

EFFECT OF ROSE (*Rosa damascene*) ESSENTIAL OIL DIFUSION TOWARDS AMOUNTS OF AIR BACTERIAL COLONY IN INTENSIVE CARE UNIT

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Article Info

Article history:

Received December 10th, 2022

Revised December 28th, 2022

Accepted January 4th, 2023

Keywords:

Essential Oil

Rose

Air Bacteria

ICU

ABSTRACT

Background: Based on WHO 2016, incident of Nosocomial Infection (NI) in low and middle income country ranged 5,7-19,1%. Patients who treated in *Intensive Care Unit* (ICU) have higher risk to Nosocomial Infection (NI), its 90% derived from bacteria and 10-20% from airborne transmitted. Rose essential oil (*Rosa damascena*) contains β -citronellol (48,2%) and geraniol (17%) which has potential as antibacterial, so could be applied by air transmitted to reduce amounts of air bacteria colony in ICU. **Purpose:** To determine the effect of rose essential oil towards amounts of air bacteria in ICU **Methods:** Used true experimental with pre - post test only control group design. The sample were divided into 10 groups. 1 groups was treated before essential oil given (K+), groups concentration 1%, 2%, 3% and time given 55 minute (K55), 110 minute (K110), 165 minute (K165). The data analyzed by using repeated anova test and *post hoc bonferoni*. **Results:** Repeated Anova test showed difference ($p = 0,000$), *post hoc bonferoni* test based on the time variable showed K55 ($p > 0,05$), K110 and K165 ($p < 0,05$), is approved that K55 and K165 are effective reduce amounts of air bacteria. **Conclusion:** There's an effect of rose essential oil (*Rosa damascena*) towards amounts of air bacteria in ICU

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1. INTRODUCTION

Based on WHO 2016, incident of Nosocomial Infection (NI) in low and middle income country ranged 5,7-19,1% ¹ Patients who treated in *Intensive Care Unit* (ICU) have 5-10 times higher risk to Nosocomial infected ². Based on data INICC (*International Nosocomial Infection Control Consortiu*) in 2010-2015, 50 WHO region countries in europe, southeast Asian, East mediteranian incident of nosocomial infection 50 incidents/1000 equipments each day in ICU³. Air bacteria in ICU have role of spreading nosocomial infection, because 90% of etiology are bacteria and 10-20% spread by air transmitted⁴.

Other method considered to reduce amounts bacteria in ICU is using essential oil which transmitted in the air by room diffuser combined with aquadest, it can cleaved being micro particles and have more solid

bond, so it can spreading more easily inside the room⁷ Rose (*Rosa damascena*) essential oils contain main antibacterial components such as β -citronellol (48,2%) dan geraniol (17%)⁸.

2. METHOD

This is an experimental research used true experimental with pre - post test only control group design. Sample of this research are bacteria in Intensive Care Unit (ICU) University Muhammadiyah Malang hospital before and after giving exposure of the essential oils.

The sample were divided into 10 groups. 1 groups was treated before essential oils given (K+), groups concentration 1%, 2%, 3% and time given 55 minute (K55), 110 minute (K110), 165 minute (K165). The nutrient agar opened for 15 minutes after interval phase of this exposure. The data analyzed by using repeated anova test and *post hoc bonferoni*.

Sample of air bacteria in the room after exposure of essential oil using purposive sampling technique without patient in the room, it purposed to reduce activity in ICU and air conditions in the room being more stabilized and prevent bias result

Normality test used for the collected data is Shapiro wilk dan homogeneity test used Maurich sphericity. If the result normal and homogeny, the data statistically by repeated anova and post hoc bonferoni

3. RESULTS AND DISCUSSION

Based on conducted 3 days research exposure with different concentration, Friday, 7th February 2020 (concentration 1%), Friday 28th February 2020 (concentration 2%), and Thursday 12th March 2020 (concentration 3%) indicated there differentiation amounts of air bacteria colony in ICU before and after exposure of rose essential oil (*Rosa damascena*). On the second days of observation, there is confounder factor that cannot controlled by researcher, in 145 minutes of the observation there is a code blue patient that must entered the ICU, so in this research data collected on that day not including in analytical analysis.

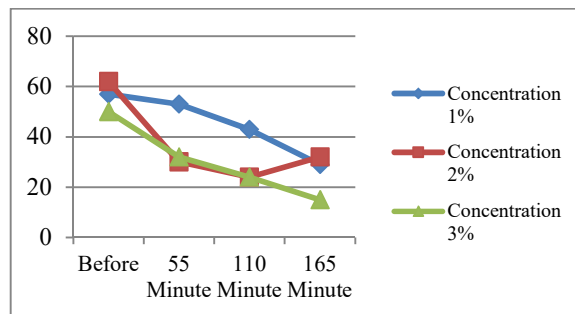


Figure 1. Time exposure with different concentration

Table 1. Number of Colony with different concentration

Exposure Time	Concentration 1%			Concentration 2%			Concentration 3%		
	Σ Bacterial colony	Σ Bacterial colony	%*	Σ Bacterial colony	Reducing Average	%*	Σ Bacterial Colony	Reducing Average	%*
Before (K+)	57		0	62		0	50		0
After 55 Minute (K55)	53		2,64	30		21,23	32		11,94
After 110 Minute (K110)	43	9,3 Colony	8,93		9,3 Colony			11,67 Colonyi	
After 165 Minute (K165)	29		18,9	24		24,9	24		17,24
				32		18,9	15		23,22

(Primary Source, 2020)

The distribution of data not normal, based normality test Shapiro Wilk on group K+ shows sig (0,554), K55 shows sig (0,639), K110 sig (0,010), K165 sig (0,878), because the requirement of normality data must sig (>0,05). That condition not eligible to Repeated ANOVA test than must doing transformation data using

Ln. Transformation result : K+ sig (0,330), K55 (0,680), K110 (0,340), and K165 (0,063), so data distribution normally now

Homogeneity test based on Mauchly's Sphericity shown the data is homogeny because sig (0,394), than data distribution normally and homogeny, its qualify to doing Repeated anova test, The result of repeated anova is the significancy (0,000), According on requirement if sig <0,05 its means H0 rejected and H1 received.

The result of this research, group concentration 1% reduction range 2,64% - 18,8% and the average 7,18% (629 colony). Group concentration 2% reduction range 21,2% - 24,9% and the average 15,36% (731,76 colony), and group 3% concentration have reduction range 11,9% - 23,2% (774 colony), this fact appropriated with research by Mulyana 2015 using essential oil Rosa damascene in classroom concentration 1% reduction colony of bacteria 55,41% and after given concentration 2% is 77,03%. Other result using lemon essential oil (Citrus limon) and silver fir (Abies alba need concentration 86% for 3 hours to reducing average of air bacteria 40% in palliative care Klinikum Wels-Grieskirchen hospital Austria sejumlah koloni 40%.

The result of colony air bacteria in group concentration 2%, after giving 165 minute there is rising graphic because there is activity changes inside the ICU after there's code blue patient who going inside in 120 minutes the door also opened more often. Based of Kumar & Lokesh research on 2018 about factor affected colony air bacteria in hospital such as : room activity, amount of peoples inside, and also from other things brought to the room

Clinically, colony of air bacteria before and after exposure always decreased, based of component that affected to uncontrollable factor such as light intensity, room temperature, room humidify, and room density, than after giving rose essential oil which contains some antibacterial substance like Fenil Etil Alkohol (5,1%), β -citronelool (48,2%), geraniol (17%), eugenol (1,9%), β Fenil Etil Benzoat (5,4%) heneicosane (1,8%)⁸. That compound have their speciality functions, Eugenol resist growth of bacteria with lacked cell wall structure of bacteria, Fenil Etil Alkohol have mechanism disturbing cell membrane metabolism and nutritional cell transport being resistance¹⁴ (Han et al., 2007). Geraniol mechanism as antibacterial is affected efflux mechanism at bacterial membrane cell and have character hydrophobic which really dominant it affected to reduce potential of membrane cell and ATP of bacteria¹⁵ Fenil Etil Benzoat have antibacterial mechanism with affected production layering of membrane cell¹⁶, other compound is Heneicoisane, it resist bacterial growth from reduce activity of cell membrane, Antibacterial mechanism of rose essential oil (*Rosa damascena*) in vitro proved on gram positive colony such as *Bacillus subtilis* (KHM : 0,5 KBM : 1) *Staphylococcus aureus* (KHM : 0,5 KBM : 2) resistance concentration 0,125 – 2 mg/ml dan range of concentration to killed bacteria 0,5 – 4 mg/ml¹⁷. Still unknown mechanism for air bacteria in vivo .

Spreading mechanism of essential oil in the room affected by combination essential oil with aquadest, essential oil based on ISO : 2003 have density <1¹⁸ (ranged 0,0848 – 0,880), it smallest than water/aquades which based on 2017 Material Safety Data Sheet (MSDS) smartlab Indonesia have relative density = 1. In this way, aquadest use as propagation vibration media because the higher density of the substance, its better as vibra propration¹⁹ it will used by ultrasonic wave on the diffuser equipment to change mixture of essential oil and aquadest being mist, so that substance which have potential antibacterial easier to spread in the air²⁰. This research using 3 variant concentration consist combination essential oil and aquadest concentration 1% v/v (1 ml essential oils + 99 ml aquadest) , konsentrasi 2% (2 ml essential oils + 98 ml aquadest) , konsentrasi 3% (3 ml essential oils + 97 ml aquadest) , it shows to us higher concentration have more slight aquadest, so the concentration of essential oil highter and as long exposure time cause mist circulating longer time in the air²¹.

4. CONCLUSION

There's an effect of aromatherapy from rose essential oil (*Rosa damascena*) towards amounts and type of air bacteria in ICU

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