

## Case Report

# Diabetic foot osteomyelitis caused by *Burkholderia pseudomallei*: first case report from Türkiye and a review of literature

Cumhur Özmen<sup>1</sup>, Muhammed Soylar<sup>2</sup>

<sup>1</sup> Department of Infectious Diseases, Turgutlu State Hospital, Manisa, Türkiye

<sup>2</sup> Department of Microbiology, Turgutlu State Hospital, Manisa, Türkiye

## Abstract

**Introduction:** *Burkholderia pseudomallei* is a non-fermenting, motile, Gram-negative, saprophytic bacillus that causes melioidosis. It is typically found as an endemic agent in South-eastern Asia and northern Australia. The primary transmission route is most likely percutaneous inoculation from wet soils or contaminated water. *B. pseudomallei* can cause a wide range of human diseases, including bacteremia, abscesses, osteomyelitis, and septic arthritis. Diabetes mellitus, renal disease, alcoholism, liver cirrhosis, and thalassemia are known predisposing factors. Mortality from melioidosis depends on clinical presentation, ranging from 2% (skin and soft tissue infections) to 21% (neurological disease).

**Case Report:** We reported a patient with a diabetic foot infection whose wound drainage yielded *B. pseudomallei* as the infecting agent. Due to the organism's rarity in our country, we searched with the keywords "melioidosis" and "osteomyelitis" in Pubmed on 09.07.2024. Among the 88 results displayed, there is a variety of case reports about septic arthritis, osteomyelitis, foot and splenic abscesses, acute cholangitis, pneumonia, pericarditis, and even cerebritis and subdural collections in patients with *B. pseudomallei* infections. These reports and studies mostly come from Middle Eastern and South Asian countries. There are also two previous reports of this microorganism from our country, but to our knowledge, this case is the first *B. pseudomallei* diabetic foot infection from Türkiye.

**Conclusions:** This case signifies the appropriate sample collection practices for diabetic foot infections are important even in outpatient settings.

**Key words:** Diabetic foot infection; *Burkholderia pseudomallei*; melioidosis; Türkiye.

*J Infect Dev Ctries* 2025; 19(6):982-986. doi:10.3855/jidc.20687

(Received 06 August 2024 – Accepted 23 October 2024)

Copyright © 2025 Özmen *et al.* This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## Introduction

*Burkholderia pseudomallei* is a non-fermenting, motile, Gram-negative, saprophytic bacillus that causes melioidosis [1]. It is typically found as an endemic agent in South-eastern Asia and northern Australia [2]. Northeastern Thailand and north Australia are hyperendemic regions with peak disease activity in wet seasons [3,4]. This microorganism is found in soil and surface waters [5]. The primary transmission route is most likely percutaneous inoculation from wet soils or contaminated water [4,6,7]. Cases of pneumonia after skin injuries are also well known, suggesting a hematogenous route to the lungs [4]. Inhalation is also another route of transmission [8-10]. Person-to-person transmission is thought to be unusual [11,12]. Mother-to-infant transmission has been described [12,13]. Sexual transmission has also been described as an uncommon route [14,15].

*B. pseudomallei* can cause a wide range of human diseases, including bacteremia, abscesses, osteomyelitis, and septic arthritis [16]. Pneumonia is the most common manifestation of melioidosis, with an acute presentation resembling community-acquired

pneumonia and a subacute or chronic presentation resembling tuberculosis [13,17-19]. Skin infections are also common and include abscesses, pustules, furuncles, crusted erythematous lesions, macular lesions, and cellulitis [20-22]. Genitourinary melioidosis includes a prosthetic infection or abscess, kidney abscess, and urinary tract infection [23-25]. Primary (without an obvious focus) or secondary (from another infection site) bacteremias can occur [26]. Bone and joint involvement have been described but are relatively uncommon for melioidosis [7,20,27,28]. Melioidosis may rarely cause encephalomyelitis, meningitis, cerebral abscesses, myelitis, and epidural abscesses [29-31]. Diabetes mellitus (DM), renal disease, alcoholism, liver cirrhosis, and thalassemia are known predisposing factors [16]. Mortality from melioidosis depends on clinical presentation, ranging from 2% (skin and soft tissue infections) to 21% (neurological disease) [26].

Here, we report a patient with diabetic foot osteomyelitis whose culture yielded *Burkholderia pseudomallei* as the causative agent. As far as we searched from PubMed and Google Scholar on

09.07.2024, this is the third report of *B. pseudomallei*'s presence and the first report of *B. pseudomallei* as the causative agent of a diabetic foot infection from Türkiye.

### Case report

We evaluated our case below. We also searched with the keywords “*melioidosis*” and “*osteomyelitis*” in Pubmed on 10.07.2024 because of the microorganism's rarity in our country. We obtained an informed consent from our patient. All procedures in these studies involving human participants were in accordance with the ethical standards of the National Research Committee and with the ethical standards of the Declaration of Helsinki.

A 67-year-old male patient with a 20-year history of type 2 diabetes mellitus applied to our infectious diseases outpatient clinic on 06.07.2024. We learned that his blood glucose levels were still high, suggesting poor control of diabetes. His anti-diabetes medication included insulin aspart (3 × 12 IU/day), insulin detemir (1 × 24 IU/day), and empaglifozin/metformin. The patient complained about a wound on the hallux of his left foot. The wound developed after he pressed on what he described as “a wart” with an onion at home. There were also lesions suggesting tinea pedis. He was a native of Turgutlu and had no recent travel history in the last two months. He never rode or owned horses but was feeding chickens at home. He was given liquid rifamycin for his wound and terbinafin cream for fungal

**Figure 1.** Patient's left foot after 1 week of trimethoprim/sulfamethoxazole treatment. Swelling and redness on the second foot started to regress.



infection.

Twenty days later (06.27.2024), he revisited our outpatient clinic. Examination of the left foot revealed a new wound with purulent drainage, swelling, and redness on the dorsal side of his second finger. The wound was located just above the proximal phalangeal joint. The wound is clearly visible in Figure 1. His diabetic wound was draining pus. We obtained a pus specimen with a sterile syringe and processed it via VITEK 2. Because of the wound's proximity to the joint, septic arthritis and osteomyelitis were also considered, so we ordered a magnetic resonance imaging (MRI) scan with contrast. Amoxicillin/clavulanate (2 × 1 gr orally) and ciprofloxacin (2 × 500 mg orally) were started as empirical treatment till the culture and MRI results were obtained.

From wound culture, a Gram-negative bacillus was isolated (greenish gray colonies in Figure 2). The isolated strain was identified as *Burkholderia pseudomallei* via VITEK 2® (bioMérieux, France). Gram staining of the specimen showed numerous polymorphonuclear leucocytes (PMLs), suggesting the causative microorganism. MRI scan revealed bone marrow edema consistent with osteomyelitis and abscess formation on the second finger (Figure 3). Based on the susceptibility results, amoxicillin/clavulanate and ciprofloxacin were stopped

**Figure 2.** The patient's pus culture on blood agar: The greenish gray mucoid colonies on the upper left of the image were identified as *Burkholderia pseudomallei*.

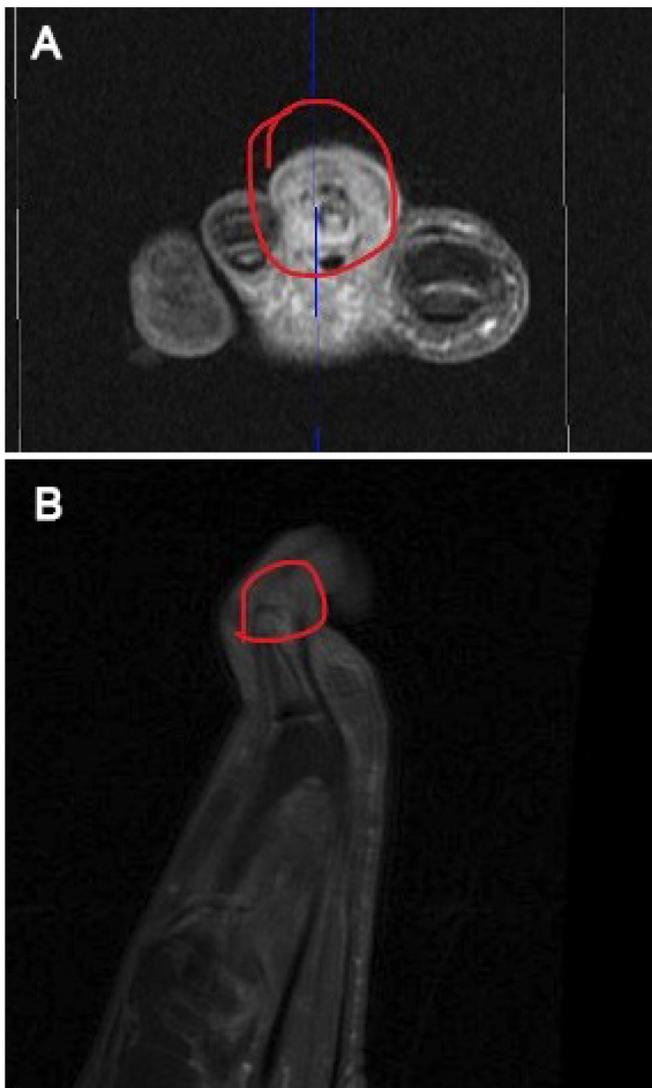


after five days of treatment. Trimethoprim/sulfamethoxazole 160/800 mg 2 × 1 tablets per day were started instead. This treatment was planned for at least 3 months, and regular follow-up of the patient is underway. After 1 week of trimethoprim/sulfamethoxazole therapy, the redness and swelling around the wound started to regress as shown in Figure 1.

**Discussion**

The most important transmission route for melioidosis is subcutaneous inoculation. After entry into the body, the disease can manifest itself as local cutaneous lesions, subacute pneumonia, local

**Figure 3.** Contrast MRI image of patient’s foot: **A.** (coronal view) shows post-contrast enhancement of bone and soft tissues (red circle); **B.** (sagittal view) shows post-contrast enhancement of bones around proximal interphalangeal joint, suggesting osteomyelitis (red circle).



**Table 1.** Antibiogram results of *Burkholderia pseudomallei*.

Meropenem	S
Levofloxacin	S
Trimethoprim/sulfamethoxazole	S
Ceftazidime	R

S: susceptible; R: resistant.

abscesses, and even fulminant bacteremia with or without organ abscesses [7,33,34]. Septic arthritis and osteomyelitis, though rarely diagnosed, are also well-known manifestations of this disease [28]. A 30-year prospective, observational investigation from the Northern Territory of Australia detected 29 (3% of all cases) patients with septic arthritis and 15 (2% of all cases) patients with osteomyelitis [26].

In this report, we presented a diabetic patient with foot osteomyelitis caused by *B. pseudomallei*. The diagnosis was made via culture. Growth of *B. pseudomallei* in the culture of any site has been designated as diagnostic [35]. Although colonization with an avirulent *B. pseudomallei* strain has been described [36,37], true colonization of this microorganism is uncommon, and culture growth generally requires treatment [38].

*B. pseudomallei* is naturally resistant to gentamycin, multiple β-lactams, rifampicin, and erythromycin (Table 1). In most cases, this microorganism remains susceptible to ceftazidime. However, ceftazidime resistance is reported to be on the rise [50]. Our isolate was susceptible to ceftazidime, but our patient rejected hospitalization and trimethoprim/sulfamethoxazol was started instead of ceftazidime.

Due to the organism’s rarity in Türkiye, we searched with the keywords “melioidosis” and “osteomyelitis” in Pubmed and Google Scholar on 10.07.2024. Among the 88 results displayed, there is a variety of case reports about septic arthritis, osteomyelitis, foot and splenic abscesses, acute cholangitis, pneumonia, pericarditis, and even cerebritis and subdural collections in patients with *B. pseudomallei* infections [1,2,5,16,40-45]. These reports and studies mostly come from Middle-Eastern and South Asian countries like Saudi Arabia, India, Thailand, China, and Malaysia. We did not find a case report from Türkiye. Also, adding the words “Turkey” or “Türkiye” to the search retrieved 0 results. We found another case report from Brazil, where a patient with a diabetic foot infection yielded *Burkholderia cephalica*, another rare microorganism for skin and soft tissue infections [46]. To our knowledge, this is the first case of diabetic foot infection caused by *B. pseudomallei* in Türkiye. Interestingly, we noticed that this is not the

first case report of melioidosis in our country. The presence of *B. pseudomallei* has been known since 1959 when a patient from Adana (a city in southern Türkiye) was diagnosed with pneumonia [47]. A bronchoscopy was performed on this patient, and an unusual bacterium was grown, later identified as *Malleomyces pseudomallei* (the organism's binominal name at that time). We also found another study published in 1998 from animal milk samples [48]. These studies were not included in the results of our search. This may be because we searched with the keyword “osteomyelitis”.

In this report, we also benefited from sample collection even in the outpatient setting: This creates chances for the identification of rare and novel organisms in diabetic foot infections [13]. We identified the second melioidosis and the first diabetic foot osteomyelitis caused by *B. pseudomallei* from our country.

As a limitation of this study, we could not apply the 16S ribosomal RNA (rRNA) study because it was not available in our laboratory.

## Conclusions

In conclusion, appropriate sample collection practices for diabetic foot infections are important even in outpatient settings. We also presented the first *B. pseudomallei* diabetic foot osteomyelitis from Türkiye. Given our country's broad territorial borders with Asia and the Middle East, it is highly likely that emerging infectious diseases like melioidosis will be encountered more frequently in Türkiye. A surveillance program is required.

## Corresponding author

Cumhur Özmen, PhD  
Department of Infectious Diseases,  
Turgutlu State Hospital  
Manisa, Türkiye  
Tel: 905382327389  
Email: cumhur\_ozmen@hotmail.com

## Conflict of interests

No conflict of interests is declared.

## References

- Dhodapkar R, Sujatha S, Sivasangeetha K (2008) *Burkholderia pseudomallei* infection in a patient with diabetes presenting with multiple splenic abscesses and abscess in the foot: a case report. *Cases J* 1: 224 doi: 10.1186/1757-1626-1-224.
- Boyer PN, Woods ML (2020) *Burkholderia pseudomallei* sepsis with osteoarticular melioidosis of the hip in a patient with diabetes mellitus. *BMJ Case Rep CP* 13: 12. doi: 10.1136/bcr-2020-238200.
- Chaowagul W, White NJ, Dance DA, Wattanagoon Y, Naigowit P, Davis TM, Pitakwatchara N (1989) Melioidosis: a major cause of community-acquired septicemia in northeastern Thailand. *J Inf Dis* 159: 890-899. doi: 10.1093/infdis/159.5.890
- Currie BJ, Fisher DA, Howard DM, Burrow JN, Selvanayagam S, Snelling PL, Anstey NM, Mayo MJ (2000) The epidemiology of melioidosis in Australia and Papua New Guinea. *Acta Trop* 74: 121-127. doi: 10.1016/S0001-706X(99)00060-1.
- Baruah Frincy K, Biswajyoti B, Saikia S, Baruah MP, Devi U (2020) *Burkholderia pseudomallei* septic arthritis in Type-2 diabetes mellitus patients: Report of two cases. *Indian J Med Microbiol* 38: 223. doi: 10.4103/ijmm.IJMM\_20\_74.
- Dance DA (1991) Melioidosis: the tip of the iceberg? *Clin Microbiol Rev* 4: 52-60. doi: 10.1128/CMR.4.1.52.
- Leelaramee A, Bovornkitti S (1989) Melioidosis: review and update. *Rev Infect Dis* 11: 413-425. doi: 10.1093/clinids/11.3.413.
- Brundage WG, Thuss J, Walden DC (1968) Four fatal cases of melioidosis in US soldiers in Vietnam. *Bact Pathologic Char.* doi: 10.4269/ajtmh.1968.17.183.
- Mackowiak PA, Smith JW (1978) Septicemic melioidosis: occurrence following acute influenza A six years after exposure in Vietnam. *Jama* 240: 764-766. doi: 10.1001/jama.1978.03290080054027.
- Howe C, Sampath A, Spotnitz M (1971) The pseudomallei group: a review. *J Infect Dis* 124: 598-606. doi: 10.1093/infdis/124.6.598.
- Dance DA (2000) Ecology of *Burkholderia pseudomallei* and the interactions between environmental *Burkholderia* spp. and human-animal hosts. *Acta Trop* 74: 159-168. doi: 10.1016/S0001-706X(99)00066-2.
- Kunakorn M, Jayanetra P, Tanphaichitra D (1991) Man-to-man transmission of melioidosis. doi: 10.1016/0140-6736(91)92962-2.
- Cheng AC, Currie BJ (2005) Melioidosis: epidemiology, pathophysiology, and management. *Clin Microbiol Rev* 18: 383-416. doi: 10.1128/CMR.18.2.383-416.2005.
- Webbing DD (1980) Genito-urinary infections with *Pseudomonas pseudomallei* in Australian Aborigines. *TRSTMH* 74: 138-139. doi: 10.1016/0035-9203(80)90036-X.
- McCormick JB (1975) Human-to-human transmission of *Pseudomonas pseudomallei*. *Ann Intern Med* 83: 512. doi: 10.7326/0003-4819-83-4-512.
- Jayakumar B (2022) A rare case of *Burkholderia Osteomyelitis* affecting the hip joint in an adult. *J Orthop Case Rep* 12: 77. doi: 10.13107/jocr.2022.v12.i12.3472.
- Puthuchery SD, Parasakthi N, Lee MK (1992) Septicaemic melioidosis: a review of 50 cases from Malaysia. *TRSTMH* 86: 683-685. doi: 10.1016/0035-9203(92)90191-E.
- Singapore Committee on Epidemic Diseases (1995) Melioidosis in Singapore. *Epidemiol Bull* 21: 69-72.

19. Birnie E, Virk HS, Savelkoel J, Spijker R, Bertherat E, Dance DA, Limmathurotsakul D, Devleeschauwer B, Haagsma JA, Wiersinga WJ (2019) Global burden of melioidosis in 2015: a systematic review and data synthesis. *Lancet Inf Dis* 19: 892-902. doi: 10.1016/S1473-3099(19)30157-4.
20. Currie BJ, Ward L, Cheng AC (2010) The epidemiology and clinical spectrum of melioidosis: 540 cases from the 20 year Darwin prospective study. *PLoS Negl Trop Dis* 4: e900. doi: 10.1371/journal.pntd.0000900.
21. Gibney KB, Cheng AC, Currie BJ (2008) Cutaneous melioidosis in the tropical top end of Australia: a prospective study and review of the literature. *Clin Inf Dis* 47: 603-609. doi: 10.1086/590931.
22. Zueter A, Yean CY, Abumarzouq M, Rahman ZA, Deris ZZ, Harun A (2016) The epidemiology and clinical spectrum of melioidosis in a teaching hospital in a North-Eastern state of Malaysia: a fifteen-year review. *BMC Infect Dis* 16: 333. doi: 10.1186/s12879-016-1583-2.
23. Kan SK, Kay RW (1978) Melioidosis presenting as prostatitis—a case report from Sabah. *TRSTMH* 72: 522-524. doi: 10.1016/0035-9203(78)90175-X.
24. Woo ML, Chan PSF, French GL (1987) A case of melioidosis presenting with prostatic abscess in Hong Kong. *J Urol* 137: 120-121. doi: 10.1016/S0022-5347(17)43897-3.
25. Morse LP, Moller C-CB, Harvey E, Ward L, Cheng AC, Carson PJ, Currie BJ (2009) Prostatic abscess due to *Burkholderia pseudomallei*: 81 cases from a 19-year prospective melioidosis study. *J Urol* 182: 542-547. doi: 10.1016/j.juro.2009.04.010.
26. Currie BJ, Mayo M, Ward LM, Kaestli M, Meumann EM, Webb JR, Woerle C, Baird RW, Price RN, Marshall CS (2021) The Darwin prospective melioidosis study: a 30-year prospective, observational investigation. *Lancet Inf Dis* 21: 1737-1746. doi: 10.1016/S1473-3099(21)00022-0.
27. Subhadrabandhu T, Prichasuk S, Sathapatayavongs B (1995) Localised melioidotic osteomyelitis. *J Bone Joint Surg Br* 77-B: 445-449. doi: 10.1302/0301-620X.77B3.7744934.
28. Popoff I, Nagamori J, Currie B (1997) Melioidotic osteomyelitis in northern Australia. *ANZ J Surg* 67: 692-695. doi: 10.1111/j.1445-2197.1997.tb07111.x.
29. Currie B (2015) Melioidosis: evolving concepts in epidemiology, pathogenesis, and treatment. *Semin Respir Crit Care Med* 36: 111-125. doi: 10.1055/s-0034-1398389.
30. Gora H, Hasan T, Smith S, Wilson I, Mayo M, Woerle C, Webb JR, Currie BJ, Hanson J, Meumann EM (2024) Melioidosis of the central nervous system: impact of the bimA allele on patient presentation and outcome. *Clin Inf Dis* 78: 968-975. doi: 10.1093/cid/ciac111.
31. Chadwick DR, Ang B, Sitoh YY, Lee CC (2002) Cerebral melioidosis in Singapore: a review of five cases. *TRSTMH* 96: 72-76. doi: 10.1016/S0035-9203(02)90248-8.
32. Punyagupta S (1989) Melioidosis. Review of 686 cases and presentation of a new clinical classification. *Melioidosis*. 217-229.
33. Currie B, Puthuchery SD, Malik YA (1994) Increasing recognition of melioidosis in tropical Australia. *Melioidosis: prevailing problems and future directions*. Puthuchery SD, Malik YA (Eds). 20-24.
34. Merianos A, Patel M, Lane JM, Noonan CN, Sharrock D, Mock PA, Currie B (1993) The 1990-1991 outbreak of melioidosis in the Northern Territory of Australia: epidemiology and environmental studies. *Southeast Asian J Trop Med Public Health* 24: 425-435.
35. Hoffmaster AR, AuCoin D, Baccam P, Baggett HC, Baird R, Bhengri S, Blaney DD, Brett PJ, Brooks TJ, Brown KA (2015) Melioidosis diagnostic workshop, 2013. *Emerg Infect Dis* 21. doi: 10.3201/eid2102.141045.
36. Viberg LT, Sarovich DS, Kidd TJ, Geake JB, Bell SC, Currie BJ, Price EP (2017) Within-host evolution of *Burkholderia pseudomallei* during chronic infection of seven Australasian cystic fibrosis patients. *mBio* 8: e00356-17. doi: 10.1128/mBio.00356-17.
37. Pearson T, Sahl JW, Hepp CM, Handady K, Hornstra H, Vazquez AJ, Settles E, Mayo M, Kaestli M, Williamson CH (2020) Pathogen to commensal? Longitudinal within-host population dynamics, evolution, and adaptation during a chronic 16-year *Burkholderia pseudomallei* infection. *PLoS Pathog* 16: e1008298. doi: 10.1371/journal.ppat.1008298.
38. Currie B, Anstey NM (2021) Melioidosis: epidemiology, clinical manifestations, and diagnosis. *UpToDate* Accessed 2 December 2021.
39. Almarhabi H, Munshi A, Althobaiti M, Aljohani S, Shanab RA, Althaqafi A (2022) Melioidosis pneumonia in Saudi Arabia: a rare case report and review of the literature. *Cureus* 14: e21871. doi: 10.7759/cureus.21871.
40. Bhat V, Gosavi S, Krishnan G, Acharya RV (2023) A case of disseminated melioidosis with cerebritis. *Cureus* 15: e40182. doi: 10.7759/cureus.40182.
41. Leung CCD, Ngai CM, Wong CK, Chan YH (2023) A rare case of melioidosis presenting as pericarditis and pneumonia in a patient with poorly controlled diabetes mellitus. *Respirology Case Reports* 11: e01119. doi: 10.1002/rcr2.1119.
42. Alexander V, Koshy M, Shenoy R, Sudarsanam TD (2018) Chronic multifocal osteomyelitis: A rare presentation of melioidosis. *J Family Med Prim Care* 7: 1133-1135. doi: 10.4103/jfmpc.jfmpc\_227\_18.
43. Mohamad N, Ponnusamy S, Devi S, Manikam R, Idrus II, Bakar NHA (2012) Melioidosis in acute cholangitis of diabetic patient: a forgotten diagnosis. *Res Rep Trop Med*: 103-106. doi: 10.2147/RRTM.S34483.
44. Wu H, Wang X, Zhou X, Chen S, Mai W, Huang H, You Z, Zhang S, Zhang X, Lu B (2021) Osteomyelitis and septic arthritis due to *Burkholderia pseudomallei*: a 10-year retrospective melioidosis study from South China. *Front Cell Infect Microbiol* 11: 654745. doi: 10.3389/fcimb.2021.654745.
45. Deb S, Singh M, Choudhary J, Jain VK, Kumar S (2021) A rare case of a knee septic arthritis by *Burkholderia pseudomallei*: A case report from a tertiary care hospital of Andaman and Nicobar Island. *J Orthop Case Rep* 11: 20. doi: 10.13107/jocr.2021.v11.i09.2398.
46. Paes Leme RC, Chaves JRE, Gonçalves LCS, Alvim LC, Almeida JRC de, Renó L da C (2022) Diabetic foot infection caused by bacteria of the *Burkholderia cepacia* complex: report of an unusual case and a scoping literature review. *Rev Inst Med Trop Sao Paulo* 64: e36. doi: 10.1590/s1678-9946202264036.
47. Ertuğ C (1961) Melioidosis. *Dis Chest* 40: 693-697. doi: 10.1378/chest.40.6.693.
48. Uraz G, Çitak S (1998) The isolation of *Pseudomonas* and other Gram (-) psychrotrophic bacteria in raw milks. *J Basic Microbiol* 38: 129-134. doi: 10.1002/(SICI)1521-4028(199805)38:2<129::AID-JOBM129>3.0.CO;2-M.
49. Podnecky NL, Rhodes KA, Schweizer HP (2015) Efflux pump-mediated drug resistance in *Burkholderia*. *Front Microbiol* 6: 305. doi: 10.3389/fmicb.2015.00305.