The association between oral antibiotics with the decreased severity index of acne vulgaris in the medical cosmetics division dermatovenereology outpatient clinic of Dr. Soetomo General Teaching Hospital Surabaya from 2017- 2019

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ABSTRACT

Background: Acne vulgaris (AV) is a chronic inflammatory disease of the pilosebaceous unit. AV therapy is given based on the severity of AV. Oral antibiotic therapy is routinely prescribed to treat moderate to severe inflammatory acne. The purpose of this study is to determine the relationship between systemic antibiotic administration and the decrease in the severity of acne vulgaris.

Methods: This was a retrospective study with an analytical design, carried out on 49 medical records that met the inclusion criteria for acceptance of the sample; new AV patients come with grades 2, 3, and 4 to the Medical Cosmetics division Dermatovenereology Outpatient Clinic of Dr. Soetomo General Teaching Hospital Surabaya in the period January 2017 - December 2019.

Results: This study was conducted on 49 patients with acne vulgaris grade 2,3,4 who came to follow-up in a week 2,4,8 treatment. Data from the first follow-up group, 26 subjects (53.1%) experienced a decrease in grade; from the second follow-up group, 25 subjects (51.0%) experienced a decrease in grade; from the third follow-up group, 38 subjects (77, 6%) experienced a decrease in the group comparing with condition patient before treatment. Analytic comparative showed that the condition of the first visit compared to the first, second and third follow-up groups were 0,180, 0,000, and 0,000, respectively. The significance test results showed a value of 0.000 (p ≤ 0.05) in the second and third follow-up groups, which is statistically significant.

Conclusion: An oral antibiotic can effectively reduce the severity degree of acne vulgaris in four to eight weeks after treatment with an oral antibiotic.

Keywords: acne vulgaris, an oral antibiotic, tropical disease.
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INTRODUCTION

Acne vulgaris (AV) is a chronic inflammation of the pilosebaceous with a multifactorial cause that is marked with polymorph lesions like comedones, papules, pustules, nodules, or cysts on the predilection area. The predilection of AV is on the face, neck, shoulder, anterior or posterior of the chest, and the upper arm, and also AV can occur on any site that has a rich sebaceous gland. Internal triggers are genetics, inflammation, immune response, overproduction of sebum that can cause proliferation of Propionibacterium acnes and resulting blockage of the sebaceous infundibular, while external factors that can trigger AV are unhealthy lifestyle like smoking, consuming high glycemic index food, cosmetic usage that can cause blockage of infundibulum, pollutants, and high oxidant exposure.[1-3] Acne vulgaris is the eighth most prevalent disease worldwide. Almost every individual between 15 and 17 years of age is affected.[4]

Acne therapies include topical and systemic treatments, targeting different aspects of acne pathogenesis. Oral antibiotics are routinely prescribed for the treatment of moderate-severe inflammatory acne and are believed to be successful because they target both bacteria and associated inflammation. The antibiotics used in the treatment of acne include tetracyclines, macrolides, clindamycin, and trimethoprim/sulfamethoxazole.[4] Oral antibiotics can also decrease comedo by suppressing the metalloproteinase matrix enzyme,

the enzyme has a big impact on skin proliferation, but when the enzyme is overproduced, then it can cause a deposit then comedo will appear.[5]

This study aimed to determine the relationship between systemic antibiotic administration and the decrease in the severity of acne vulgaris.

METHODS

This study was an analytical study with a retrospective cross-sectional design. The data of the present study was obtained from 167 new AV patients in grades 2, 3, and 4 who were treated at the medical cosmetics division dermatovenereology outpatient clinic of Dr. Soetomo general teaching hospital Surabaya in the period January 2017 to December 2019, but only 49 patients met the inclusion criteria. Total sampling was used in this study. The inclusion criteria in this study were all-new AV patients in grades 2, 3, and 4 who control 3 times (weeks 2, 4, and 8) at the medical cosmetics division dermatovenereology outpatient clinic of Dr. Soetomo general teaching hospital Surabaya. The exclusion criteria were missing medical records and low compliance. The descriptive data included the clinical characteristics of gender, age, and acne grading, and the resolution of the lesion observed during 2 weeks, 4 weeks, and 8 weeks after treatment.

The acne lesions were classified into the severity degree of acne vulgaris by Plewig and Kligman. The severity degree of acne vulgaris by Plewig and Kligman consists of 4 grades, where the 1st-grade counts on less than 10 papulopustular lesions, the 2nd-grade counts on 10-20 papulopustular lesions, the 3rd-grade counts on 21-30 papulopustular lesions and the 4th grade counts on more than 30 papulopustular lesions. Oral antibiotics given to all 49 patients were doxycycline 100mg two times a day for eight weeks. The study was conducted with three groups, the first follow-up group was the data two weeks after treatment, the second follow-up group was the data four weeks after treatment, and the third follow-up group was the data eight weeks after treatment.

The study compared the severity degree of acne vulgaris before and after the treatment of oral antibiotics. Variables data were analyzed using paired t-test for normal distribution and a Wilcoxon test for abnormal distribution. Confounding variables were analyzed using the Chi-square test. The value of the degree of significance is p < 0.05.

RESULTS

Out of the 49 patients who met the inclusion criteria, the majority of the cases were female, 35 patients (71.41%), while the male was 14 patients (28.59%). The male and female ratio is about 2.5:1. The majority of patients in this study were 20-24 years age group, as many as 22 patients (44.88%). The highest degree of severity was grade 3, with as many as 35 patients (71%), then grade 2 with as many as 9 patients (18%), and grade 4 with as many as 5 patients (11%). Patient characteristic in this study is reported in Table 1.

Subjects were examined around the face and neck where the lesion was counted before treatment and 2, 4, and 8 weeks after the treatment. The subject's lesion counts were converted into the severity degree index of acne vulgaris by Plewig and Kligman. The result of the first visit (before treatment) and after treatment condition showed a decrease in the severity degree of acne vulgaris after the treatment that was marked by the decrease in acne lesion count during the examination (Table 2). Statistical results obtained using the Wilcoxon test for pre-post treatment showed. A decrease in the severity degree of acne vulgaris indicated by decreasing acne lesion count. Through this statistical analysis, a significant result was obtained (p = 0.000).

In the first follow-up group, the results of the severity degree of acne vulgaris were seven patients (14.3%) experienced a decreased grade, 29 patients (59.2%) remained, and 13 patients (26.5%) increased. In the second follow-up group, the results obtained were that 42 patients (85.7%) experienced a decreased grade, 7 patients (14.3%) remained, and no patients experienced an increase. In the

Table 1. Patients Characteristic

Characteristics	Frequency & Percentage (%)
Sex	
Male	14(28.59)
Female	35(71.41)
Age	
15-19	24(49)
20-24	22(44.88)
25-30	3(6.12)
Severity grading	
Grade 2	**9**
Male	3(6.12)
Female	6(12.24)
Grade 3	**35**
Male	8(16.32)
Female	27(55.12)
Grade 4	**5**
Male	3(6.12)
Female	2(4.08)

Table 2. The Change of severity grade of acne vulgaris.

Study Phase Group	Severity Grade of AV			Wilcoxon Test p-value
	Decrease	Still	Increase	
First follow-up (n=49)	7 (14.3%)	29 (59.2%)	13 (26.5%)	0.180
Second follow-up (n=49)	42 (85.7%)	7 (14.3%)	0 (0%)	0.000
Third follow-up (n=49)	46 (93.9%)	3 (6.1%)	0 (0%)	0.000

*p <0.05 indicates significant statistical results

third follow-up group and the second follow-up group, the results showed that all 49 patients (100%) experienced a decrease in the number of papulopustular. The Wilcoxon signed ranked test statistic was used in each group to see if there was a significant change in the severity degree of acne vulgaris after the treatment. The p-value generated in the first follow-up group was 0.180 (p >0.05), the second follow-up group was 0.000 (p<0.05), the third follow-up group was 0.000 (p < 0.05).

DISCUSSION

All of the subjects underwent a physical examination by counting the acne lesions in the area of the face and neck before and after the treatment. All of the subjects underwent treatment with doxycycline oral two times a day for eight weeks. Patients with papulopustular AV are classified according to severity by looking at the number of lesions.[6] This study focused on patients with AV papulopustular grades 2, 3, and 4. Of the 167 patients who were categorized as AV papulopustular degrees 2, 3, and 4, there were only 49 patients who were included in the inclusion criteria of this study.

Of the 49 patients, 9 patients with AV degree 2 (18%), degree 3 were 35 people (71%), and degree 4 was 5 (11%). The majority of female and male patients with papulopustular AV had a grade 3 severity. The number of female patients is more than males. These results are consistent with a study by Lynn et al. in America, who found a higher prevalence of women with AV in a younger population, which could be due to the earlier onset of puberty in women. However, the opposite result was found by research by Tan and Bathe et al. and also by Hwee et al.[7,8]

In this study, it was found that patients with AV papulopustular grades 2, 3, and 4 were mostly in the age category 15-24 years, and the least were in the age group 5-14 years. These results are similar to the results of a study in Bandung, which found that 71.35% of patients presenting with AV were aged 15-24 years. Several other studies have shown that the risk of severe AV is higher in older adolescents than in young or pre-adolescents because puberty and older adolescents have higher levels of sebum.[8,9]

All patients with AV papulopustular grades 2, 3, and 4 who were included in the inclusion criteria, apart from receiving oral antibiotics, also received topical therapy in the form of retinoic acid, benzoyl peroxide, azelaic acid, and topical antibiotics. This is consistent with the various consensus that oral antibiotics in the treatment of AV should not be used as a single therapy but should be given in combination with topical drugs to accelerate the therapy and also to prevent antibiotic resistance.[10] The oral antibiotic given in this study was doxycycline, which was agreed to be the first-line therapy for moderate-to-severe AV. Giving antibiotics to AV is not only aimed at killing *propionibacterium acne* as the main cause of AV but also as an anti-inflammatory.[4] The dose of oral antibiotics given in this study was following the 2017 PERDOSKI PPK is doxycycline at a dose of 50-100 mg/day. It was also following the randomized controlled trial by Leyden et al., who stated that doxycycline was effective at doses of 1.7 mg/kg to 2.4 mg/kg. Lower than the usual dose of 40 mg/day has also been reported to have a moderate therapeutic effect on AV.[11]

Thus, all 49 patients (100%) had lesion improvement at the end of follow-up. Based on the comparison of decreasing AV severity degree in groups 1, 2, and 3, the significance of each group is 0.180, 0.000, and 0.000. The data above shows that this study was in line with the research hypothesis, especially in condition patients in the 4th and 8th weeks after treatment (second and third follow-ups), where there was a significant improvement in the degree of disease both between groups and each group from the beginning to the end of the study period, as mentioned in the previous studies.[11-17] The calculation of the power of the study in this study using the power and sample size test for two proportions, the results of the research power of 0.999 indicate that the improved group has significant research power.

The results of the evaluation showed that there was an improvement in the lesions in the second follow-up (4th week) and significant improvement in the third follow-up (8th week). The improvement in the 8th week of therapy shows us that compliance with using the treatment and visits to the outpatient clinic regularly shows

significant improvement. The literature recommended giving oral antibiotics for less than 12 weeks.[5] The highest use of oral antibiotics in the patient population studied was doxycycline 100 mg twice daily. In some other studies, doxycycline 20 mg twice daily also showed improvement in reducing the number of inflammatory lesions, but doxycycline 100 mg showed a higher success rate for acne improvement. Vulgaris until it reaches lesion 0 or the lesion disappears completely.[4] This study has some limitations because there were patients with low compliance, so the number of samples in this study was small. The minimum number of similar research data makes it difficult for this study to find comparisons.

CONCLUSION

Acne vulgaris moderate and severe grade (grade 2 to 4) was recommended oral antibiotics as treatment because they target both bacteria and associated inflammation. An oral antibiotic can effectively reduce the severity degree of acne vulgaris four to eight weeks after treatment with an oral antibiotic.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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ETHICS APPROVAL

This research has been through the Ethics Committee review in Dr. Soetomo General Academic Hospital Surabaya with reference number: 2022/KEPK/VI/2020.

AUTHORS CONTRIBUTION

All authors have the same contribution in writing the report on the results of this study, from the stage of proposal preparation, data search, and data analysis, to the interpretation of research data and presentation of the final report.

REFERENCES

1. Goh C, Cheng C, Agak G, Zaenglein AL, Graber EM, Thiboutot DM, Kim J. Acne Vulgaris. In:

Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, McMichael AJ, Orringer JS. eds. Fitzpatrick's Dermatology. 9e. McGraw Hill. 2019. p272-278.

2. Oon HH, Wong SN, Aw DCW, Cheong WK, Goh CL, Tan HH. Acne Management Guidelines by the Dermatological Society of Singapore. J Clin Aesthet Dermatol. 2019;12(7):34-50.

3. Tan AU, Schlosser BJ, Paller AS. A review of diagnosis and treatment of acne in adult female patients. Int J Womens Dermatol. 2017 Dec 23;4(2):56-71. doi: 10.1016/j.ijwd.2017.10.006. PMID: 29872679; PMCID: PMC5986265.

4. Bienenfeld A, Nagler AR, Orlow SJ. Oral Antibacterial Therapy for Acne Vulgaris: An Evidence-Based Review. Am J Clin Dermatol. 2017;18(4):469-490. doi:10.1007/s40257-017-0267-z

5. Farrah G, Tan E. The use of oral antibiotics in treating acne vulgaris: a new approach. Dermatol Ther. 2016;29(5):377-384. doi:10.1111/dth.12370.

6. Plewig G and Melnik B, and Chen W. Acne and Nutrition. 2019. p293-298. doi:10.1007/978-3-319-49274-2_8.

7. Tan JK, Bhate K. A global perspective on the epidemiology of acne. Br J Dermatol. 2015;172 Suppl 1:3-12. doi:10.1111/bjd.13462.

8. Heng AHS, Chew FT. Systematic review of the epidemiology of acne vulgaris. Sci Rep. 2020 Apr 1;10(1):5754. doi: 10.1038/s41598-020-62715-3.

9. Ruchiatan, K. et al. A five-year clinical acne patients profiles and its management based on Indonesian acne expert guideline in Bandung, Indonesia. 2020;30(2). p229–234.

10. Kelompok Studi Dermatology Kosmetik Indonesia. Panduan praktik klinis PERDOSKI. 1st ed. Edited by S. Widati et al. Jakarta: PERDOSKI. 2017.

11. Zaenglein AL, Pathy AL, Schlosser BJ, et al. Guidelines of care for the management of acne vulgaris [published correction appears in J Am Acad Dermatol. 2020 Jun;82(6):1576]. J Am Acad Dermatol. 2016;74(5):945-73.e33. doi:10.1016/j.jaad.2015.12.037.

12. Raghavan, et al. Clinical profile of acne vulgaris: an observational study from a tertiary care institution in Northern Kerala, India. International Journal of Research in Dermatology. 5. Doi:10.18203/issn.2455-4529. IntJResDermatol20192135. 2019.

13. AK Mohiuddin (2019) 'A Comprehensive Review of Acne Vulgaris', Clinical Research in Dermatology: Open Access. doi: 10.15226/2378-1726/6/2/00186.

14. Ip A, Muller I, Geraghty AWA, McNiven A, Little P, Santer M. Young people's perceptions of acne and acne treatments: secondary analysis of qualitative interview data. Br J Dermatol. 2020;183(2):349-356. doi:10.1111/bjd.18684.

15. Kraft J, Freiman A. Management of acne. CMAJ. 2011;183(7):E430-E435. doi:10.1503/cmaj.090374

16. Lynn DD, Umari T, Dunnick CA, Dellavalle RP. The epidemiology of acne vulgaris in late adolescence. Adolesc Health Med Ther. 2016 Jan 19;7:13-25. doi: 10.2147/AHMT.S55832. PMID: 26955297; PMCID: PMC4769025..

17. Dawson AL, Dellavalle RP. Acne vulgaris. BMJ. 2013;346:f2634. doi:10.1136/bmj.f2634.