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Pseudooutbreak of Candida guilliermondii fungemia in Neonatal Intensive Care Unit

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ABSTRACT

Objective: This study aims at identifying the source of Candida guilliermondii (C.guilliermondii) from Neonatal Intensive Care Unit (NICU) and guide the clinicians for proper preventive measures to be taken to eliminate the source of infection.

Methods: Total 448 blood culture samples were received during 22 week period (1st October 2011 to 17th February 2012) which were processed by standard routine conventional methods and were correlated with their clinical history and various laboratory parameters. To identify the source, swabs were collected from different sites of NICU and were cultured.

Results: 90 (20.08%) blood culture samples were positive. Of the various organisms isolated, 43(47.7%) were bacteria and 48(53.33%) were candida. Among the candida isolated, C. guilliermondii(41(85.41%) were maximum. Most of the patients positive for C.guilliermomondii had normal laboratory parameters without any significant clinical history. From the swabs collected from NICU, those collected from lumen of multiple cut sections of intravenous set ,three-way stop cocks of neonates and hands and nails of few paramedical staff gave positive culture for C.guilliermondii.

Conclusion: This study brings us to the conclusion that, C.guilliermondii was a mere colonizer as it has not lead to any complications in neonates.

Introduction:

Fungal infection in premature infants is not rare [1]. Most candidal infections in neonates arise sporadically from an endogenous source [2-4] and are associated with certain risk factors [2-5] including prematurity, very low birth weight, prolonged hospitalization, indwelling central venous catheters, hyperalimentation, intravenous fat emulsion and broad -spectrum antibiotic usage. By virtue of their size and increased exposure to interventional methods of care including indwelling lines and catheters, the premature infants in a Neonatal Intensive Care Unit (NICU) are prone to develop candidal fungemia. Recently, non-albicans candida have emerged as important opportunistic pathogen, notably *Candida tropicalis, Candida glabrata and Candida parapsilosis* [6]. *Candida guilliermondii* (*C. guilliermondii*) is among the one of the rare species of candida causing fungemia[7-15]. So, its repeated isolation from the blood became a necessity for evaluation, before coming to the conclusion that whether this rare candida was pathogenic or not and does it required a treatment. Our study aims to identify the source of *C. guilliermondii* from NICU and guide the clinicians for proper preventive measures to be taken to eliminate the source of infection.

Materials and methods:

Total 448 blood culture samples in a pre-sterilized glucose broth bottle were received from NICU during 1st October 2011 to 29th February 2012 (22 weeks period). All the samples were processed by routine conventional methods..Of this 90 (20.08%) samples were found positive. Of the positive blood cultures, 43(47.77%) showed bacterial growth while 48(53.33%) showed growth of candida. Growth on Sabouraud's dextrose agar (SDA) and Gram stain was used for identification of candida. Further species identification of candida was done by germ tube test, inoculating Sabouraud's dextrose broth, Chrome agar, Dalmau technique on Corn-meal agar and sugar assimilation on Yeast nitrogen base media [16, 17,18]. Anti-fungal sensitivity was done using Sabouraud's dextrose agar. 41(85.41%) candida isolated were *C.guilliermondii*, 2 (4.16%) were *Candida albicans* and 5 (10.41%) were *Candida tropicalis*. To identify the source of *C.guilliermondii* (being an unusual cause of neonatal fungemia), various steps were taken by the team of microbiologists, epidemiologists, clinicians and nurses which included the collection of swabs from various sites of NICU along with the detail study of patient's clinical history , C-Reactive protein (CRP) levels and other haematological parameters. Swabs were taken from Patient's cots, wall, air-conditioner, C-PAP machine, intravenous set, three way stop cock, RT feeding tube, various fluids, oxygen flow meter, oxygen hood, patients skin, phototherapy units, spirit swabs, sterilium and hands and nails of various medical and paramedical staff. Even the uninoculated blood culture bottles were checked for their sterility. Also environment in NICU was tested by using a open petri-dish with SDA. The swabs were cultured by routine conventional methods and the organisms were identified.

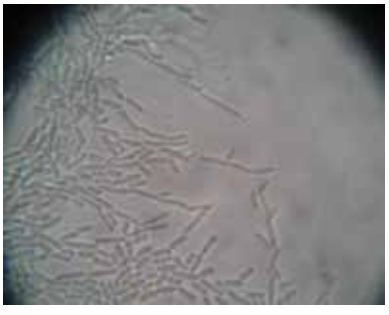
Results:

The isolates of blood culture samples were 43(47.77%) were bacteria and 48(53.33%) were candida.

Forty-one (85.41%) candida isolated showed results suggestive of *C.guilliermondii* which were as following [16,17,18]:

1) Gram stain: Gram positive budding yeast like cells.
2) Germ tube test: Negative.
3) SD broth: Generalized turbidity.
4) Chrome agar: Cream to violet colour .
5) Sugar assimilation: Positive for sucrose, maltose and raffinose and negative for lactose.
6) Dalmau technique: Elongated blast conidia with curved pseudohyphal cells at junctions."Fig:1 is about here"
7) Anti-fungal sensitivity: Sensitive to amphotericin B, nystatin and all azoles.

Fig:1 *C.guilliermondii* **as seen on Dalmau technique.**



To identify the cause for such increased number of cases of *C.guilliermondii* fungemia, various swabs were taken from NICU, of which the swabs taken from lumen various cut sections of intravenous set , three-way stop cock and hands and nails of some of the paramedical staff showed growth of *C.guilliermondii.*

There was a sudden outbreak of *C.guilliermondii* fungemia which gradually decreased. This species of candida in such a significant number was never isolated from NICU. The month wise

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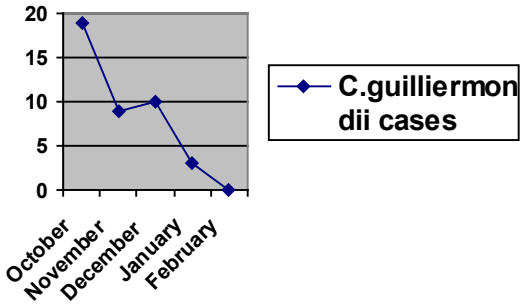
distribution of the number of cases was such that nineteen(19) cases were reported in October followed by nine (9) in November, ten (10) in December, three (3) in January and then no case was reported in February, 2012. "Fig. 2 is about here"

Fig:2 Month-wise distribution of no. of *C.guilliermondii* cases.



On clinical correlation of all patients showing C.guilliermondii fungemia, some important findings were as following:

1) All patients were pre-term infants.
2) They showed no signs of sepsis.
3) Developed no complications.
4) All the patients were treated without anti-fungal therapy.
5) 38(93%) patients had normal CRP levels.
6) 39(96.42%) patients had normal haemoglobin levels.
7) 35(85.36%) patients had normal total counts.
8) 38(92.6%) patients had normal absolute platelet count.

Similarly, when the patients showing blood culture positive for other species of candida, it was found that all the patients showed signs of sepsis and altered laboratory blood parameters which included thrombocytopenia and leukocytosis.

Discussion:

This study, which was the retrospective analysis of a pseudo-outbreak, showed us that more than 50% patients showing positive blood culture samples had *C.guilliermondii* fungemia. This candida being a rare cause of fungemia[7-15] raised a doubt about its pathogenicity for the neonates. Also, its clinical correlation, which showed no signs of fungemia with nearly normal laboratory parameters, made us think about the cause of this rare entity. Another important point was that all the patients showed sterile blood cultures on the day of admission and their second samples (which was sent on 2nd or 3rd day of admission to rule out sepsis and with the same intravenous set and three-way stop cock on site**)** showed growth of *C.guilliermondii* without any signs and symptoms of sepsis or any other complications except being a pre-term baby. And on our way to search for the cause, various swabs were taken from NICU, through which we finally found out that it were the intravenous sets, three-way stop cocks and hands and nails of some of the paramedical staff, which showed colonization of this candida. So, we can say that, the hands and nails of the paramedical staff were the main source of this unusual fungus which may be was also the cause for colonization in the intravenous sets. The spread among various patients was possibly due to improper hygienic measures, insufficient hand washing practices and failure to change gloves while dealing with different patients. Our study was similar to one of the study done at University hospital of Brazil, which showed the growth of *C.guilliermondii* from the environmental surfaces and nails and skin of the nursing team [19]. Also one study carried out at a hospital in Israel showed similar growth in the heparin vials used for flushing the needles [20].

Although, the organism was non-pathogenic, it was still very important for us to find out the source and remove it.(Within a month after applying all aseptic precautions by all NICU personnel, each sample was negative).

Conclusion:

This study brings us to the conclusion that *C.guilliermondii* fungemia found in NICU in our hospital was a pseudooutbreak. *C.guilliermondii* was a mere colonizer as it is known that this fungi commonly behaves as a human saprophyte[21]. Though it was not pathogenic, this issue must not be avoided. Proper preventive measures (hand washing before examining any patient, wearing of gloves as well changing the gloves every time a new patient is examined, regular cleansing and scrubbing of NICU) and maintenance of appropriate hygienic conditions is imminent to prevent such colonization in NICU. Who knows in future this non-pathogenic entity may turn out to be one of the cause of neonatal mortality!

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