# Impact of Anidulafungin Treatment in Obese Patients with Candidemia: Retrospective Cohort Study

Khalid Eljaaly, PharmD, MS, BCPS, BCIDP, FCCP, FIDSA*

## ABSTRACT

**Pharmacokinetic studies suggested the need to increase anidulafungin dose in obesity, but the clinical data are limited. This study aimed to evaluate the impact of anidulafungin in obese adults with candidemia. A retrospective cohort study was conducted between 2015 and 2022. Hospitalized adults who received anidulafungin for at least 72 hours for confirmed candidemia were included. The primary outcome was global response, while the secondary outcomes included clinical response on days 7 and 14, 30-day all-cause mortality, candidemia recurrence within 90 days, and length of hospital stay after culture collection. A total of 190 patients were included (70 in the obese group and 120 in the non-obese group). 74% were admitted to the ICU at the time of candidemia. The most common infection site was intravascular (67%), followed by intra-abdominal (29%). No statistically significant differences were found between the obese group and non-obese group in global response (47.1% vs. 56.7%, respectively; P=0.204), clinical response, whether on day 7 (57.1% vs. 60.0%,; P=0.699) or day 14 (52.9% vs. 58.3%; P=0.463), 30-day all-cause mortality (31.4% vs. 31.7%; P=0.973), recurrent candidemia within 90 days (7.1% vs. 6.7%; P=0.900), or length of hospital stay after Candida blood culture collection date (34 days vs. 29 days; P=0.271). Obesity was not significantly associated with differences in the global response, clinical response, mortality, recurrence, and length of hospital stay in hospitalized adults with candidemia. Future studies of larger sample sizes, ideally randomized controlled trials, are needed to confirm these findings.**

## INTRODUCTION

The worldwide prevalence of obesity (body mass index [BMI] ≥ 30 kg/m$^2$) in adults aged 18 years and older was 16% in 2022, according to the WHO. The obesity rate increased more than twofold between 1990 and 2022[1]. Obese patients are at high risk of developing nosocomial infection, secondary complications, and hospitalization due to severe infections[2]. Obesity can induce physiological alterations that significantly affect the pharmacokinetics (PK) of numerous drugs. Consequently, understanding the influence of obesity on the PK of antimicrobial therapies is of critical importance[3].

Anidulafungin is an echinocandin antifungal agent that inhibits β-(1,3)-glucan synthesis, leading to fungal cell wall damage. Echinocandins are considered a preferred empiric therapeutic option for invasive candidiasis, with a broad antifungal spectrum, favourable safety characteristics, and comparatively lower potential for clinically relevant drug interactions than other available antifungal classes. In addition, several Candida spp. are resistant to azole antifungals but susceptible to echinocandins[4]. The Infectious Diseases Society of America (IDSA) guidelines recommend echinocandins, such as anidulafungin, as the initial therapy for managing invasive candidiasis and candidemia[5]. Pharmacodynamic studies have demonstrated that echinocandins exhibit concentration-dependent killing and prolonged post-antifungal effects. In vivo candidiasis models further support that the 24-hour area under the concentration-time curve to minimum inhibitory concentration ratio (AUC/MIC) is a reliable predictor of the exposure–response relationship for this class of drugs[6].

The dosing of some antifungal drugs, such as voriconazole, is based on body weight[7]. For the anidulafungin, in the previous studies about the PK effect of obesity found relatively similar results. A population PK-PD analysis of data from patients with different fungal infections found that a typical 150-kg male had an AUC about 30% lower than a 60-kg male[8]. Another study evaluated the anidulafungin PK in 21 intensive care unit (ICU)-treated patients with IV anidulafungin (a 200 mg loading dose followed by 100 mg daily). The study included a single morbidly obese patient (BMI > 80 kg/m²) who received 150 mg daily as a maintenance dose. This patient had a comparable AUC to the patients who received a 100 mg daily maintenance dose. Based on this finding, the author suggested a 50% increase in the dose[6].

An open-label phase IV trial that included 8 morbidly obese adult patients (BMI 49 kg/m²) found a 32.5% reduction in the AUC in obese subjects in comparison with the general population. The authors likewise recommend a 50% increase in both loading and maintenance doses for patients with BMI > 40 kg/m² to achieve target exposures similar to non-obese individuals[9]. Moreover another study after the comparison of the clearance and volume of distribution of 8 morbidly obese adults (BMI 40–58 kg/m²) with normal weight adults (BMI 20–27 kg/m²) found that anidulafungin exposure was 30% less in obese compared to normal weight adults, and suggested the dose should be increased by 25% in obese patients[10]. A study found that the traditional 100 mg maintenance per day is predicted to have a probability of target attainment (PTA) below 90% in 20 adults with a lean body weight > 55 kg or an adjusted body weight > 75 kg. They concluded that a higher maintenance dose (150-200 mg per day) will increase the PTA compared to the current approach in obese patients[11]. Because of the need for studies evaluating clinical outcomes, the objective of this study was to compare the effectiveness of anidulafungin in hospitalized adults between the obese and the non-obese groups.

## METHODS

**Study design and eligibility criteria:** A retrospective cohort study was done between 2015 and 2022 at a tertiary care hospital in Saudi Arabia. Hospitalized patients aged ≥18 years who received anidulafungin standard doses (200 mg loading dose and 100 mg maintenance doses)

* Department of Pharmacy Practice, Faculty of Pharmacy
King Abdulaziz University, Jeddah, Saudi Arabia.
Email: keljaaly@kau.edu.sa

**Table 1.** Patient Characteristics

| Variable | Obese (N=70) | Non-obese (N=120) |
|---|---|---|
| **Age (years)** | 61 [47 – 70] | 58 [40 – 71] |
| **Men** | 25 (35.7) | 76 (63.3) |
| **BMI (kg/m²)** | 33 [31 – 39] | 23 [21 – 26] |
| **Weight (kg)** | 90 [80-100] | 60 [50 – 70] |
| **CCI score** | 5 [2 – 8] | 5 [2 – 7] |
| **Immunosuppression** | 19 (27.1) | 43 (35.8) |
| **ICU admission** | 55 (78.6) | 85 (70.8) |
| **Fever** | 23 (32.9) | 36 (30) |
| **Primary candidemia site** | | |
| Intravascular | 43 (61.4) | 85 (70.8) |
| Intra-abdominal | 24 (34.3) | 32 (26.7) |
| Urinary | 3 (4.3) | 3 (2.5) |
| **Candida species** | | |
| C. albicans | 16 (22.9) | 42 (35) |
| C. tropicalis | 19 (27.1) | 27 (22.5) |
| C. glabrata | 17 (24.3) | 28 (23.3) |
| C. parapsilosis | 11 (15.7) | 14 (11.7) |
| C. auris | 2 (2.9) | 6 (5) |
| Others | 7 (10) | 9 (7.5) |
| **Polyfungal candidemia** | 2 (2.9) | 6 (5) |
| **Duration of antifungal therapy** | 21 [14 – 37] | 20 [10 – 38] |

for at least 72 hours for confirmed candidemia were included in the study. Patients were excluded if they had Candida endocarditis or resistance to echinocandins. The two study arms were either the obese or the non-obese group. Obesity was defined as a BMI ≥30 kg/m².

**Data collection and study outcomes:** The patient demographics, comorbidities, laboratory data, vital signs, source of candidemia, antifungal therapy details, and study endpoints were obtained from the patient's medical record. The primary endpoint was the global response, which was defined as achieving both clinical and microbiological success at the end of candidemia treatment. The secondary outcomes included clinical response on days 7 and 14, 30-day all-cause mortality, 90-day recurrence of candidemia, and length of hospital stay after the date of Candida blood culture collection.

**Data analysis:** The descriptive statistics were utilized as means ± SD or medians [interquartile ranges] for continuous variables, and frequencies (%) for categorical variables. The continuous variables were compared via the Student t-test or Mann-Whitney U test. The categorical variables were compared via the Chi-square tests or Fisher's exact tests. The SPSS software, version 23 (IBM, Chicago, IL, USA), was used for the data analysis.

## RESULTS

### Patient characteristics

A total of 190 patients were included (70 in the obese group and 120 in the non-obese group). Table 1 summarized the baseline characteristics. Other than weight and BMI, no significant differences in the baseline characteristics were observed except in male percentages (P=0.002). The median age was 59 years, and about half were male. The median BMI and body weight were 33 kg/m² versus 23 kg/m² and 90kg versus 60kg in the obese versus non-obese group, respectively. The median Charlson Comorbidity Index was 5, and 33% had immunosuppression. 74% were in the ICU at the time of candidemia, and 31% had fever. The most common infection site was intravascular (67%), followed by intra-abdominal (29%). The most common isolated Candida spp. were C. albicans (31%), C. tropicalis (24%), and C. glabrata (24%). 4.2% of patients had more than one Candida spp. The median duration of antifungal therapy was 20 days.

### Study outcomes

No statistically significant difference was observed in the primary outcome (global response) between the obese group and non-obese group (47.1 vs. 56.7, respectively; P=0.204). For the secondary outcomes, no statistically significant differences were observed in clinical response, whether on day 7 (57.1% vs. 60.0%, respectively; P=0.699) or day 14 (52.9% vs. 58.3%, respectively; P=0.463), 30-day all-cause mortality (31.4% vs. 31.7%, respectively; P=0.973), recurrent candidemia within 90 days (7.1% vs. 6.7%, respectively; P=0.900), or length of hospital stay after Candida blood culture collection date (34 days vs. 29 days, respectively; P=0.271) Table 2.

## DISCUSSION

This observational study of 190 adults with candidemia evaluated the association of obesity with the effectiveness of anidulafungin in hospitalized adults with candidemia. The Infectious Diease Society of America guidelines recommended a higher than the conventional dose of anidulafungin in a few conditions, such as endocarditis[5]. The PK studies raised a concern of lower systemic exposure of anidulafungin without any statistically significant differences in the global response, clinical response, mortality, recurrence, and length of hospital stay. In this study, three-quarters of patients were admitted to the ICU; however, no difference in mortality was observed. Numerically, the global and clinical response was lower in the obese group, but it did not achieve statistical significance. Additionally, it could be attributed to other factors associated with obesity rather than the anidulafungin systemic exposure.

A 2023 scoping review evaluated the data comparing PK and clinical outcomes in obese patients who received echinocandins. 25 studies were included and three echinocandins were used (anidulafungin, micafungin, and caspofungin). Although most PK studies suggested the need for dose adjustment, none of the clinical studies supported this recommendation. The authors concluded a lack of high-quality evidence to reach a consensus on recommendations for dose adjustment of echinocandins in obesity and the need for clinical data[12]. To date, the other clinical studies have found no differences in clinical outcomes. The first study assessing clinical outcomes in obese patients receiving anidulafungin was published in 2022 by Hutton et al[13]. It included 173 patients with candidemia. Although they reported multiple outcomes,

**Table 2.** Study Outcomes

| Outcome | Obese (N=70) | Non-obese (N=120) | P-value |
|---|---|---|---|
| **Global response** | 33 (47.1) | 68 (56.7) | 0.204 |
| **Clinical response to antifungal therapy on day 7** | 40 (57.1) | 72 (60.0) | 0.699 |
| **Clinical response to antifungal therapy on day 14** | 37 (52.9) | 70 (58.3) | 0.463 |
| **30-day all-cause mortality** | 22 (31.4) | 38 (31.7) | 0.973 |
| **Recurrent candidemia within 90 days** | 5 (7.1) | 8 (6.7) | 0.900 |
| **Length of hospital stay after Candida blood culture collection date** | 34 [15 – 59] | 29 [15 – 51] | 0.271 |

they only compared the mortality rate across groups. The second study was published by Alsowaida et al. in 2024 and assessed different clinical outcomes similar to the current study, but included only patients in the ICU. In addition, they evaluated drug safety and found no differences between the obese group and non-obese group[14].

The mortality rates were not different in any study. The 30-day all-cause mortality rate was approximately 30% in Hutton et al., similar to our study. However, the in-hospital mortality was higher (~70%) in Alsowaida et al. study, which was limited to patients in the ICU. The response to therapy occurred in about half of the patients, similar to the Alsowaida et al. study, but lower than the study by Hutton et al. The 90-day recurrence rate was similar to the study by Alsowaida et al.

This study has several strengths and limitations. We compared several study outcomes, unlike the study by Hutton et al., and collected the candidemia source, unlike the study by Alsowaida et al. In addition, we collected antifungal susceptibilities unlike the two previous studies. It is possible this study could be underpowered for some outcomes. However, it is the largest study to date evaluating the effectiveness of anidulafungin in obese patients. It is a single-center observational study with several potential biases due to the study design. Therefore, a multicenter, randomized controlled trial with a large sample size is ideal to answer this research question.

## CONCLUSION

**This observational study of hospitalized adults with candidemia who received standard doses of anidulafungin observed no significant differences in the global response, clinical response, mortality, recurrence, or length of hospital stay between the obese group and the non-obese group. These findings are consistent with other limited clinical data, which do not support the claim from the PK studies that the dose should be increased in obese patients. Future studies of larger sample sizes, ideally randomized controlled trials, are needed to confirm these findings.**

**Authorship Contribution:** All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

**Potential Conflicts of Interest:** None

**Competing Interest:** None

**Acceptance Date:** 06 November 2025

## REFERENCE

1. Obesity and overweight. (Last accessed on 10 Oct 2025).
2. Falagas ME, Kompoti M. Obesity and infection. Lancet Infect Dis 2006;6(7):438-46.
3. Knibbe CA, Brill MJ, van Rongen A, et al. Drug disposition in obesity: toward evidence-based dosing. Annu Rev Pharmacol Toxicol 2015;55:149-67.
4. Denning DW. Echinocandin antifungal drugs. Lancet 2003;362(9390):1142-51.
5. Pappas PG, Kauffman CA, Andes DR, et al. Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America. Clin Infect Dis 2016;62(4):e1-e50.
6. Liu P. Population Pharmacokinetic-Pharmacodynamic Analysis of Anidulafungin in Adult Patients with Fungal Infections. Antimicrob Agents Chemother 2013;57(1):466–74.
7. Eljaaly K, Nix DE. Voriconazole Dosing in Obese Patients. Clin Infect Dis 2016;63(2):286-7.
8. Liu P, Ruhnke M, Meersseman W, et al. Pharmacokinetics of Anidulafungin in Critically Ill Patients with Candidemia/Invasive Candidiasis. Antimicrob Agents Chemother 2013;57(4):1672–6.
9. Lempers VJ, van Rongen A, van Dongen EP, et al. Does Weight Impact Anidulafungin Pharmacokinetics? Clin Pharmacokinet 2016;55(10):1289–94.
10. Wasmann RE, ter Heine R, van Dongen EP, et al. Pharmacokinetics of Anidulafungin in Obese and Normal-Weight Adults. Antimicrob Agents Chemother 2018;62(7):e00063-18.
11. Hall RG 2nd, Liu S, Putnam WC, et al. Optimizing anidulafungin exposure across a wide adult body size range. Antimicrob Agents Chemother 2023;67(11):e0082023.
12. Alsowaida YS, Alamer A, Thabit AK, et al. Echinocandin exposures in obese patients: A scoping review and clinical perspectives. Am J Health Syst Pharm 2023;80(8):503-17.
13. Hutton M, Kenney RM, Vazquez JA, et al. Influence of Body Weight Category on Outcomes in Candidemia Patients Treated With Anidulafungin. J Pharm Pract 2022;35(1):20-5.
14. Alsowaida YS, Sulaiman KA, Mahrous AJ, et al. Evaluation of clinical outcomes of anidulafungin for the treatment of candidemia in hospitalized critically ill patients with obesity: A multicenter, retrospective cohort study. Int J Infect Dis 2024;148:107234.