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COMMUNITY ACQUIRED OF RESPIRATORY TRACT BACTERIAL INFECTION ETIOLOGICAL AGENTS AND SUSCEPTIBILITY TESTING

Dr. Nawal S Faris
Department of Allied medical sciences /Zarqa University

ABSTRACT: *Respiratory tract infections are believed to be one of the main reasons why people visit their GP or pharmacist. Respiratory tract infections (RTIs) are the leading cause of Death in USA. Lower respiratory tract infections(LRIs) are generally more serious than upper respiratory infections. LRIs are the leading cause of death among all infectious diseases. The two most common LRIs are bronchitis and pneumonia. Typical infections of the upper respiratory tract include tonsillitis, pharyngitis, laryngitis, sinusitis, otitis media . The aims of our study are strengthening of surveys of the cases of the respiratory tract infection , the causes of respiratory tract infection ,then evaluate the number of persons who have negative result and the reason for this lack of screening for all pathogenic virus and search for bacterial infection only , finally culture characterization and antibiotic susceptibility testing of the isolated pathogenic bacteria. In order to reach those goals we carried out a survey of 635 throat swabs and sputum sample in the Department of Microbiology at Central Laboratory of the Ministry of Health in Amman the capital of Jordan between January 2013 to December 2014 using of throat and sputum , culture and biochemical test and antisera have been did . Atotal of 635 individuals (275 males and 360 females) swabs and sputum were tested for bacterial infection , a total 55 throat swabs were gave positive results for Group A beta-hemolytic streptococci of with an overall prevalence of 8.7 %. Atotal 23 sputum samples were gave positive results for different types of bacterial infection with an overall prevalence of 10 %. Then to report the information about their antibiotic susceptibility. In conclusions Group A beta-hemolytic streptococci the most common cause the upper respiratory tract infection. But K. pneumonia the most common cause of lower respiratory tract infection.*

KEYWORDS: Respiratory tract infections, Lower respiratory tract infections throat swab, sputum sample, and Antibiotic Susceptibility testing .

INTRODUCTION

Respiratory tract infection refers to any of a number of infectious diseases involving the respiratory tract. An infection of this type is normally further classified as an upper respiratory tract infection (URI or URTI) or a lower respiratory tract infection (LRI or LRTI). Lower respiratory infections, such as pneumonia, tend to be far more serious conditions than upper respiratory infections, such as the common cold. [14] Although some disagreement exists on the exact boundary between the upper and lower respiratory tracts, the upper respiratory tract is generally considered to be the airway above the glottis or vocal cords. This includes the nose, sinuses, pharynx, and larynx. The lower respiratory tract consists of the trachea (wind pipe), bronchial tubes, the bronchioles, and the lungs. Lower respiratory tract infections are generally more serious than upper respiratory infections. LRIs are the leading cause of death among all infectious diseases.[13]The two most common LRIs are bronchitis and pneumonia[8]. Influenza affects both the upper and lower respiratory tracts, but more dangerous strains such as the highly pernicious H5N1 tend to bind to receptors deep in the lungs[15]. Upper respiratory tract infection (URI) is a nonspecific term used to describe acute infections involving the nose, paranasal sinuses[3], pharynx, larynx, trachea, and bronchi. The prototype is the illness known as the *common cold,* which is discussed here, in addition to pharyngitis, sinusitis, and tracheobronchitis. Influenza is a systemic illness that involves the upper respiratory tract and should be differentiated from other URIs[5]. Pharyngitis is an inflammation of the throat caused by a respiratory virus (rhinovirus, coronavirus, adenovirus, influenza virus, parainfluenza viruses, respiratory syncytial virus), Epstein–Barr virus or coxsackievirus [1]. Bacterial pharyngitis Bacterial pharyngitis is less common and its single most frequent cause is S. pyogenes[2]. Other rare bacterial causes include Neisseria meningitidis, Mycoplasma pneumoniae, C. diphtheriae and Arcanobacterium haemolyticum. Peak incidence is between autumn and spring in temperate climates, and during the rainy season in the tropics. Transmission is more rapid among groups sharing crowded living quarters and is by droplet spread or direct transmission. The investigation most frequently requested for pharyngitis is detection of S. pyogenes[1]. This species is detected either by culture on blood agar and subsequent latex agglutination reaction for group-specific polysaccharide, or by direct antigen detection. Neither method can distinguish oropharyngeal colonisation from true infection, but only culture allows antibiotic susceptibility testing[9]. Suspicion of infection with N. gonorrhoea, Mycoplasma spp., Arcanobacterium sp. or Corynebacterium spp. should be communicated to the laboratory so that specialist, non-routine culture media can be used. Treatment An oral penicillin or erythromycin is used to treat streptococcal pharyngitis[10]. Treatment may not alter the course of the primary pharyngeal infection, but it should reduce the risk of major non-infective sequelae such as rheumatic heart disease, poststreptococcal glomeru- lonephritis and Sydenham's chorea[11]. The need for antibiotic treatment of streptococcal pharyngitis has been questioned in developed countries, since the non- infective sequelae of streptococcal infection are all rare; but the recent increase in streptococcal infection in Europe and North America may change this view[12]. The other complications of streptococcal pharyngitis include scarlet fever (less common than in the past in developed countries), streptococcal toxic shock syn drome (both caused by toxin) and quinsy (paratonsillar abscess). In quinsy, there may be secondary infection with oral anaerobic bacteria, but these are often peni- cillin sensitive. Drainage of purulent foci is required.In order for the pathogens (viruses and bacteria) to invade the mucus membrane of the upper airways, they have to fight through several physical and immunologic barriers. Common lower RTIs include flu (this can affect either the upper or lower respiratory tract) bronchitis (infection of the airways) pneumonia (infection of the lungs) bronchiolitis (an infection of the small airways that affects babies and children younger than two) tuberculosis (persistent bacterial infection of the lungs) [4]. The main symptom of a lower RTI is also a cough, although it is usually more severe and you may bring up phlegm and mucus. Other possible symptoms are a tight feeling in your chest, increased rate of breathing, breathlessness and wheezing. RTIs can spread in several ways. If you have an infection such as a cold, tiny droplets of fluid containing the cold virus are launched into the air whenever you sneeze or cough. If these are breathed in by someone else, they may also become infected. Infections can also be spread through indirect contact. For example, if you have a cold and you touch your nose or eyes before touching an object or surface, the virus may be passed to someone else when they touch that object or surface. The best way to prevent the spread of infection is to practice good hygiene, such as regularly washing your hands with soap and warm water. Most RTIs will pass without the need for treatment and you usually won't need to see your GP. You can treat your symptoms at home by taking over-the-counter painkillers such as paracetamol or ibuprofen[13], drinking plenty of fluids and resting. Antibiotics are not recommended for most RTIs because they are only effective if the infection is caused by bacteria.

Aim of study

The aims of our study are strengthening of surveys of the cases of the respiratory tract infection , the causes of respiratory tract infection ,then evaluate the number of persons who have negative result and the reason for this lack of screening for all pathogenic virus and search for bacterial infection only , finally culture characterization and antibiotic susceptibility testing of the isolated pathogenic bacteria.

METHODS

From January 2013 to December 2014, a total of 635 individual (275 males and 360females) swabs and sputum samples were tested in the Department of Microbiology at Central Laboratory of the Ministry of Health in Amman the capital of Jordan. Swabs were tested for Group A beta-hemolytic streptococci . Throat swabs were collected and sent to the laboratory for processing and analyses. They were processed following standard guidelines. Briefly, a loopful of each specimen was taken from the throat swab and inoculated on blood agar. The plates were incubated under aerobic conditions at 37 for 24-48 h. Microscopic and macroscopic examinations of the growing colonies on the plates were performed. Suspicious colonies were then subcultured on a blood agar for purification . Preliminary identification was performed based on morphology and cultural characteristics of the pure cultures on selective and differential media as described by Cheesbrough[19] and subsequent latex agglutination reaction for group-specific polysaccharide, or by direct antigen detection and differential media as described by Cheesbrough[19]. The API 20E kit (Biomerieux, France) was then used for the final confirmation . Antibacterial susceptibility testing was performed using the Kirby-Bauer disc diffusion method as described by Bauer and co-workers[10]. Briefly, for each isolate, a small inoculum was emulsified in 3 mL sterile normal saline. The density was then compared with a barium chloride standard (0.5 McFarland). A sterile cotton swab was dipped into the standardized solution of bacterial cultures and used for evenly inoculating Mueller-Hinton agar plates (Oxoid, USA) and allowed to dry. Next, antibiotic discs with the following drug contents-ampicillin (10 g), cefuroxime (30 g), ceftriaxon gentamicin (10 g), t and penicillin (10 IU) (Oxoid, England) were placed on the plates, spacing them well to prevent the overlapping of inhibition zones. The plates were incubated at 37 for 24 h, and the diameters of zone of inhibition were compared with recorded diameters of the reference isolate.

RESULTS

Atotal of 635 individuals (275 males and 360 females) swabs and sputum were tested for bacterial infection , a total 55 throat swabs were gave positive results for Group A beta-hemolytic streptococci of with an overall prevalence of 8.7 %. Table 2. Atotal 23 sputum samples were gave positive results for different types of bacterial infection with an overall prevalence of 10 %. The seroprevalence in males was approximately the double of that of females (10.9% vs. 6.9%) Table 1. Five different types of bacteria were recovered: *Pseudomonase earuginosa*(*P. earuginosa*), *Klebsiella pneumoniae* (*K. pneumoniae*), *Streptococcus* pneumoniae(S. pneumonia) ,*Pseudomonas Enterobacter*, *Acinetobacter*, and Others than bacteria like candida spp. Table 3 . .The resistance patterns of the recovered bacteria isolates from respiratory tract infections. Table 4.

Table 1 : The Seroprevalence in males was approximately the double of that of females (10.9% vs. 6.9%)

Months	**Female**	**Male**
January	**2**	**2**
February	**1**	**3**
March	**3**	**4**
April	**4**	**1**
May	**0**	**2**
June	**2**	**3**
July	**3**	**1**
August	**1**	**0**
September	**3**	**1**
October	**2**	**4**
November	**2**	**3**
December	**2**	**2**
Total	**25**	**30**
Prevalence	**6.9**	**10.9**

Table 2: The number of isolates of the upper respiratory bacteria pathogen

Months	Number of throat swab	Group A beta-hemolytic *streptococci*
January	52	4
February	63	4
March	64	7
April	46	5
May	55	2
June	40	5
July	68	8
August	32	1
September	90	4
October	35	6
November	60	5
December	50	4
Total	635	55
Prevalence		8.7

Table 3: The number of isolates of the lower respiratory bacteria pathogen

Months	**Number of sputum samples**	***K. pneumoniae***	***S. pneumonia***	***Pseudomonas***	***Enterobacter***	***Acinetobacter***
January	50	4	1	1	1	2
February	35	6	2	1	2	1
March	32	5	1	2	1	1
April	40	3	3	1	1	1
May	52	4	1	1	1	1
June	60	2	2	1	0	0
July	90	1	1	0	0	1
August	64	1	4	0	1	0
September	68	2	0	1	0	0
October	64	0	1	0	0	1
November	55	2	2	1	1	0
December	50	1	0	0	0	1
November	60	1	1	0	0	0
December	47	3	0	0	0	0
Total	635	35	19	9	8	9
Prevalence		5.5	3	1.4	1.3	1.4

Table 4: The resistance patterns of the recovered bacteria isolates from respiratory tract infections

Antimicrobial agent	s. pyogenes	K. pneumoniae	S. pneumoniae	*Pseudomonas*	*Enterobacter*	*Acinetobacter*
Cefuroxime	7.4(5)	10.4 (6)	16.1(7)	35.5(9)	37.8(9)	30.1(6)
Gentamycin	11.4(5)	7.9(5)	12.1(3)	20.6(5)	19.3(4)	15.7(5)
Ampicillin	65.7 (29)	50.3(35)	56.8(19)	56.8(19)	65.6(8)	58.5(9)
Cotrimoxazole	13.5(6)	60.0 (21)	65.8(10)	80.2(12)	82.3(9)	77.5(8)
Erythromycin	40.1(15)	28.6 (10)	35.4(8)	45.3(6)	43.8(7)	32.1(6)
vancomycin	9.1(10)	6.7(4)	11.5(4)	19.6(6)	17.5(6)	14.2(7)
penicillin	87.9(30)	85.2(32)	80.2(10)	90.1(7)	88.1(8)	85.4(9)
Ciprofloxacin	14.5(22)	19.9(9)	17.2(4)	20.9(8)	21.3(7)	17.5(5)

DISCUSSION

The aims of our study are strengthening of surveys of the cases of the respiratory tract infection , the causes of respiratory tract infection ,then evaluate the number of persons who have negative result , finally culture characterization and antibiotic susceptibility testing of the isolated pathogenic bacteria. In order to reach those goals we carried out a survey of 635 throat swabs and sputum sample in the Department of Microbiology at Central Laboratory of the Ministry of Health in Amman the capital of Jordan between January 2013 to December 2014 using of throat and sputum , culture and biochemical test and antisera have been did . Atotal of

635 individuals (275 males and 360 females) swabs and sputum were tested for bacterial infection , a total 55 throat swabs were gave positive results for Group A beta-hemolytic streptococci of with an overall prevalence of 8.7 %. Atotal 23 sputum samples were gave positive results for different types of bacterial infection with an overall prevalence of 10 %. Then to report the information about their antibiotic susceptibility. from our results we note that male more affected than female, because the man more exposure to Environment pollution in work. ALSO we note that the prevalence of bacterial is very low despite in the patient suffer from respiratory tract infection the reason for this lack of screening for all pathogenic virus and search for bacterial infection only. Group A beta-hemolytic *streptococci the most common cause* the upper respiratory tract infection. Different types of bacteria cause lower respiratory tract infection like *Pseudomonase earuginosa*(*P. earuginosa*), *Klebsiella pneumoniae* (*K. pneumoniae*), *Streptococcus* pneumoniae(S. pneumonia) *,Pseudomonas Enterobacter, Acinetobacter. But K. pneumonia* the most common cause of lower respiratory tract infection . table 3 . also our study show that the bacterial isolates were most sensitive to vancomycin followed by Cefuroxime and gentamicin . the bacteria isolates showed lower resistant to Ampicillin and penicillin , the reason of that is the antibiotics abuse without control.

CONCLUSIONS

Group A beta-hemolytic *streptococci the most common cause* the upper respiratory tract infection. *But K. pneumonia* the most common cause of lower respiratory tract infection . The prevalence of bacterial is very low despite in the patient suffer from respiratory tract infection the reason for this lack of screening for all pathogenic virus and search for bacterial infection only. The Susceptibility data obtained in our study provide information to the clinician when they make decision on therapeutic options . the bacteria isolates showed lower resistant to Antibiotic , the reason of that is the antibiotics abuse without control.

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