selected microorganism were examined on the basis of morphology of the colonies and hemolysis caused on selective media. Gram staining procedure were performed by using ingredients distilled water, crystal violet, iodine, ethanol and sifranine, and the smear were examined under compound microscope, so that to check their color and cellular shape. Catalase test was done by using hydrogen per-oxide. Antibiotic sensitivity test was conducted by standard procedure used by Bauer, 1966 (Bauer et al., 1966). Antibiotic discs were placed aseptically on new culture media through despiser inside laminar flow hood on each plate followed by its incubation at 37°C for 24 hours.

Results and Discussion

Results of the current study stated that out of 110 samples 23 (20.9%) were found positive for S. Pyogene (remaining samples were found clear or some other bacteria were found). Gram reaction indicated that the species is gram positive and appeared long chain under microscope. The results further demonstrated that its optimum temperature range was 20-40°C and negative catalase test. The pH of the current study was optimized and found in range 5.5 to 6.5, which provided favorable growth condition for S. pyogene. The color of the colonies was seen blue under colony counter and microscope. These findings are concordant with other studies from around the world (Todar et al., 2005).

Results of the antimicrobial susceptibility and resistance suggested that Ampicillin, Amoxicillin Pipracillin, Cephradine, Ofloxacin and Erythromycin are the most potential antibiotics against the S. Pyogene which showed maximum mean inhibition zone of 2.4, 2.2, 2.1, 1.7, 1.2 and 1.7 mm respectively (Fig. 1). The results also indicated that the species showed resistance against Cloxacillin, Oxacillin, Gentamycin, Sulfamethoxazole and Cefoparazone. The present observations stated that the aforesaid antimicrobial agents could be used against the infections caused by this species. These results could be utilized to undertake further research and take an important step ecosystem restoration and management. Ampicillin have provided the highest inhibition zone against the species, which is the key inhibitory compound and could be used as a drug of choice against the disease producing by S. pyogene. This species are known to have high incidence rate in developing countries like Pakistan. The current results were compared with investigations of Dr. Ajmal Rashid. According to their result Streptococcus pyogenes showed sensitivity to penicillins, including Ampicillin and Amoxycillin, Cloxacillin, Cephalosporin and Vancomycin. Some of Streptococcus pyogenes strains are resistant to Erythromycin, Cotrimoxazole and tetracycline (Rashid et al., 2006).

**Antimicrobial Sensitivity of S.Pyogene against Antibiotics**

![Antimicrobial Sensitivity of S.Pyogene against Antibiotics](image)

**Figure 1.** susceptibility of S. Pyogenes against Antibiotics

Conclusion

The present study illustrated that Ampicillin, Amoxicillin, Pipracillin, Cephradine, Ofloxacin and Erythromycin are the most imminent antibiotics against the S. Pyogene, which showed maximum mean inhibition zone of 2.4, 2.2, 2.1, 1.7, 1.2
and 1.7 mm respectively. The results also stated that the species showed complete resistance to Cloxacillin, Oxacillin, Gentamycin, Sulfamethoxazole and Cefoparazone. It is concluded from the current study that Ampicillin and Amoxacillin are the most effective antibiotics against S. Pyogene.

**Competing interest**

The author declares that they have no competing interest.

**Acknowledgement**

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