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Surveillance of acinetobacter species in high vaginal swab of reproductive aged women: A prospective study

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Abstract
Acinetobacter species has been progressively detailed as the reason for nosocomial contaminations and have a genuine danger to the medicinal services framework due to its multi-tranquilize resistance. The present investigation was directed over a time of one year (September 2011 to August 2012) in a tertiary consideration emergency clinic to seclude and speciate Acinetobacter species from clinical examples and to decide their antibiogram. 172 clinical disconnects of Acinetobacter species were prepared for species distinguishing proof and antimicrobial weakness of these segregates was performed by Kirby-Bauer plate dispersion strategy. *A. baumannii* was the commonest species disengaged 150/172 (87.2%), trailed by A. haemolyticus 16/172 (9.3%) and *A. lwoffii* 6/172 (3.5%). Lion's share of the separates were confined from blood culture 92/172(53.48%), trailed by discharge 34/172 (19.76%) and sputum 22/172 (12.8%) Of the all out 172 segregates of Acinetobacter species, nosocomial detaches from the emergency clinic patients were 131 (76.1%) when contrasted with the 41 (23.9%) network procured secludes. Out of 172 Acinetobacter secludes, 99 (58%) were broadly tranquilize safe, 24 (14%) were multi-sedate safe and none of the separates were pandrug safe. Legitimate utilization of contamination control measures and anti-toxin stewardship program ought to be under set aside from effort to time.

Keywords: *Acinetobacter*, nosocomial, drug resistance, infection control, antibiotic stewardship

Introduction
In 1911 Beijerinck, a Dutch microbiologist working in Delft, secluded and depicted the living being which is currently perceived as Acinetobacter (Dijkshoorn L, Nemec A, 2008) [4]. Brison and Prevot proposed the conventional assignment, Acinetobacter in 1954. In 1971, the Subcommittee on Taxonomy of Moraxella and partnered Bacteria recommended that the class Acinetobacter will incorporate just oxidase negative microscopic organisms, non-motile, non-maturing, gram negative cocco-bacilli. DNA homology has prompted acknowledgment of something like 25 genomospecies by different specialists.
A. ursingii, A. schindleri, A. venctianus are the others. The other genomospecies are unnamed. DNA groups 1, 2, 3 and 13 are sachharolytic strains and are collectively referred to as *Acinetobacter calcoaceticus, A. baumannii complex* (William Riley, 2005) [20].
Acinetobacter species are saprophytic and ubiquitous and can be found in natural (e.g. soil, water, food) and hospital environment. *Acinetobacter* is considered as a part of commensal flora of man (e.g. axillae, groin, digit webs) where they occasionally present as opportunistic pathogens. Cutaneous colonization can be seen in approximately 25% of population. 7% of adults and children show transient pharyngeal colonization. It is often difficult to distinguish between the colonization and the infection with this organism and hence attribute the exact morbidity and mortality associated with infections due to this organism (Larson E *et al*, 1986) [11]. *Acinetobacter* species are increasingly being recognized as a major pathogen causing nosocomial infections, including bacteremia and ventilator associated pneumonia, particularly in patients admitted to intensive care units. Carbapenems are often used as a last resort for infections due to multidrug resistant gram negative bacilli. However, there is an alarming increase in reports of carbapenem resistance in *Acinetobacter* species. These carbapenem resistant organisms have the ability to rapidly disseminate within an institution and may lead to poor patient outcomes when infection occurs. Therefore, early detection and identification of these multidrug resistant organisms is of great clinical importance (Bonomo RA, Szabo D, 2006) [1].

Most reports in india do not report the species involved in human infections and address the infections at only genus level. Speciation of isolates is important in the epidemiology of *Acinetobacter* infections. In view of the increasing challenges posed by this organism in health care settings, the present study was undertaken to isolate and speciate *Acinetobacter* species from clinical samples and to determine their antibiogram.

Materials and Methods

The present prospective study was conducted in the Department of Obstetrics and Gynaecology and samples were cultured and studied and medical research laboratory, IMS and sum hospital, Bhubaneswar over a period of one year (September 2017 to August 2018) after approval from the Institutional Ethical Committee Sample collection: A total of 172 isolates of *Acinetobacter* species recovered from the urine, pus, blood, respiratory samples such as ndotracheal aspirates, bronchoalveolar lavage (BAL), CSF, high vaginal swabs and various body fluids were included in the study. Isolation and identification of *Acinetobacter* species: For the isolation of *Acinetobacter* spp., the clinical samples were inoculated onto blood agar and MacConkey agar. After overnight incubation at 37 ^{0}C, the suspected colonies were further processed for identification of *Acinetobacter* species by routine conventional methods. Species differentiation was done on basis of glucose oxidation, gelatin liquefaction, haemolysis, growth at 37 °C and 42 °C, susceptibility to penicillin and chloramphenicol discs. Antimicrobial helplessness testing: The antimicrobial vulnerability testing of all the Acinetobacter segregates was completed by Kirby-Bauer circle dissemination strategy on Mueller-Hinton agar medium and results were translated according to the Clinical and Laboratory Standards Institute rules. Antimicrobial circles utilized in the examination were secured from Hi-media Laboratories, Mumbai, India. Anti-microbials tried were gentamicin, amikacin, netilmycin, amoxicillin-clavulinic corrosive, cefotaxime, ceftriaxone, ceftazidime, cefepime, ciprofloxacin, imipenem, meropenem, doxycycline, piperacillin-tazobactum, polymyxin B and colistin. Escherichia coli ATCC 25922 strain was utilized as a control strain.

The information accumulated on all Acinetobacter diseases was broke down utilizing SPSS rendition 17.0.Chi-square test was utilized in surveying the relationship between unmitigated factors. A p-estimation of 0.05 or less was considered measurably critical.

Result and Discussion

An aggregate of 172 non-copy, non-back to back Acinetobacter disconnects were prepared for species distinguishing proof, antimicrobial helplessness testing and to know the MDR, XDR and PDR example of these detaches. *A. baumannii* was the commonest species segregated 150/172 (87.2%), trailed by A. haemolyticus 16/172 (9.3%) and *A. lwoffii* 6/172 (3.5%) (Table 1). *A. baumannii* is among the most well-known of multi-sedate safe clinical confines in the United States, Europe and Asia, and is a noteworthy risk moving forward. It has just been informed by the Infectious Disease Society of America as a red ready pathogen. Larson *et al* 1986 [11], demonstrated that Acinetobacter were the most widely recognized gram-pessimistic life forms carried on the skin of medical clinic work force. Concentrates in Germany, London and rustic India all found somewhere in the range of 42% and 55% of sound people to be colonized with Acinetobacter spp., which contained up to 30% of the absolute microbiota gathered from locales on the temple, arms and toes. Hospitalized subjects had a higher colonization rate of ~75%. Most of skin disengages from both sound and hospitalized European subjects were *A. lwoffii* (>50%) and A. johnsonii (21%), while *A. baumannii* was recuperated from <1% of people tried. Interestingly, the most pervasive strains colonizing people in rustic India were A. haemolyticus (41%) and A. calcoaceticus (15%). These examinations recommend that normal carriage of pathogenic species including *A. baumannii* by sound or debilitated people is uncommon (Mindolli *et al*; 2010, Oberoi *et al*; 2009) [14].

The example of conveyance of Acinetobacter species from different clinical examples is reflected in Table 2. Larger part of the secludes were detached from blood culture 92/172(53.48%), trailed by discharge 34/172 (19.76%) and sputum 22/172 (12.8%). Concentrates on Acinetobacter in different nations have demonstrated a transcendence of detachment from pee (21-27%) and tracheo-bronchial discharges (24.8-48.8%).In this investigation, Blood tests (53.48%) were overwhelmingly gotten for culture when contrasted with pee and respiratory secretions. Pus/copy/wound swab disengagement rate in this examination was 19.76% which was tantamount to the aftereffects of other western nations (Cisneros JM *et al*; 1996, Seifert H *et al*, 1995) [2, 17].

Circulatory system contaminations due to Acinetobacter spp. represent ~1.5 2.4% of all revealed BSIs in the United States, and *A. baumannii* (86%) is the most habitually separated species. Because of the generally low frequency of *A. baumannii* BSI, empiric treatment for Gram-negative bacteremia is frequently aimed at progressively regular guilty parties which are prevalently defenseless to b-lactam/b-lactamase inhibitor blend drugs. This can possibly result in treatment disappointment and increment dismalness and mortality in patients with *A. baumannii* BSIs.

A. baumannii BSIs are related with death rates as high as 44% to 52%, which is somewhat higher than the 20% to 40% mortality announced for Gram-negative sepsis all in all. Be that as it may, it very well may be hard to unequivocally ascribe mortality to *A. baumannii* contamination since a considerable lot of these patients have other hidden illnesses (Gaynes R, Edwards JR, 2005) [7].

Acinetobacter has been one of the built up reasons for Ventilator Associated Pneumonia (VAP). Around 5-10% instances of all the VAP are expected to Acinetobacter. In this the inclining factors are Endo-tracheal intubation, tracheostomy, medical procedure, past anti-microbial treatment or hidden lung malady. Nosocomial spread of the living being can be because of ventilator gear, gloves, tainted parenteral arrangements, PC consoles. Mortality diminishes once hostile to microbial treatment has been established for over 3 days. Optional bacteremia and sepsis are poor prognostic variables. The nearness of Acinetobacter is inferable more to ICU patients insufficient insusceptibility instead of the destructiveness of the life form (Shete *et al*, 2010) [18].

Skin and delicate tissue contaminations represent a little level of diseases inferable from Acinetobacter, and are basically confined to patients enduring serious consumes or awful damage. This kind of skin and delicate tissue disease brought about by *A. baumannii* can frequently be perceived by the

peau d'orange erythyma going before improvement of fasciitis. These diseases require broad debridement notwithstanding anti-infection treatment to determine the contamination. Dispersal to the circulation system is additionally basic in this patient gathering, happening in 44% of these infections. During the Vietnam struggle the most widely recognized gram negative life form to defile horrible furthest point wounds was Acinetobacter with bacteremia happening 3 after 5 days. This marvel was likewise noted amid the Iraq war. Be that as it may, in these cases the Acinetobacter were multi-sedate resistant (Guerrero DM, 2010) [8].

Genitourinary tract contaminations as cystitis and pyelonephritis can be found if there should be an occurrence of indwelling catheters or nephrolithiasis. Intracranial infections generally follow head trauma or neurosurgery and can likewise be seen in solid people. Petechial rash is seen in 30% of the patients. Waterhouse-Friderichson disorder has likewise been reported with Acinetobacter meningitis (David M, 2005) [3].

The male to female proportion among patients with Acinetobacter contamination was 1.7:1 (Table 3). The age astute example of appropriation of Acinetobacter species is reflected in Table 4. Most normal age bunches included were under ten 50/172 (29.1%), age gathering between 20-30 years 35/172(20.4%) and patients of over 60 years 32/172 (18.1%). The example of dissemination of Acinetobacter species from different medical clinic units is reflected in Table 5. Dominant part of the disengages were recuperated from the patients conceded in ICUs 64/172 (37.2%) trailed by those conceded in the careful wards 38/172 (22.09%) and therapeutic wards 27/172 (15.7%) where various hazard factors were available, including the way that patients were hospitalized for extensive stretches, the wet condition of the catheters/urobags and treatment with anti-infection agents now and again, all giving an open door for the bacilli to colonize different locales and after that later transform into a pathogen (Vincent *et al*; 2009, Lee Sang Oh *et al*; 2004) [19, 12].

Of the complete 172 segregates of Acinetobacter species, nosocomial disengages from the medical clinic patients were 131 (76.1%) when contrasted with the 41 (23.9%) network procured confines, conveying to fore the job of Acinetobacter spp as a significant nosocomial pathogen, since much of the time the patients were symptomatic. The hazard factors related with network gained contaminations are liquor addiction, smoking, incessant lung infection, diabetes mellitus and habitation in tropical creating network. The hazard factors related with nosocomial diseases are length of medical clinic remain, surgery, wounds,previous infections, indwelling intravenous catheters, mechanical ventilation, parenteral nutrition etc.

In the social insurance setting, protection from drying up and disinfectants permits Acinetobacter spp. to persevere and stay reasonable on surfaces for 13 27 days (Jawad An *et al*, 1998) [10]. The foundation of biofilms can additionally block cleaning and sanitization, in this manner giving a steady source to nosocomial infection (Felfö ldi T, 2010) [5]. Surfaces ordinarily debased with Acinetobacter incorporate PC consoles, ledges, laryngoscopes, gloves, persistent diagrams, endotracheal connector cylinders and bedding. In particular, *A. baumannii* was detached from 4.3% of PC consoles utilized by medicinal services laborers (HCWs) in closeness to patients. Essentially, a study of patient graphs in a careful ICU unit found *A. baumannii* to be the most common Gram-negative bacterium, present on 5.5% of charts. With such a significant number of lifeless stores notwithstanding colonized and tainted patients, it isn't astounding that the hands of HCWs are regularly defiled prompting nosocomial infections (Morgan DJ, 2010) [15].

The antimicrobial defenselessness example of Acinetobacter species is appeared table 6. Out of 172 Acinetobacter confines, 99 (58%) were XDR as these were impervious to atleast one of the carbapenems, aminoglycosides, fluoroquinolones, - lactams and - lactam- - lactamase inhibitor blends. Around 24 (14%) of the segregates were impervious to other gathering of antimicrobial operators aside from carbapenems in this way, these were classified as MDR secludes. None of the confines recuperated was impervious to polymyxin B and colistin. Thus, there was no seclude, which was observed to be PDR. The components of obstruction by and large fall into 3 classifications:

(1) antimicrobial-inactivating catalysts, (2) diminished access to bacterial targets, or (3) transformations that change targets or cell capacities. Apart from its characteristic obstruction for the most part because of the low penetrability of the external layer to specific anti-infection agents just as constitutive articulation of certain efflux siphons, *A. baumannii* can without much of a stretch gain and join hereditary components, for example, plasmids, transposons and integrons. (H. Giamarellou, 2008) [9]. Consequently, *A. baumannii* has a place with a one of a kind class of Gram-negative microscopic organisms that are portrayed as normally transformable. MDR *A. baumannii* have been accounted for from medical clinics in Europe, USA, China, Hong Kong, Korea and Japan just as from remote territories, for example, the South Pacific (F Perez, 2007) [6]. A noteworthy unwelcome element of MDR *A. baumannii* is aminoglycoside resistance by modifying enzymes. Topoisomerase mutations leadto quinolone resistance and efflux pumps can effectively oust beta lactams, quinolones and even aminoglycosides. The chromosomally encoded beta lactamase, especially AmpC cephalosporinase, is regular to every one of the *A. baumannii* strains. There are additionally opposition instruments basic to both Acinetobacter species and Pseudomonas aeruginosa. These incorporate carbapenemases, which are OXA beta lactamases and metallo-beta lactamases, especially the VIM type which presented noteworthy carbapenem opposition in separates from Korea (Bonomo RA, Szabo D, 2006) [1]. This penchant for multi sedate obstruction makes Acinetobacter contaminations risky and difficult to-treat.

The rise of *A. baumannii* as a critical nosocomial pathogen is a prime case of a sharp pathogen exploiting an undeniably in danger populace. Characteristic protection from basic disinfectants and the capacity to endure on surfaces and structure defensive biofilms make it hard to destroy this bacterium from heath care settings and gives a simple component to tolerant to-quiet spread and rehashed episodes. The nearness of a variety of local anti-microbial obstruction instruments, just as the obtaining of explicit anti-infection opposition qualities through sidelong exchange, has brought about strains of *A. baumannii* that are impervious to about each kind of medication as of now accessible. Along these lines, the treatment of safe *A. baumannii* contaminations will keep on displaying a test. This underscores the significance of legitimate disease control measures, including screening, contact seclusion and great hand cleanliness while interfacing with patients colonized or tainted with *A. baumannii*.

Table 1: Species differentiation of the isolates

	Glucose oxidation	Gelatin liquefaction	Hemolysis	Growth At 42 °C	Penicillin susceptibility	Total
Acinetobacter	+	_	_	+	_	150
baumannii						(87.2%)
complex						
Acinetobacter	+	+	+	-	_	16
hemolyticus						(9.3%)
Acinetobacter	_	_	_	-	+	6
lowffii						(3.5%)

Table 2: Distribution of the isolates from various specimens

Sample	Number of isolates	
Blood	92	(53.48%)
Sputum	22	(12.8%)
Respiratory secretions	7	(4.07%)
Urine	13	(7.6%)
Pus	34	(19.76%)
Fluids	4	(2.3%)

Table 3: Sex wise distribution of isolates

Sex	Number of isolates
Male	109
Female	63

Table 4: Age wise distribution of isolates

Age in years	Number of isolates
0-10	50 (29.1%)
10-20	28 (16.6%)
20-30	35 (20.4%)
30-40	14 (8.3%)
40-50	8(4.2%)
50-60	5(3.3%)
More than 60 years	32(18.1%)

Table 5: Unit wise distribution of isolates

Units	Number of isolates
Intensive care units	64 (37.2%)
Surgical wards	38 (22.09%)
Medical wards	27 (15.7%)
Burn	10 (5.8%)
Orthopedic	8 (4.6%)
OPD	25 (14.53%)

Table 6: Antimicrobial susceptibility pattern of Acinetobacter isolates

Antimicrobial drugs	*Acinetobacter* isolates (n=172) Number (%)
Amikacin	48 (27.9)
Amoxicillin-clavulinic acid	7 (4.06)
Cefotaxime	2 (1.16)
Ceftriaxone	2 (1.16)
Ceftazidime	3 (1.74)
Cefepime	8 (4.65)
Ciprofloxacin	35 (2.03)
Cotrimoxazole	9 (5.23)
Colistin	172 (100)
Doxycycline	18 (1.04)
Gentamicin	36 (2.09)
Imipenem	89 (5.17)
Meropenem	78 (45.34)
Netilmycin	67 (38.95)
Piperacillin-tazobactum	94 (54.65)
Polymyxin B	172 (100)

* Numbers in parenthesis indicate percentage of susceptible Acinetobacter isolates

Conclusions

Today, while clinicians stand up to the most exceedingly awful circumstance endeavoring to battle even container tranquilize safe segregates, for example, Acinetobacter baumannii, the industry diminishes the improvement of new anti-toxins. A coordinated exertion by industry, government and foundations is desperately required to improve the circumstance. Meanwhile, what is left for the clinician? Legitimate use of contamination control measures and especially of hand cleanliness just as better anti-toxin stewardship so as to moderate the advancement of obstruction and to diminish high opposition rates. There is no uncertainty that we should investigate methods for keeping up the strength of right now accessible anti-microbials. Suitable societies ought to be taken so as to maintain a strategic distance from the experimentation of the specialists, and pharmacokinetics/pharmacodynamics ought to be abused, though when culture results are prepared, de-acceleration of the controlled anti-infection agents ought to be expeditiously requested.

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