

# CHILD DEATH DUE TO INFECTION WITH PHOTOBACTERIUM DAMSELAE SUBS.DAMSELAE, A NEW CASE

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## ABSTRACT

Photobacterium damsela subsp. damsela is a common marine bacterium, which primarily infects marine animals. In humans, it was reported to cause severe and fatal infections. We report a case of a 5 years old child who presented with septic shock and died within 5 hours after presentation in spite of medical care. We briefly reviewed the infection with this organism and we want to alert health care workers about this highly virulent pathogen.

## INTRODUCTION

Photobacterium damsela subsp. damsela is a common marine bacterium which belongs to genus vibriaceae. Human infections caused by P. damsela subsp. damsela are rare<sup>1</sup>. Most of these infections were associated with severe complications and death. Herein we report a case of a 5 years old child who presented with septic shock due to P. damsela subsp. damsela infection which was refractory to management and led to death of the child. This case to our best knowledge is the first case of human infection with P. damsela subsp. damsela reported in Saudi Arabia.

## THE CASE:

We report a case of 5 years old boy who presented to emergency department in Rabigh General Hospital with 2 days history of fever, right ear discharge and decreased oral intake. Rabigh city is located on the western coast of Saudi Arabia on the Red Sea. These symptoms were associated with skin rash mainly over the chest, abdomen and back, there was no history of headache, vomiting or abnormal movement. He received antipyretics and oral antibiotic (Amoxicillin) prior to presentation (3 doses given). He came with his mother from their country to visit his father few weeks earlier. They went for a beach picnic few days before his illness.

His past medical history showed that, he was admitted 5 times in his country due to chest infection with a hospital stay ranging from 5 to 10 days, he also used to have recurrent bilateral ear discharge and he was investigated for immunodeficiency but no specific diagnosis was given to the family. Furthermore, one of his cousins. On presentation to emergency department,

he was conscious, unwell with tachypnea and mild to moderate dehydration. There was erythematous skin rash over the chest and abdomen and purulent right ear discharge.

His initial vital signs showed a temperature of 38.7°C, Blood pressure 90/65 mmHg, Respiratory rate 35/minute and pulse 110/minute and capillary refill 3/second chest examination showed moderate chest retractions with bilateral coarse crepitations and heart exam was normal apart of mild tachycardia, there was no organomegaly and no neck stiffness with normal tendon reflexes. He was initially managed by ER doctor with intravenous fluids (Lactated ringer 20 ml/kg over one hour) and oxygen via face mask, his blood sugar was 147mg/dl. Initial investigations showed CBC: Leukocytes: 1.7x10<sup>3</sup>, 61% lymphocytes, Hemoglobin 10g/dl, hematocrit 31%, Platelets 325,000. Serum chemistry showed: BUN: 37 mg/dl, Creatinine: 2.2mg/dl.

Sodium: 131 mmol/L, Potassium: 3.5 mmol/L. Aspartate aminotransferase (AST): 141 U/L, Alanine aminotransferase (AST): 57 U/L, Total bilirubin 2.8mg/dl and direct bilirubin 1.7 mg/dl. Arterial blood gas done 45 minutes after presentation showed: Ph: 7.27 PCO<sub>2</sub> 34 mmHg PO<sub>2</sub> 121 mmHg Bicarbonate 16.4 mmol/L, Base deficit -10.2. His chest X-ray showed increased bronchovascular markings and normal heart size. While the child was being prepared for admission, he became anxious, irritable and more distressed with decreasing level of consciousness and his blood pressure was further dropped to 80/50mmHg, another IV bolus of normal saline 20ml/kg given fast and he was intubated and connected to mechanical ventilation. Dopamine 20 microgram/kg/minute was started and 1 gram of Ceftriaxone was given.

He was shifted to ICU immediately for further management. In ICU, his blood pressure continued to decrease to 80/30mmHg and pulse rate 186/minute with poor perfusion, so Adrenaline infusion was started and Vancomycin was added. Three and a half hour after presentation, he had bradycardia which improved after cardiac massage and one dose of adrenaline. One hour later, he developed cardiac arrest and he did not respond to resuscitation. The death was suggested to

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be due to non refractory septic shock in a child with probable immunodeficiency. Five days later, his blood culture showed *Photobacterium damsela* which was sensitive Ceftriaxone, Ceftazidime and Gentamicin.

## DISCUSSION

*Photobacterium damsela* subs. *damsela* is a common marine micro-organism which belongs to the genus *photobacterium*, family *vibrionaceae* which caused severe complications and death in humans<sup>1,2</sup>. Since it was reported in 1971<sup>3</sup> it was undergone several changes in taxonomic classification through different genetic and phenotypic studies. It was named initially as *vibrio damsela*, *listonella damsela* in 1985<sup>4,5,6</sup>, *photobacterium damsela* in 1991<sup>7</sup> till finally designated as *photobacterium damsela* subs. *damsela* in 1995<sup>8</sup>. This organism primarily causes infection in marine animals including wild fish, sharks, dolphins and crustaceans, and in humans, severe infections and deaths were caused in hours<sup>9,10</sup>.

It causes primarily wound infection following laceration leading to abscess formation and tissue necrosis. Wound infection is manifested by swelling, edema, erythema, discoloration, local pain, local necrosis and discoloration. Wound infection can progress to severe lethal necrotizing fasciitis<sup>9,10,11</sup>. *Photobacterium damsela* subs. *damsela* also causes bacteremia<sup>12</sup>, sepsis and multiorgan failure and death<sup>13,14,15</sup>. Urinary tract infection due to *photobacterium damsela* subs. *damsela* was reported in children<sup>4</sup> and adults<sup>11</sup>.

Infection also was reported in immunocompromised patients like diabetics<sup>2</sup> and patients with sickle cell disease<sup>16</sup>. Most infections were reported in males. Humans usually get infection through lacerations caused by fish or a marine organism or through contact of a previously existing wound with sea water, infection after ingestion of raw sea food<sup>17</sup> and possibly through urinary tract<sup>11</sup>.

Diagnosis of this infection is done through isolation of the organism from wounds<sup>2</sup> and blood culture<sup>9</sup> and also it was isolated from urine culture<sup>11</sup>. Virulence factors of *photobacterium damsela* subs. *damsela* were studied but not fully understood<sup>5</sup>. *Damselysin* (Dly), a phospholipase, was considered the main virulence factor. It is a heat labile cytotoxin which causes hemolysis in host erythrocytes<sup>9</sup> but recently another hemolysin – HlyA<sub>ch</sub> and HlyA<sub>pl</sub> were identified<sup>17</sup>, the presence of these hemolysins together can cause synergistic effects leading to more virulence<sup>18</sup>.

Because of the high risk of mortality due to infection with *photobacterium damsela* subs. *damsela*, high index of suspicion is mandatory in order to enable early diagnosis and prompt management. Infection with this organism should be suspected especially on those who have exposure to sea water or marine animals.

Although it may cause release of toxins and spread of the toxic effects causing more tissue damage, surgical wound management is of great importance.

Surgical wound debridement is essential in early management to prevent progression of the infection to adjacent tissues and early amputation of the affected limb may save life<sup>19</sup>. Antimicrobial management for this halophilic gram negative rods showed different levels of susceptibility. Treatment should be based on organism susceptibility to antimicrobials.

Different antibiotics were used empirically and although multidrug resistance was observed<sup>18</sup>, cultures of the organism were sensitive to cephalosporins, ofloxacin and doxycycline<sup>20</sup>. Because mortality can occur in less than 24 hours after initial symptoms, early admission to ICU should be considered for supportive measures to control blood pressure and oxygenation.

In our case, the child has a history which may suggest immunodeficiency as he was admitted to hospital 5 times and he was investigated for immunodeficiency in his country but we were not able to take more information about the investigations done there as we were not able to contact the family after the death of the child. Immunodeficient children and adults are generally at greater risk of infection and sepsis. Although there was no history of contact with fish or marine animals and no history of raw fish ingestion, this child has contact with seawater during a beach picnic. Infection with *P. damsela* was reported in patients with no history of injury or contact with marine animals<sup>11</sup> and even fatal cases occurred without a history of obvious injury<sup>1,2,14,13</sup>.

On presentation to emergency department, he was showing signs of sepsis including fever, dehydration, low blood pressure, increase work of breathing and his CBC showed leukopenia. He was managed with lactated ringer to improve hydration and blood pressure and given oxygen to improve oxygen delivery to tissues and to decrease the work of breathing, within one hour after presentation to Emergency room, he showed signs of deterioration with irritability, more distress, more drop in his blood pressure and eventually shock and then connected to mechanical ventilation and a dose of Ceftriaxone was given.

Infections with *P. damsela* were associated with rapid progression to sepsis, septic shock, multiorgan failure and death and death was occurred within hours after presentation in spite of extensive medical care<sup>1,14</sup>. The possible history of immunodeficiency may contribute further to this rapid progression<sup>1,2,12,19</sup>.

Although the blood culture showed susceptibility of the organism to Ceftriaxone, this inadequate response may be explained by the presence of possible immunodeficiency. Furthermore, it was proposed that toxic effects of the organism was the main cause of fatality rather than septicemia and antibiotic treatment were found to be unable to prevent fatal infection.<sup>9,20,21</sup>

## CONCLUSION

In immunodeficient patients strong suspicion can be done for this type of infection in those children who were exposed to sea water and sea food.

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### AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

**AI Haemeri M:** Idea and concept.

**AI Ghani F:** Manuscript writing.

**AI Shimeri AS:** Data collection and bibliography.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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