

# Infectious diarrhea with sepsis symptoms from *Yokenella Regensburgei*

## Abstract

*Yokenella regensburgei* of the family *Enterobacteriaceae* is a rare clinical isolate. Only six infection cases in humans have been reported previous to the present. We report a case of infectious diarrhea with sepsis symptoms in a 17 year old patient with *Y. regensburgei*.

## Background

*Yokenella regensburgei* is an opportunistic human pathogen, a gram-negative, oxidase negative, motile rod, fermentative bacterium,<sup>1</sup> whose infections are rarely reported in humans. Only 6 cases have been previously reported regarding septic knee<sup>2</sup>, urinary tract infection<sup>3</sup>, transient bacteraemia<sup>2</sup>, perimalleolar ulcer<sup>4</sup>, cellulitis<sup>5</sup>, septic shock<sup>6</sup> and enteric fever<sup>7</sup> similar to the present case.

It belongs to the family *Enterobacteriaceae*<sup>8</sup> and it is biochemically similar to the bacterium *Hafnia alvei* with their difference being that *H. alvei* is resistant to colistin and Voges-Proskauer Test (VP) negative, whereas *Y. regensburgei* has the opposite characteristics<sup>8,9</sup>. The National Institutes of Health in Japan identified *Y. regensburgei* as NIH biogroup 9 and the Centers for Disease Control and Prevention in Atlanta as enteric group 45, proposing the name *Koserella trabulsii*. The name *Yokenella regensburgei* proposed by Kosako et al.<sup>1</sup> finally prevailed over *K. trabulsii*.<sup>1,2</sup> The bacterium has been isolated from intestinal tracks of insects and reptiles, well water and salad,<sup>7</sup> as well as from the following human anatomical sites: blood<sup>6</sup>, faecal samples<sup>8</sup>, upper respiratory tract, urine,<sup>2,3</sup> and knee fluid.<sup>9,10</sup> The small number of the cases reported with *Y. regensburgei* as a pathogen is responsible for the shortage of epidemiological and clinical information. Here we present a case from *Y. regensburgei* which is to our current knowledge the first case reported in Greece.

## Case report

A 17-year old male athlete was transported to General Hospital of Messolonghi from the community Health Centre of Astakos with 6-7 daily episodes of diarrhea, fever up to 39.8°C and chills. The patient reported that these symptoms emerged three days before his arrival to the Health Centre of Astakos, three hours after physical exercise and that the fever would not subside with the consumption of paracetamol and mefenamic acid. He arrived to General Hospital of Messolonghi on the fourth day of the symptoms. Physical examination with deep palpation of abdomen showed sensitivity in the entire abdominal wall and increased bowel sounds. A systemic examination revealed nothing of note. Patient's medical history showed only cefuroxime allergy. His vital signs were: blood pressure 135/60 mm/Hg, pulse rate 105/min, Oxygen Saturation (SO<sub>2</sub>) 98% and body temperature 39.0°C. Upper and lower abdominal sonography results were normal. Laboratory examination showed leukocytosis (WBC 13,270/mm<sup>3</sup>), neutrophilia (76.7%, normal range 40-74%), absolute neutrophil count 10,180/mm<sup>3</sup>, lymphocytes 11.8% (19-48%), monocytes 7% (3.4-9%), eosinophils 1.5% (0-7%), increased C- Reactive Protein (CRP) 18.76 mg/dl (0-0.8mg/dl), hemoglobin 14,2 mg dl<sup>-1</sup> and mean corpuscular volume (MCV) 78,5fL. The rest of the biochemical test results (glucose, urea, creatinine, uric acid, bilirubin, serum glutamic oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), alkaline phosphatase, gamma-glutamyl transferase (G-GT), amylase, albumin, total serum protein, creatine phosphokinase (CPK), lactate dehydrogenase (LDH), Calcium (Ca), Sodium (Na), Potassium (K), total cholesterol (TC), high-density lipoprotein, low-density

lipoprotein, Iron (Fe), immunoglobulin igG, igM and IgA) were normal. The widal test for typhoid and wright tests were negative. Blood smear examination showed neutrophils with toxic granulation, and white blood cell count differential showed band neutrophils 12%, neutrophils 67%, lymphocytes 12%, monocytes 7%, eosinophils 2%. Urine culture showed no growth. General stool examination showed a large amount of white blood cells, erythrocytes and mucous. Parasitological examinations' results for gastro-intestinal protozoa, nematodes roundworms and flatworms were negative. X-ray of the chest was normal.

Two stool culture samples were prepared in two days and after a 48-hour incubation, bacterial growth was observed on SS agar for both samples. This bacterium was non-lactose fermenting with opaque colony morphology unlike the transparent colonies of shigella. Biochemical testing of the microorganism showed that the bacterium was weakly positive for catalase and negative for oxidase, urease, indole and H<sub>2</sub>S. The identification testings were performed by VITEK 2 Compact automated system (Bio Merieux, France) and identified the bacterium as *Yokenella regensburgei*. Biochemical tests of Vitek - 2 are presented in Table 1. The stool cultures were negative for the following enteropathogens: *Salmonella*, *Shigella*, *Campylobacter*, *Enterohemorrhagic*, *Escherichia coli* and *Yersinia enterocolitica*.

Antimicrobial susceptibility test was performed using Disk diffusion: Mueller-Hinton agar (MHA) method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines (Zone Diameter and Minimal Inhibitory Concentration (MIC) Interpretive Standards for *Enterobacteriaceae*).<sup>11</sup> The microorganism was resistant

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to ampicillin and colistin, intermediate to amoxicillin/clavulanic acid and sensitive to cefotaxime, amikacin, gentamicin, cefuroxime, cefixime, ciprofloxacin, imipenem, meropenem, aztreonam and trimethoprim/sulfamethoxazole.

The patient received treatment with cefixime and his symptoms were resolved. After 3 days of hospitalization he was dismissed, continued the treatment with cefixime for six more days and was recommended for a follow-up 10 days after the end of the treatment. Clinical examination showed no evidence of relapse.

## Conclusion

The track of the pathogen transmission remains unclear.<sup>6,7</sup> The patient of this case reported that three hours before the symptoms (abdominal pain and diarrhea) emerged, he had returned home after his sport activity, boiled an egg and consumed it. There appears no correlation between this incident and the other cases reported<sup>2-7</sup>. Although in five of the six previous cases the patients were immune suppressed (alcohol consumption, adenocarcinoma, chronic renal failure, diabetes mellitus and use of steroids were reported)<sup>2-6</sup>, the patient of the present case had no such medical history and seemed to be immunocompetent as he is a young athlete, there was no primary immune deficiency referred, he receives no immunosuppressive drugs and no chronic illness or recurrent infections were referred. The previous cases involved patients of an older age.<sup>2-6</sup> Only one case has been reported of a younger person (aged 5) who was immunocompetent previous to the present patient.<sup>7</sup>

The patient met the SIRS (Systemic Inflammatory Response Syndrome) criteria which involve two or more of the following: body temperature over 38°C or under 36°C, pulse rate over 90/min, respiratory rate over 20 breaths /min or PaCO<sub>2</sub> under 32mmHg, WBC over 12000 or less than 4000 mml<sup>-3</sup>.<sup>12</sup> The patient showed body temperature 39.8°C, pulse rate 105/min and WBC 13270mml<sup>-3</sup>.

*Yokenella regensburgei* is probably a potentially dangerous pathogen that has been rarely isolated from humans.<sup>7</sup> It is highly possible that some cases of *Y. regensburgei* have not been identified, as the stool culture results showed opaque colony morphology on SS agar, which does not indicate a common enteropathogen colony, and therefore we do not continue to the identification process.

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## Conflicts of interest

There is no conflict of interest.

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