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Prevalence and antibiotic susceptibility pattern of methicillin resistant *Staphylococcus aureus* at Armed Forces Hospital in Saudi Arabia

Methicillin-resistant *Staphylococcus aureus* (MRSA) is well recognized as a major cause of nosocomial infections worldwide and is associated with high morbidity and mortality rates with rapid development of resistance. MRSA has become established outside the hospital environment and is now appearing in community populations without identifiable risk factors[1]. The traditional treatment for infections caused by MRSA is vancomycin, which is indicated for treatment of antibiotic-associated pseudomembranous colitis caused by *Clostridium difficile.* First described in 1944, penicillinase-producing strains of *S. aureus* became universally present in hospitals in the 1950s and dominant in the community in the early 1970s[2]. Methicillin was introduced in 1959 as the first beta-lactamase-resistant penicillin, but outbreaks of MRSA infections were reported in Europe soon thereafter, and nosocomial MRSA strains are now distributed worldwide[3-4]. MRSA organisms generally are resistant to multiple antibiotics, including aminoglycosides, macrolides, fluoroquinolones, clindamycin, trimethoprim-sulfamethoxazole, chloramphenicol, and beta-lactams. Though vancomycin resistant *S. aureus* is not widely seen, a low level resistance to vancomycin is being reported[5]. Hence, the knowledge of the prevalence of MRSA and their antimicrobial susceptibility pattern becomes necessary in the selection of appropriate empirical treatment.

In this study, an attempt was made to determine prevalence of MRSA and methicillin sensitive from different clinical specimens and their *in vitro* susceptibility pattern to various antimicrobial agents in our hospital.

A total of 689 clinical specimens such as pus, wound swabs, ear swabs, aspirates, and sputum were received at Armed Forces Hospital, Al-Kharj over a period of three years from November 2004 to October 2007. All the specimens were processed in the microbiology section of the laboratory medicine. Cultures positive for *S. aureus* were identified. All specimens were processed using standard methods for the isolation of clinically significant pathogens including *S. aureus*. Specimens were inoculated on 5% sheep blood agar, MacConkey agar and Mannitol salt agar plates. The plates were incubated at 37^{o}C for 24-48 hours. Identification of the isolates was based on Gram film, colonial morphological appearance and by positive catalase, coagulase and DNase test[6]. A total of 166 *S. aureus* were isolated from various clinical specimens.

All isolates were screened for oxacillin resistance as described elsewhere[7] using oxacillin disc (1 µg) obtained from DIFCO. A zone of inhibition less than 10 mm was indicative of methicillin resistance. Standard disc diffusion tests for penicillin G (10 U), ampicillin (10 µg), erythromycin (15 µg), tetracycline (30 µg), gentamicin (10 µg), cephalothin (30 µg), sulphamethoxazole-trimethoprim (25 µg), clindamycin (2 µg) and vancomycin (30 µg) were carried out by modified Kirby Bauer method[7]. Zone sizes were measured and interpreted according to the National Committee for Clinical Laboratory Standards.

Out of 166 isolates of *S. aureus*, 37 (22.3%) were found to be MRSA. Of these 22.2% were from pus, 23.8% were from wound swabs, 33.3% were from aspirates and 13.3% were from sputum (Table I).

Table I: Isolation of *Staphylococcus.aureus* from different clinical specimens

Specimen	Total no. of *S. aureus*	Total no. of MRSA	Percentage
Pus	36	8	22.2
Wound swabs	84	20	23.8
Aspirates	18	6	33.3
Sputum	15	2	13.3
Ear swabs	13	1	7.7
Total	166	37	22.3

About 83.8% MRSA isolates were resistant to gentamycin, 67.5% were resistant to erythromycin, 54.0% to tetracycline, 48.6% to sulphamethoxazole-trimethoprim and 21.6% to clindamycin. Multidrug resistance was less common amongst the methicillin sensitive *S. aureus* isolates. In case of both methicillin-resistant as well as methicillin sensitive *S. aureus* isolates zero resistance was found to vancomycin whereas highest resistance was found to penicillin G followed by ampicillin and gentamicin (Table II).

Table II: Antibiotic resistance pattern of methicillin resistant and sensitive *S. aureus*

Sl. No.	Antibiotic	*Staphyllococcus aureus*	
		Methicillin resistant n=37	Methicillin sensitive n=129
1.	Penicillin G	37 (100%)	119 (92.2%)
2.	Ampicillin	37 (100%)	116 (89.9%)
3.	Erythromycin	25 (67.5%)	78 (60.4%)
4.	Gentamicin	31 (83.8%)	107 (82.9%)
5.	Tetracycline	20 (54.0%)	23 (17.8%)
6.	Cephalothin	37 (100%)	19 (14.7%)
7.	Sulphamethoxazole-trimethoprim	18 (48.6%)	21 (16.2%)
8.	Clindamycin	8 (21.6%)	7 (5.4%)
9.	Vancomycin	0 (0.0%)	0 (0.0%)

Nosocomial infections are one of the occupational biohazards. MRSA is one of the major pathogens associated with community-acquired serious nosocomial infection because these strains generally show multiple drug resistance which limits treatment possibilities[8]. MRSA has been reported earlier from hospitals in various parts of the world[9].

The antimicrobial agents generally preferred are clindamycin and sulphamethoxazole-trimethoprim, sometimes in combination with rifampin in selected cases, for the treatment of infections caused by community-acquired MRSA.

The mainstay antibiotic for treatment of infections caused by MRSA has been vancomycin, a drug that was approved by the US Food and Drug Administration in 1956 but not used extensively until the last 20 years[2]. The escalating use of vancomycin is attributed to the increase in nosocomial infections caused by MRSA from 2% in 1974 to more than 50% in 2000[2]. Vancomycin is used mainly to treat patients with infections caused by MRSA, patients with infections caused by gram-positive bacteria in whom beta-lactam antibiotics are contraindicated, and patients with device- and catheter-associated infections.

The prevalence rate of MRSA in our hospital was found to be 22.3% which is almost similar to most of the other reports where it ranged between 20 and 32.8%[10]. Our figures however were much higher than those reported from a general hospital in Jeddah[11] and lower than those reported from 4 tertiary hospitals in Makkah[12]. Our findings were in agreement with others in which antibiotic sensitivity results showed that all MRSA isolates were significantly more resistant to rest of the antibiotic classes compared to the methicillin sensitive isolates[11-12]. Majority of our isolates were also resistant to gentamicin, erythromycin and tetracycline which is in agreement with others[11-12]. All our isolates were sensitive to vancomycin.

Vancomycin seems to be the only antimicrobial agent which shows 100% sensitivity even with multidrug resistance. However, regular monitoring of vancomycin sensitivity and routine testing of newer glycopeptides should be carried out further. A regular surveillance of hospital associated infections including monitoring antibiotic sensitivity pattern of MRSA and methicillin sensitive is mandatory to control the spread of MRSA in the hospital.

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Prevalence of hepatitis C virus infection in rural adult population of Bangladesh

Hepatitis C virus (HCV) infection is an important global health problem and may cause acute and chronic infection in man and is one of the most common causes of chronic liver disease, cirrhosis of liver and hepatocellular carcinoma. HCV accounts for 40% of chronic liver disease[1]. It is estimated that about 3% of global population is infected with HCV although prevalence ranges from 0.1 to more than 12%, depending on country which equals to approximately 170 million chronic carriers worldwide[2]. In United States, the overall HCV prevalence rate is 1.8%, with a relatively high prevalence among African Americans (3.2%) and Hispanic (2.1%) than the non-Hispanic white (1.5%).[3]

A study among truck driver and helper in Bangladesh showed the prevalence of HCV infection was <1%[4]. In another study the prevalence of HCV infection was higher among intravenous drug abusers (24.8%) in comparison to non-drug abusers (5.8%)[5].

Khan et al[6] showed that 2.4% of Bangladeshi professional blood donors were anti-HCV positive whereas it was 0.6% of Japanese voluntary blood donors.

We conducted a cross-sectional population based study over the population living village of Kaligonj Upazilla under the District Gazipur, Bangladesh during the period from July 2005 to June 2006.

Inclusion criteria were apparently healthy adult voluntarily participants aged ≥18 years and both male and female were included on the basis of availability.

Exclusion criteria were age less than 18 years irrespective of sex, subject unwilling to participate and history of jaundice within last 6 months.

Socio-demographic data such as age, sex, marital status, occupation, education, yearly income and smoking habit were recorded. Risk factors for HCV infection were analyzed using a questionnaire including previous history of childhood immunization by old method using unsterilized and /or re-used needle, history of needle prick, major operation, dearntal procedure, shaving pattern, jaundice of parents- brothers, sisters, method of circumcision and history of intravenous drug abuse.

Data were collected using a predesigned, field tested structured questionnaire. All variable were noted in data collection sheet. Data sheet of population studied was filled-up after face to face interview. Prior to interview a public motivation program was conducted for ensuring community participation. During counseling special emphasis was given to clinical outcome of HCV infection. Risk, discomfort, confidentiality, privacy about collection of blood and data in the ethical point of view were discussed with the participants. Objectives of study discussed thoroughly. After recording of data 5 ml of blood from each individual were collected aseptically using disposal syringe and serum was separated by centrifuge machine and transported to Dhaka where serum was stored in deep frieze at-20°C. Then the sera were tested for anti-HCV by a commercial kit according to standard operating procedure of manufactures instruction (Biotec HCV rapid device, UK). Sensitivity was 96.8% and specificity was 99%. All anti-HCV positive cases were confirmed by ELISA method.

Out of 501 adults, 218 subjects were male and 282 were female. Mean age of subject was 35 ± 14.82 years. Most of subjects were less than 40 years of age (69.4%) (Table I and II). Educational status of study population showed most of the subjects was educated (72%). Most of the subjects (85.4%) had completed EPI coverage. Only 73 (14.6%) subjects were found uncovered by EPI program. Out of 283 females, 194 female subjects were completed their TT vaccination. Overall TT coverage was 68.55% (Table II). Study showed that 279 (55.7%) subjects