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Population based prevalence of community acquired methicillin resistant *staphylococcus aureus* in community settings of Srinagar Garhwal, India.

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Abstract
The present study was done to determine the prevalence of community acquired MRSA in the healthy population of Srinagar Garhwal. Population dwelling 200m away from the tertiary healthcare centre was chosen as target group and 212 samples in all from different anatomical sites were obtained after informed consent. Multiplex PCR was done to study the SCC*mec* gene type to confirm MRSA of community origin and prevalence in percentage was deduced thereafter to get clear picture. 108(50.94%) individuals were reported to have *s. aureus* and nasal colonization was reported to be most prevalent. Of *s. aureus* isolates 19 (17.59%) were methicillin resistant. Nasal carriage was the most prevalent anatomical site with 12 (63.15%) colonization of CA MRSA followed by upper respiratory tract and skin 5 (26.31%) and 2 (10.52%). Overall prevalence of CA MRSA was 8.96%. Keeping in mind the geographically distinct hilly region, although not very high but alarming prevalence of CA MRSA was observed. Our findings thus have serious implications for the rationale and judicial use of antibiotics.

Keywords: Prevalence, CA MRSA, SCC*mec* gene, nasal carriage, upper respiratory tract

INTRODUCTION

Emergence of Methicillin resistant (Beta lactam resistant) *staphylococcus aureus* in community settings colonizing different age groups of population without any symptom and prominent risk factors has been documented and has posed a serious threat to the health of population [1 – 8]. *S. aureus* is primarily known to be a opportunistic pathogen and causative agent of mainly skin and soft tissue infection [9, 10] and occurrence with speedy dissemination of beta lactam resistant strains has worsen the problem [11 – 15]. Acquisition of SCC*mec* A gene complex from a MRSA strain [16] and dissemination of hospital , strains in the community [17] are the two main possible means of emergence of CA MRSA. As phenotypic methods may be useful but not reliable, hospital acquired MRSA strains can precisely be distinguished from the Community acquired strains on the basis of presence of SCC*mec* gene type 4 [18 – 20] which is marker for the latter.

As of now, no published study has been known to the best of authors' knowledge which presents prevalence of CA MRSA from the Garhwal Himalayan sub region. Hence, the investigation was done to screen the population for prevalence of CA MRSA in community.

MATERIALS AND METHODS

Target group selection

Population of Srinagar Garhwal region dwelling from 200m away of Combined State Hospital (a tertiary healthcare centre) and to the 5 Km radius was chosen to be target population group because reach of municipal corporation was assumed to be functional in that area.

Inclusion and exclusion criteria

Every healthy or person with infection was included in the study who had not been to the hospital for last 2 months and was not receiving any kind of antibiotics whereas Individuals were excluded from the study if (1) they had previously enrolled in the study, (2) if the individual was admitted to the hospital for more than 2 days in last 2 months, (3) individual is receiving antibiotic therapy within 2 months period.

Definitions

A hospital acquired methicilin resistant S. aureus was defined as one harboring SCC*mec* A gene type I, II and III for methicilin resistance expression, whereas strains with SCC*mec* A gene type IV and V were considered to be community acquired methicillin resistant S. aureus.

Sample collection and culturing

Samples were obtained by rotating a sterile dacron swab (BBL) into both nares, upper respiratory tract and soft tissue infections if any and then directly inoculating onto nutrient agar and blood agar plates. Colonies with cultural properties of *s.aureus* were then picked and streaked on to the MeReSa and baird parker agar.

Antibiotic susceptibility testing

Susceptibility to methicillin/oxacillin, ampicillin, ciprofloxacin,

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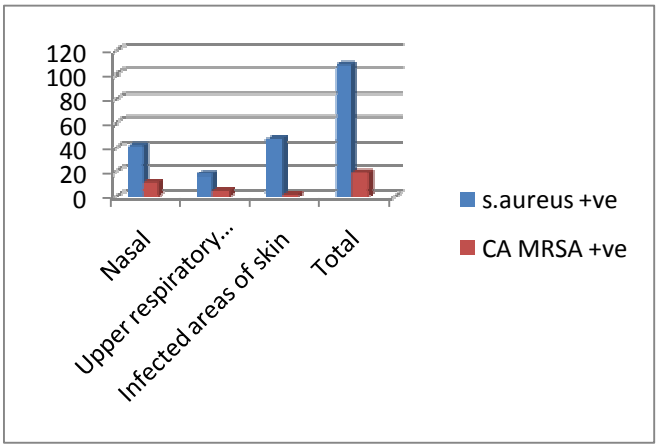
tertracycline, gentamicin, erythromycin, linezolid and vancomycin were determined Mueller-Hinton agar (Himedia) supplemented with 4% NaCl. The results were interpreted in accordance with the CLSI guidelines 2010.

SCC*mec* gene detection and typing

SCC*mec* typing was done by multiplex PCR [21] using ATCC 33591 (mec A +ve) and ATCC 25923 (mec A –ve) as control strain.

RESULTS

Out of the 212 samples taken, 108 (50.94%) were found to be culture positive for *s.aureus*. Out of those *s.aureus* isolates only 19 (17.59%) were found to be methicillin resistant.



Graph 1. Chart depicting the occurrence of CA MRSA and *s.aureus* in no.of individuals and from different anatomical sites.

Nasal/nares were found to be most prevalent site of colonization by both *s.aureus* and CA MRSA with 44(42.30%) and 12(63.15%) followed by infected areas 42 (40.38%) in case of *s. aureus* and upper respiratory tract in case of CA MRSA 5(26.31%).

DISCUSSION

Transmission of beta lactam resistance in *s.aureus* strains from hospital to the local environment and community settings has increased over the period of time [22]. Individuals screened in present investigation were found to be carrier of CA MRSA, although not at very high rate of prevalence. Presence of SCCmec A gene type 4 and a low resistance profile towards drugs with almost no apparent multiple drug resistance in community settings has been reported in present study which is consistent with the Ma XX *et al*. [23]. The present study identifies the importance of irrational use of antibiotics and incomplete course of treatment by population for the emergence of low level resistance and occurrence of methicillin resistance. Nasal carriage was found to be the prominent most site for CA MRSA and s.*aureus* colonization which was indicative of poor hygienic status and perhaps due to visits to the healthcare centre in past.

Overall prevalence of CA MRSA was although not high but has showed its presence which is likely to be disseminated at faster rate in upcoming years due to lack of knowledge of outcome of non judicial use of antibiotics and hence epidemiological studies are required to be done at regular interval in this Himalayan sub region.

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