



Microbiology Newsletter

Sir Ganga Ram Hospital

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Candida haemulonii: An emerging pathogen

Candida haemulonii (syn. *Torulopsis haemulonii*) was originally described from a strain obtained from the gut of a blue striped grunt (*Haemulon scirus*) in 1962.¹ Levarde et al reported the first clinical isolation of this micro-organism from the blood of a patient in 1984.² It has been recognised as one of the most frequently occurring human pathogenic *Candida* species by experts designing DNA based systems for rapid identification of yeast species.³ *Candida albicans* was once thought to be the only important yeast species associated with human infections. Modern medical therapy and improved methods for detecting and differentiating the yeast species, which can vary greatly in their susceptibility to the current antifungal agents. A case of fungaemia due to *Candida haemulonii* is presented here.

A three months old male child was admitted in the Paediatric ICU in the month of December 2006. The baby was delivered vaginally at full term in a nursing home, after prolonged labour with meconium stained liquor. The APGAR score was 8/10, 8/10,9/10 and the birth weight was 3.3 kg. On day 3 of life, the baby was admitted in a private nursing home with complaint of excessive secretions and respiratory distress. He had one episode of seizure for which, as per the records, phenobarbitone was given. Since there was no improvement in the condition of the patient, he was referred to Sir Ganga Ram Hospital for bronchoscopy to rule out any congenital anomaly.

On examination, the child had severe respiratory distress, pallor and increased secretions from mouth and nose. The heart rate was 128/minute, respiratory rate was 38/minute and the baby was maintaining saturation on oxygen (99%). Chest examination revealed bilateral crepts. Cardiovascular and central nervous system showed no abnormality. Bronchoscopy showed H-type tracheo-oesophageal fistula, for which the child was operated. Postoperatively, the child required ventilation for 2 weeks and developed collapse of left lung and right upper lobe.

Parenteral antimicrobial therapy with amikacin and clindamycin was started, along with total parenteral nutrition. The initial blood cultures were sterile. Subsequently, after almost 10 days, blood culture grew white to cream coloured smooth, glabrous yeast like colonies. Microscopic morphology showed numerous ovoid to globose, budding yeast cells or blastoconidia, 3-5 x 3-6.5 microns. No pseudohyphae or chlamydo spores were formed on cornmeal agar. Germ tube test and hydrolysis of urea were negative. The isolate was identified as *Candida haemulonii* by Vitek 2 compact (bioMerieux, France). Antifungal sensitivity of the strain was determined by broth microdilution method (ATB fungus, bioMerieux, France) and was found to be sensitive to amphotericin B and flucytosine.

The baby was started on amphotericin B plain, but fungaemia persisted and it was switched to liposomal amphotericin B. The

child also grew *Klebsiella* sp from ET aspirate and blood, for which antibiotics were changed to parenteral meropenem, colistin and netilmicin. Repeat blood culture was again positive for fungaemia even after 3 weeks of therapy with liposomal amphotericin B. Therefore, flucytosine was also added to the therapy. After 10 days of the combination therapy, blood culture became negative and there was clinical improvement in the patient. The baby was discharged in a stable condition.

SGRH Experience

Between July '06 to December '06 we isolated 138 *Candida* sp from blood and out of these only 16 (11.5%) were *Candida albicans* and the rest (122; 88.5%) belonged to non-albicans *Candida* sp and 12 isolates were identified as *Candida haemulonii*.

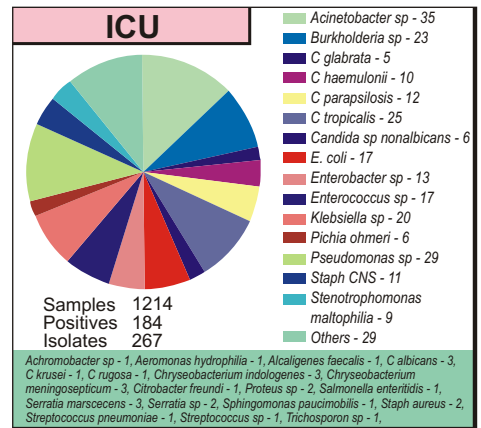
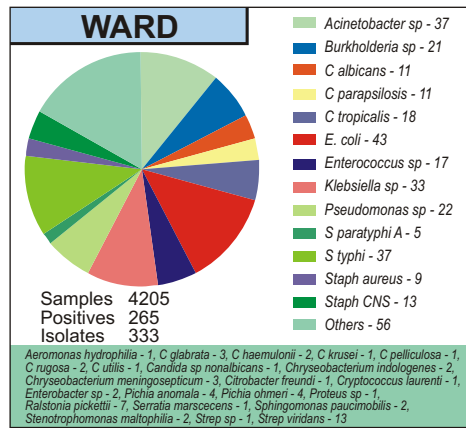
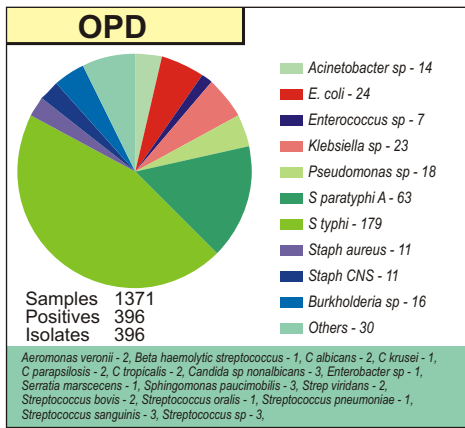
Details of *Candida haemulonii* isolates from blood

Age & Sex	Location	Sensitivity/ MIC (mg/l)	Interpretation
10 Months - Male	Ped Ward	NA	-
7 Months - Male	Ped SP**	NA	-
35 Years - Male	SP ** (Surgical Gastroenterology)	Flucytosine (<0.5) Amphotericin B (<0.5) Fluconazole (64) Itraconazole (1)	Sensitive -* Resistant Resistant
58 Years - Male	ICU (Surgical Gastroenterology)	Flucytosine (<0.5) Amphotericin B (1) Fluconazole (128) Itraconazole (0.5)	Sensitive -* Resistant Intermediate
2 Months - Male	Pediatric ICU	Flucytosine (<0.5) Amphotericin B (1) Fluconazole (128) Itraconazole (<0.5)	Sensitive -* Resistant Intermediate
10 Months - Male	Pediatric ICU	Flucytosine (<0.5) Amphotericin B (1) Fluconazole (64) Itraconazole (1)	Sensitive -* Resistant Resistant
24 Days - Male	Pediatric ICU	Flucytosine (<0.5) Amphotericin B (1) Fluconazole (128) Itraconazole (1)	Sensitive -* Resistant Resistant
29 Years - Male	ICU	Flucytosine (<0.5) Amphotericin B (<0.5) Fluconazole (128) Itraconazole (0.25)	Sensitive -* Resistant Intermediate
35 Years - Male	ICU	Flucytosine (<0.5) Amphotericin B (<0.5) Fluconazole (64) Itraconazole (0.125)	Sensitive -* Resistant Sensitive
55 Years - Male	ICU	Flucytosine (<0.5) Amphotericin B (1) Fluconazole (32) Itraconazole (0.5)	Sensitive -* Intermediate Intermediate
29 Years - Male	ICU	Flucytosine (<0.5) Amphotericin B (<0.5) Fluconazole (128) Itraconazole (0.25)	Sensitive -* Resistant Intermediate
3 Months - Male	Pediatric ICU	Flucytosine (<0.5) Amphotericin B (1) Fluconazole (128) Itraconazole (0.25)	Sensitive -* Resistant Intermediate

* CLSI breakpoints for amphotericin B not defined

** SP - semi-paying; shared room

contd. on page 8



Percentage Resistance

GPC	No. of Isolates	Penicillin	Oxacillin**	Ampicillin	Clindamycin	Gentamicin	HLAR* Gentamicin	Vancomycin
Staph aureus	11	92	25	-	0	40	-	0
	9	100	33	-	25	22	-	0
	2	-	-	-	-	-	-	-
Staph CNS	11	78	44	-	56	44	-	0
	13	100	60	-	60	75	-	0
	11	50	20	-	25	20	-	0
Enterococcus sp	7	-	-	43	-	-	57	0
	17	-	-	89	-	-	64	13#
	17	-	-	78	-	-	82	18##

* Two isolates of GRE (Glycopeptide Resistant Enterococci).

** Three isolates of GRE.

* HLAR: High Level Aminoglycoside Resistance.

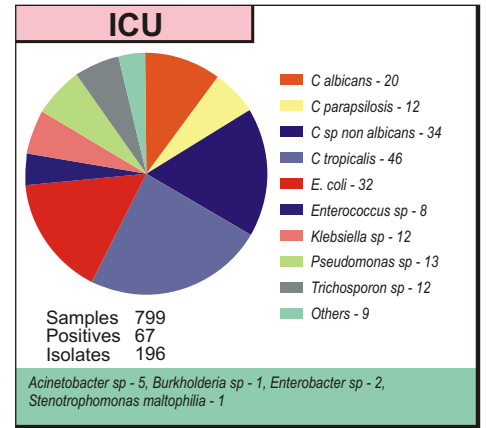
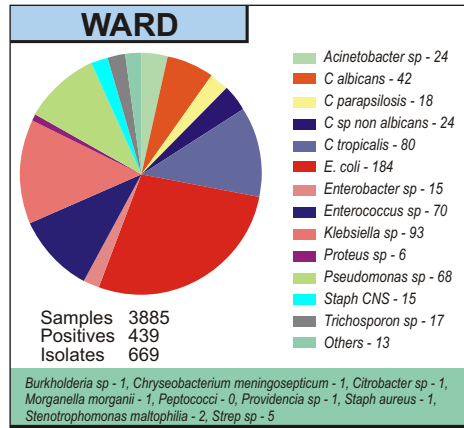
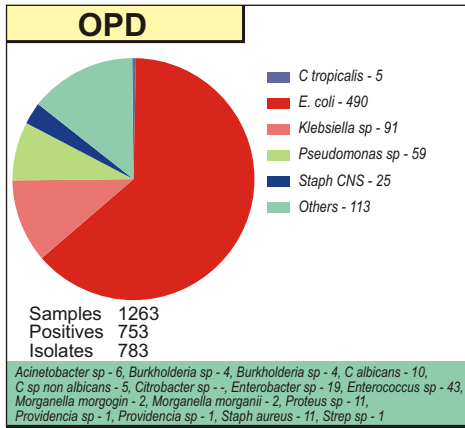
** Oxacillin sensitivity can be extrapolated for all -lactams and -lactam-inhibitor combinations; and Vancomycin sensitivity for Teicoplanin.

*OPD data for 1 year, (Jan to Dec 2006), included in this issue

GNB	No. of Isolates	Ampicillin	Cefturoxime	Ceftriaxone	Ceftazidime	Gentamicin	Amikacin	Nalidixic acid	Ciprofloxacin	Co-trimoxazole	Chloramphenicol	Piperacillin+ Tazobactam*	Cefoperazone+ Sulbactam*	Imipenem	Colistin
S. enterica serotype Typhi	179	14	-	0	-	-	-	86	6	23	14	-	-	-	-
	37	19	-	0	-	-	-	95	3	29	18	-	-	-	-
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S. enterica serotype Paratyphi A	63	0	-	0	-	-	-	98	2	0	0	-	-	-	-
	5	0	-	0	-	-	-	100	0	0	0	-	-	-	-
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. coli	24	91	69	71	-	59	22	-	82	-	-	38	25	0	-
	43	93	94	87	-	61	14	-	88	-	-	16	29	0	-
	17	94	83	69	-	58	18	-	80	-	-	17	43	0	-
Klebsiella sp	23	100	87	85	-	75	70	-	89	-	-	79	87	0	-
	33	100	83	90	-	83	39	-	63	-	-	45	46	3**	-
	20	100	100	100	-	92	46	-	92	-	-	65	86	0	-
Pseudomonas sp	18	-	-	-	67	78	77	-	73	-	-	50	73	62	13
	22	-	-	-	67	58	60	-	43	-	-	23	53	33	13
	29	-	-	-	88	95	92	-	92	-	-	78	94	78	8
Acinetobacter sp	14	62	60	55	50	50	57	-	43	-	-	36	40	60	10
	37	85	-	100	100	74	60	-	70	-	-	64	65	57	0
	35	100	-	100	100	89	88	-	88	-	-	89	87	76	4
Burkholderia sp	16	-	-	-	23	-	-	-	-	27	-	-	-	50	-
	21	-	-	-	25	-	-	-	-	74	-	-	-	89	-
	23	-	-	-	25	-	-	-	-	14	-	-	-	94	-
Enterobacter sp	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13	100	100	78	-	80	64	-	80	-	-	70	67	0	-

*Percentage Resistance may indirectly appear higher than actual, because 2nd line drugs are tested only in multi-drug resistant isolates.

** One isolate.



Percentage Resistance

OPD
WARD
ICU

GPC	No. of Isolates	Ampicillin	Penicillin	Oxacillin**	Clindamycin	Nitrofurantoin	Gentamicin	HLAR* Gentamicin	Norfloxacin	Vancomycin
<i>Enterococcus sp</i>	43	19	-	-	-	10	-	50	74	5#
	70	60	-	-	-	21	-	65	91	9#
	8	50	-	-	-	25	-	50	100	0
<i>Staph CNS</i>	25	-	87	54	29	0	59	50	69	0
	15	-	100	80	29	0	100	0	100	0
	0	-	-	-	-	-	-	-	-	-
<i>Staph aureus</i>	11	-	70	18	11	0	27	-	50	0
	1	-	-	-	-	-	-	-	-	-
	0	-	-	-	-	-	-	-	-	-

* Two isolates of GRE (Glycopeptide Resistant Enterococci).

Six isolates of GRE.

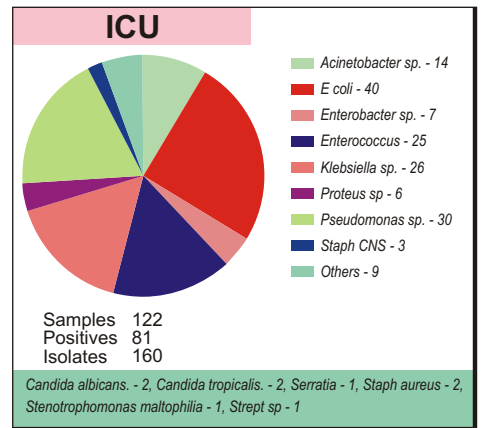
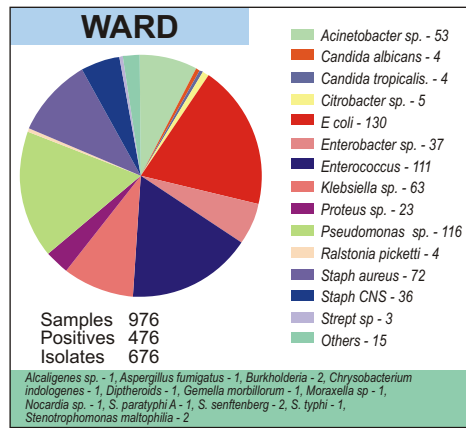
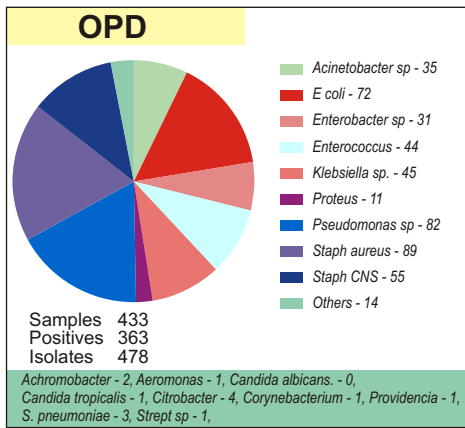
* HLAR: High Level Aminoglycoside Resistance.

** Oxacillin sensitivity can be extrapolated for all -lactams and -lactam-inhibitor combinations; and Vancomycin sensitivity for Teicoplanin.

*OPD data for 1 year, (Jan to Dec 2006), included in this issue

GNB	No of isolates	Ampicillin	Cefotaxime	Ceftazidime*	Nalidixic acid	Norfloxacin	Ciprofloxacin	Ofloxacin	Gentamicin	Netilmicin	Amikacin	Piperacillin+ Tazobactam*	Cefepime+ Sulbactam*	Imipenem	Co-trimoxazole	Nitrofurantoin
<i>E. coli</i>	490	89	65	64	94	82	80	78	59	47	33	38	36	0	76	25
	184	93	76	64	93	89	90	87	67	50	29	44	47	0	78	18
	32	100	87	67	96	89	89	86	75	50	30	50	63	0	81	16
<i>Pseudomonas sp</i>	59	100	83	40	100	100	78	49	75	61	67	25	45	30	100	92
	68	100	83	84	100	100	90	79	89	84	86	54	83	89	89	92
	13	100	75	67	100	0	78	67	67	63	67	42	44	83	100	100
<i>Klebsiella sp</i>	91	97	67	53	81	80	79	67	63	56	49	55	58	0	73	69
	93	100	83	89	86	74	75	80	68	63	64	68	70	0	75	65
	12	100	73	100	70	70	73	67	67	60	42	64	75	0	67	58
<i>Enterobacter</i>	19	94	56	50	86	75	71	50	61	89	57	56	53	0	78	63
	15	100	71	100	81	73	75	60	65	69	56	53	56	0	82	59
	2	100	50	-	50	50	50	-	50	50	50	50	50	0	50	100
<i>Acinetobacter sp</i>	6	50	50	50	25	25	57	100	29	50	43	29	33	50	40	50
	24	100	60	50	58	50	50	33	74	50	68	43	50	60	73	90
	5	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<i>Proteus sp</i>	11	64	13	0	73	33	20	25	9	9	10	0	0	0	64	73
	6	60	40	40	80	-	33	33	33	50	33	67	0	0	-	60
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Percentage Resistance may indirectly appear higher than actual, because 2nd line drugs are tested only in multi-drug resistant isolates.



Percentage Resistance

OPD
WARD
ICU

GPC	No. of Isolates	Penicillin	Oxacillin**	Ampicillin	HLAR* Gentamicin	Clindamycin	Erythromycin	Gentamicin	Vancomycin
Staph aureus	89	85	29	-	-	18	45	35	0
	72	90	28	-	-	22	45	31	0
	2	-	-	-	-	-	-	-	-
Staph CNS	55	79	51	-	-	31	-	53	-
	36	90	35	-	-	47	-	59	-
	3	-	-	-	-	-	-	-	-
Enterococcus sp	44	-	-	32	61	-	-	-	7 [#]
	111	-	-	62	55	-	-	-	25 ^{##}
	25	-	-	65	54	-	-	-	0

[#] Three isolates of GRE (Glycopeptide Resistant Enterococci).

^{##} Five isolates of GRE.

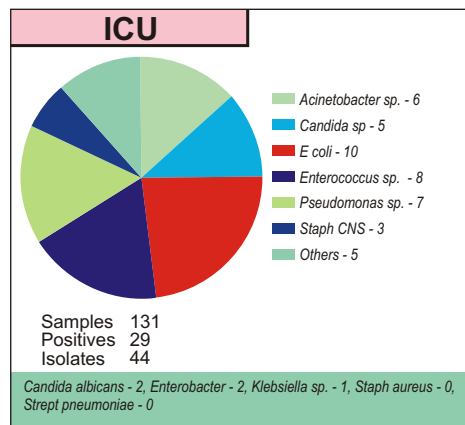
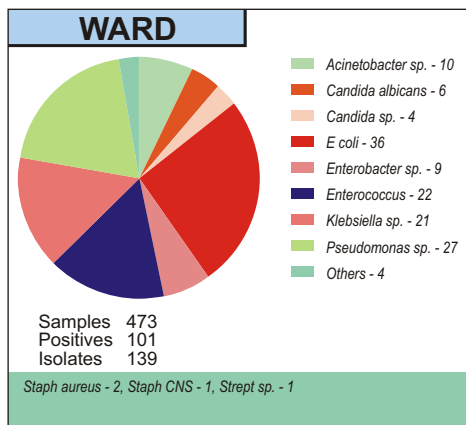
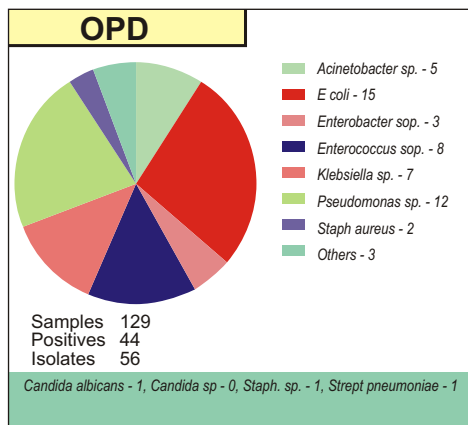
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** Oxacillin sensitivity can be extrapolated for all -lactams and -lactam-inhibitor combinations; and Vancomycin sensitivity for Teicoplanin.

*OPD data for 1 year, (Jan to Dec 2006), included in this issue

GNB	No of isolates	Ampicillin	Cefuroxime	Cefotaxime	Ceftazidime	Gentamicin	Netilmicin	Amikacin	Ciprofloxacin	Ofloxacin	Co-trimoxazole	Cefepazone+ Subactam*	Piperacillin+ Tazobactam*	Imipenem
E. coli	72	98	71	75	-	65	47	29	86	80	77	43	36	0
	130	95	88	85	-	71	51	35	84	79	81	61	51	0
	40	95	90	87	-	71	71	39	90	85	79	64	53	0
Enterobacter sp	31	86	79	83	-	74	52	52	61	59	62	50	50	0
	37	93	88	75	-	68	57	42	62	50	77	61	53	0
	7	100	83	100	-	67	33	43	40	85	74	34	17	0
Klebsiella sp	45	99	50	90	-	46	42	40	63	54	69	46	45	0
	63	99	96	94	-	86	67	53	89	83	72	71	69	0
	26	100	85	84	-	81	76	48	77	65	67	77	79	0
Pseudomonas sp	82	67	-	75	41	63	58	48	59	56	-	53	30	58
	116	100	-	85	65	73	63	70	65	70	-	59	43	64
	30	88	-	84	83	83	54	75	50	71	-	85	44	40
Acinetobacter sp	35	86	92	81	67	66	46	69	70	58	57	59	70	29
	53	97	93	86	95	88	55	88	79	72	88	70	75	39
	14	100	90	72	70	85	50	86	80	43	100	72	72	33
Proteus sp	11	88	50	29	-	30	29	23	34	25	75	-	-	0
	23	85	71	56	-	55	36	50	46	40	65	-	-	0
	6	75	67	34	-	54	50	50	50	50	67	-	-	0

*Percentage Resistance may indirectly appear higher than actual, because 2nd line drugs are tested only in multi-drug resistant isolates.



Percentage Resistance

OPD
WARD
ICU

GPC

	No. of Isolates	Penicillin	Oxacillin**	Clindamycin	Gentamicin	HLAR* Gentamicin	Vancomycin*
Staph aureus	2	100	0	0	50	-	0
	2	100	0	0	50	-	0
	0	-	-	-	-	-	-
Enterococcus sp	8	100	-	-	-	83	0
	22	67	-	-	-	85	22 [#]
	8	100	-	-	-	65	13 ^{##}

* Five isolates of GRE (Glycopeptide Resistant Enterococci).

** One isolates of GRE.

* HLAR: High Level Aminoglycoside Resistance.

** Oxacillin sensitivity can be extrapolated for all -lactams and -lactam-inhibitor combinations; and Vancomycin sensitivity for Teicoplanin.

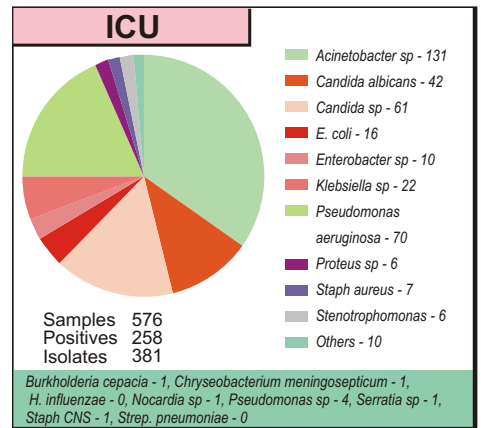
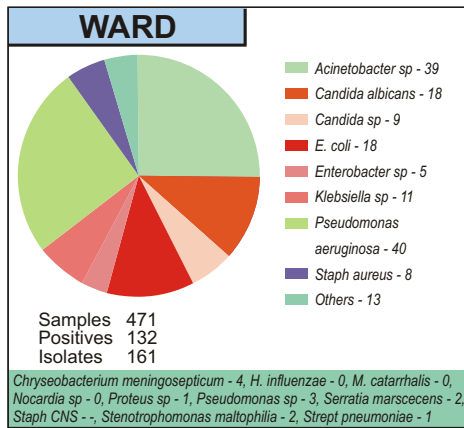
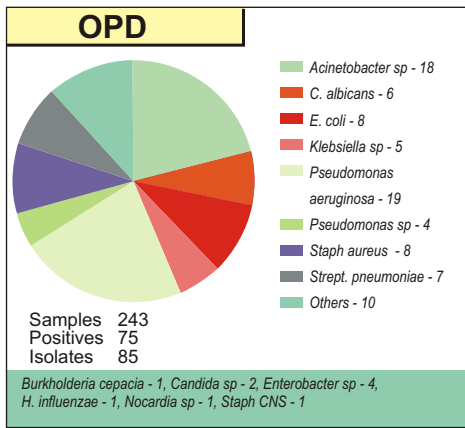
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GNB

	No of isolates	Ampicillin	Ceftazoxime	Cefotaxime	Ceftazidime	Gentamicin	Netilmicin	Amikacin	Ciprofloxacin	Ofloxacin	Co-Trimoxazole	Cefoperazone+ Sulbactam*	Piperacillin+ Tazobactam*	Imipenem
E. coli	15	80	67	67	-	67	44	14	87	91	64	40	29	0
	36	91	92	80	-	73	57	30	86	86	71	67	54	0
	10	100	78	100	-	75	33	11	100	100	86	67	40	0
Enterobacter sp	3	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	100	100	100	-	100	67	75	75	100	100	100	60	0
	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Klebsiella sp	7	100	100	90	-	75	50	7	83	70	100	83	90	0
	21	100	86	96	-	64	69	55	94	76	95	65	88	0
	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudomonas sp	12	-	-	-	68	71	73	70	100	30	-	58	40	50
	27	-	-	-	60	70	39	36	66	60	-	71	32	51
	7	-	-	-	65	80	50	80	33	100	-	80	80	100
Acinetobacter sp	5	60	67	40	0	40	33	50	40	33	80	25	40	0
	10	90	78	57	20	75	42	75	69	28	90	38	25	33
	6	100	100	100	100	100	33	100	100	100	100	33	100	100

*Percentage Resistance may indirectly appear higher than actual, because 2nd line drugs are tested only in multi-drug resistant isolates.

RESPIRATORY ISOLATES July - December 2006*



Percentage Resistance

OPD
WARD
ICU

GPC	No. of Isolates	Penicillin	Oxacillin**	Clindamycin	Erythromycin	Gentamicin	Vancomycin
Staph. aureus	8	100	0	0	0	0	0
	8	88	88	38	75	88	0
	7	100	43	43	100	71	0
Strept. pneumoniae	7	14	(14)	0	0	-	0
	1	-	-	-	-	-	-
	0	-	-	-	-	-	-

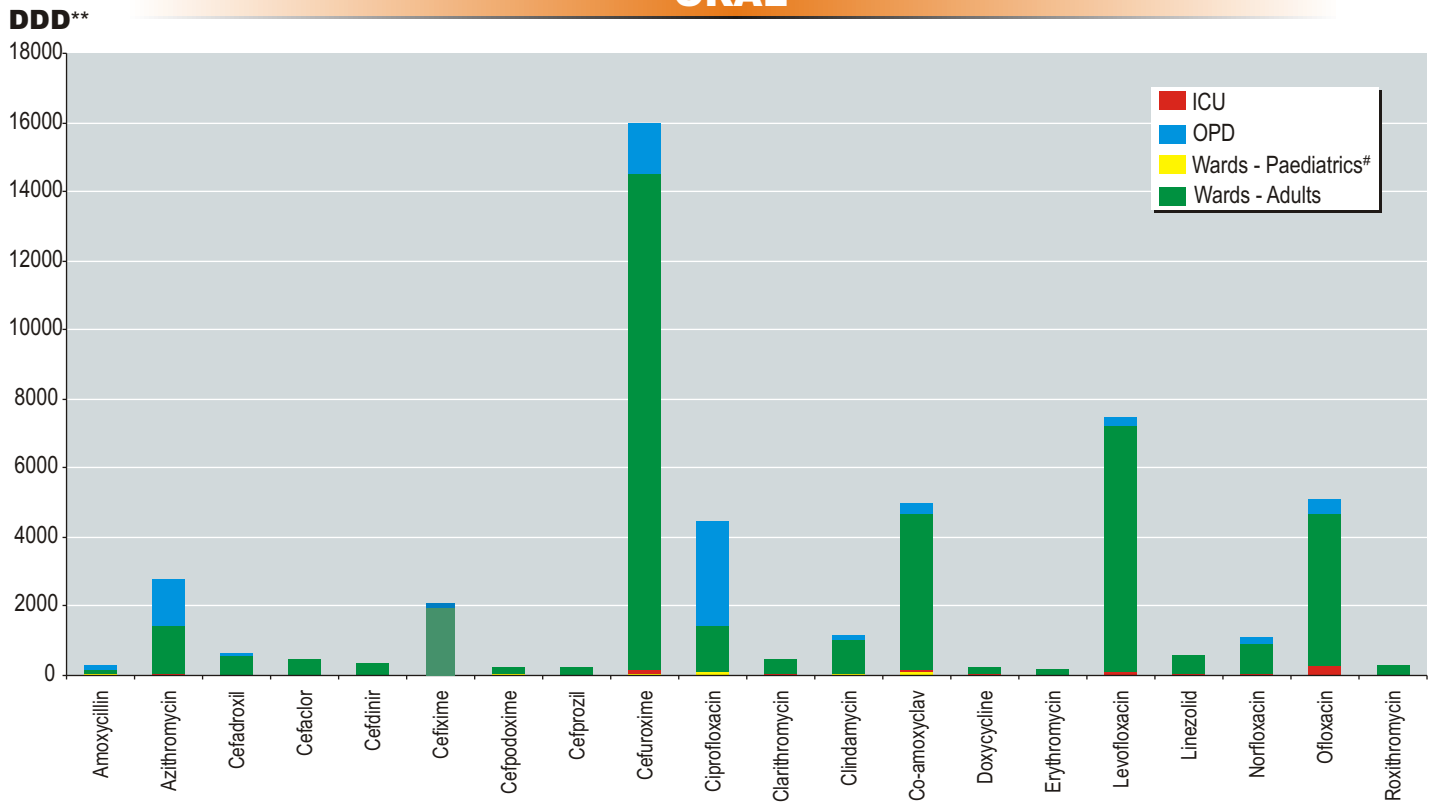
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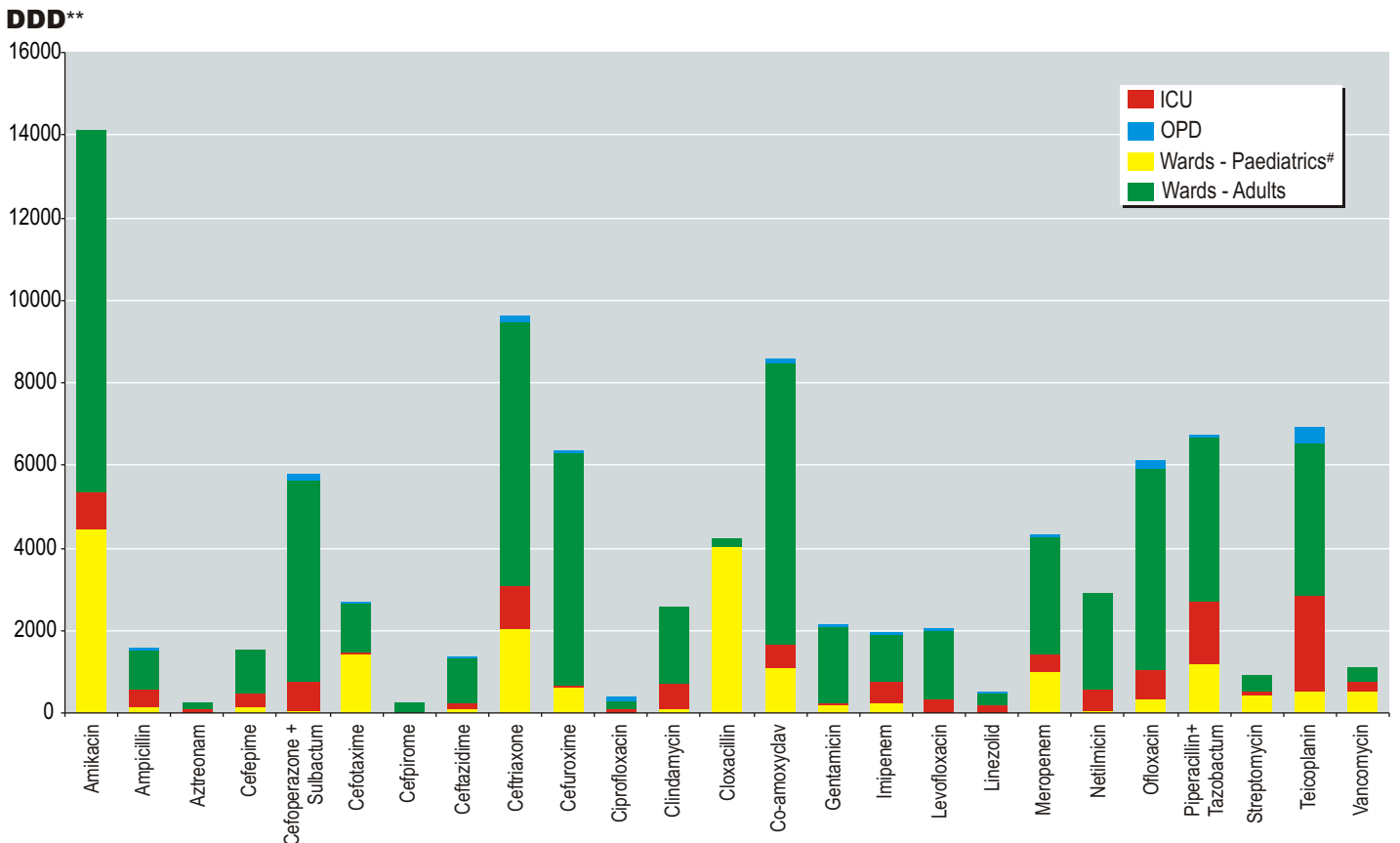
GNB	No of isolates	Ampicillin	Cefuroxime	Cefotaxime	Ceftazidime	Cefpime	Gentamicin	Netilmicin	Amikacin	Ciprofloxacin	Ofloxacin	Co-trimoxazole	Cefoperazone+Sulbactam*	Piperacillin+Tazobactam*	Imipenem	Colistin
E. coli	8	100	75	75	50	75	75	50	22	83	80	50	25	25	0	-
	18	100	80	80	100	80	50	50	26	100	100	89	58	33	0	-
	16	100	90	93	100	83	68	58	37	100	100	94	67	50	0	-
Enterobacter sp	4	75	100	50	-	0	60	50	25	0	0	50	25	25	0	-
	5	75	50	50	-	50	50	50	25	50	25	67	50	50	0	-
	10	89	75	78	-	56	78	67	45	55	44	75	33	33	0	-
Klebsiella sp	5	100	100	100	-	100	80	75	67	60	50	60	75	60	0	-
	11	100	67	75	-	58	82	67	41	50	37	58	62	58	0	-
	22	95	94	100	-	79	89	45	55	83	45	89	45	45	0	-
Pseudomonas sp	23	-	-	-	45	50	55	60	41	0	53	-	50	18	50	16
	43	-	-	-	61	80	63	45	62	75	52	-	48	32	71	6
	74	-	-	-	66	85	74	70	70	86	67	-	73	60	72	2
Acinetobacter sp	18	-	-	94	94	94	61	33	94	95	93	73	75	88	86	0
	39	-	-	91	93	91	92	64	90	92	95	87	89	95	70	5
	131	-	-	93	93	97	98	81	96	95	90	91	63	95	92	6

*Percentage Resistance may indirectly appear higher than actual, because 2nd line drugs are tested only in multi-drug resistant isolates.

ORAL



PARENTRAL



* Based on the hospital pharmacy data of the antibiotics dispensed.

** DDD - Daily Defined Doses; calculated as per the Anatomical Therapeutic Chemical (ATC) classification index, WHO Collaborating Centre for Drug Statistics Methodology, Oslo, Norway.

In paediatric group of patients and for certain antibiotics, consumption calculated as per the "Guide to antimicrobial therapy" by Sanford et al, USA (2005) presuming 10 kg as the average body weight for paediatric patients.

Candida haemulonii: An emerging pathogen

(contd. from page 1)

So far, there have been only few reports of isolation of *Candida haemulonii* from blood. One of the reasons could be that identification of *C. haemulonii* poses a problem because it is phenotypically very similar to *Candida famata* (teleomorph *Debaryomyces hansenii*) and *Candida guilliermondii* (teleomorph *Pichia guilliermondii*). Also few commercial yeast identification systems have failed to identify *C. haemulonii* isolates, as it is not included in most of their databases⁴. There are even reports describing two genetically distinct groups within the species (group I and group II) on the basis of is enzyme profiles, DNA reassociations, and physiological characteristics.⁵ But no differences in clinical associations between the groups have been described. Resistance to amphotericin B is rare among *Candida* sp, although high MICs of amphotericin B have been described for some clinical isolates of *Candida lusitanae*, *Candida guilliermondii* and *Candida parapsilosis*. Many workers have reported *Candida haemulonii* to be resistant to amphotericin B. In addition, these strains have also exhibited resistance to azoles.

In our experience also MIC for amphotericin B was found to be on the higher side in most of the isolates (1 ug/ml) and most were resistant to fluconazole. The organism thus poses a diagnostic and therapeutic challenge to the physician.

This report emphasises the emergence of *C. haemulonii* as an opportunistic fungal pathogen, which further illustrates the significance of proper identification and susceptibility of yeast species for institution of effective therapeutic regimens.

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REFLECTIONS

I would like to congratulate you for bringing out this newsletter. I hope this has been useful to clinicians in using chemotherapeutic drugs.

In Kanpur, I find the laboratories use +, ++, +++ criteria to report results. So far I have not come across this symbol in denoting degree of sensitivity.

I find here that lot of gram negative bacilli are now resistant to Nalidixic Acid.

Dr. K.C. Agarwal, Formerly Professor & Head,
Deptt. of Medical Microbiology, PGI, Chandigarh

I recently had the opportunity of getting hold of your microbiology newsletter and I found it very useful to know the current antibiotic sensitivity in my daily practice.

Dr. L.R. Aggarwal, Noida

I am very pleased that you and your team continue to put out the microbiology newsletter on a regular basis. The data given and the rare isolates from CSF makes it all the more interesting. Please do accept my personal congratulations to you and your staff for the effort.

Prof. K.N. Brahmadatah,
Deptt. of Clinical Microbiology, Christian Medical College, Vellore

Please accept my heartiest congratulations on bringing out the status of antibiotic sensitivity / resistance of micro-organisms isolated from different human sources on a regular interval which has helped to formulate the antibiotic policy in several hospitals. It has been extremely useful information and please keep it up.

Prof. R.C. Mahajan, Deptt. of Parasitology,
Postgraduate Institute of Medical Education & Research, Chandigarh

I have been receiving these valuable documents from your department since I retired from RMRC (MCMR) in Feb 1990. Often I wonder whether these information on "Drug Resistance" of the microbes have helped on clinicians, at least in the memeros medical colleges in India today to use the data while prescribing the use of antibiotics. Our medical practitioners in the towns and cities misuse the valuable drugs for conditions which are not due to partial infections. Your microbiology newsletters, I hope, will make them wise to prevent the spreading drug resistance in the community.

I still remember the "first warning by Prof. Miles "on failure of antibiotics" in 1954 at London, when *Staph aureus* had emerged as notorious agent against penicillin then. I think your valuable data will now prompt the Drug Controller of India to stop selling of antibiotics over-the-counter by our chemists and pharmacists. This is my last wish for wise and proper use of your newsletters.

Prof. L.N. Mohapatra, Formerly Dean, AIIMS,
Director RMRC (ICMR) Bhubaneswar

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