ABSTRAK

Latar Belakang: Infeksi daerah operasi (IDO) merupakan salah satu indikator *healthcare associated infections* (HAIs) yang masih menjadi permasalahan di rumah sakit karena terus terjadi setiap tahunnya. Salah satu faktor yang memengaruhi kejadian IDO adalah kualitas udara ruang operasi, yang mencakup karakteristik fisik udara (suhu, kelembaban, total pertukaran udara) serta jumlah mikroorganisme di udara.
Tujuan: Penelitian ini bertujuan untuk mengkaji karakteristik fisik dan mikrobiologi udara ruang operasi di Rumah Sakit X.
Metode: Penelitian ini merupakan penelitian kuantitatif analitik dengan desain studi *cross sectional*. Populasi penelitian adalah seluruh ruang operasi di Rumah Sakit X dengan teknik *total sampling* sehingga diperoleh dua ruang operasi sebagai sampel. Variabel independen meliputi suhu, kelembaban, dan total pertukaran udara, sedangkan variabel dependen adalah angka kuman udara pada tiga kondisi: ruang operasi kosong, saat aktivitas operasi, dan saat *ultraclean*. Instrumen penelitian menggunakan *Thermohygrometer*, *Anemometer*, dan *Microbiological Air Sampler (MAS)*. Analisis data dilakukan secara univariat dan bivariat untuk mengetahui perbedaan dan hubungan antarvariabel.
Hasil: Hasil uji Friedman menunjukkan bahwa terdapat perbedaan namun tidak signifikan secara statistik antara angka kuman udara pada ruang operasi Rumah Sakit X berdasarkan kondisi operasional ($p = 0{,}071$). Secara deskriptif, rata-rata angka kuman udara tertinggi ditemukan saat aktivitas operasi ($228{,}00 \pm 54{,}43$ CFU/m³), diikuti kondisi ruang kosong ($53{,}33 \pm 25{,}88$ CFU/m³), dan terendah pada kondisi ultraclean ($46{,}66 \pm 25{,}75$ CFU/m³). Hasil uji Spearman menunjukkan adanya hubungan positif yang kuat dan signifikan antara suhu udara dan angka kuman udara ($r = 0{,}894$; $p = 0{,}001$), sedangkan kelembaban ($r = 0{,}107$; $p = 0{,}670$) dan total pertukaran udara ($r = 0{,}157$; $p = 0{,}532$) tidak menunjukkan hubungan yang signifikan.
Kesimpulan: Terdapat perbedaan namun tidak signifikan secara statistik angka kuman udara pada ruang operasi Rumah Sakit X saat kondisi ruang kosong, saat aktivitas operasi, dan saat *ultraclean*. Selain itu, suhu udara memiliki hubungan positif yang kuat dan signifikan dengan angka kuman udara, sedangkan kelembaban dan total pertukaran udara tidak berhubungan secara signifikan dengan angka kuman udara di ruang operasi Rumah Sakit X.

Kata kunci: ruang operasi, kualitas udara, suhu, kelembaban, total pertukaran udara, angka kuman, HAIs, IDO.

ABSTRACT

Background: *Surgical site infection (SSI) is one of the indicators of healthcare-associated infections (HAIs) that remains a persistent problem in hospitals worldwide. One of the factors influencing the occurrence of SSI is the quality of operating room air, which includes physical air characteristics (temperature, humidity, and air exchange rate) as well as airborne microbial counts.*

Objective: *This study aimed to assess the physical and microbiological characteristics of operating room air at Hospital X.*

Methods: *This analytical quantitative study employed a cross-sectional design. The study population consisted of all operating rooms at Hospital X, with total sampling applied, resulting in two operating rooms as samples. Independent variables included temperature, humidity, and total air exchange rate, while the dependent variable was airborne bacterial count under three operating room conditions: unoccupied, during surgical activity, and ultraclean conditions. Data were collected using a thermohygrometer, an anemometer, and a microbiological air sampler (MAS). Univariate and bivariate analyses were conducted to examine differences and relationships among variables.*

Results: *The Friedman test results showed that there was a difference but not statistically significant between the number of airborne germs in the operating room of Hospital X based on operational conditions ($p = 0.071$). Descriptively, the highest mean airborne bacterial count was observed during surgical activity (228.00 ± 54.43 CFU/m³), followed by the unoccupied condition (53.33 ± 25.88 CFU/m³), with the lowest count recorded under ultraclean conditions (46.66 ± 25.75 CFU/m³). Spearman correlation analysis revealed a strong and significant positive correlation between air temperature and airborne bacterial count ($r = 0.894$; $p = 0.001$). In contrast, humidity ($r = 0.107$; $p = 0.670$) and total air exchange rate ($r = 0.157$; $p = 0.532$) were not significantly associated with airborne bacterial counts.*

Conclusion: *There is a difference, but not statistically significant, in the number of airborne germs in the operating room of Hospital X when the room is empty, during surgical activity, and during ultraclean. In addition, air temperature had a strong and significant positive relationship with the number of airborne germs, while humidity and total air exchange were not significantly related to the number of airborne germs in the operating room of Hospital X.*

Keywords: *operating room, air quality, temperature, humidity, air exchange rate, airborne bacterial count, HAIs, SSI.*