ISSN: 2581 – 3633

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: https://www.ijmacr.com

Volume – 9, Issue – 4, August – 2026, Page No.: 479 – 488

Epidemiological Study to determine infectious causative organisms other than Propionibacterium acnes and its association with pus culture and sensitivity in acneiform lesions of face in adult population of tertiary care hospital in Western U.P. India

[1]Dr Swati Gupta, Associate Professor, Department of Dermatology, Venereology & Leprology, Ajay Sangaal Institute of Medical Sciences & Research, Shamli, Uttar Pradesh, India

[2]Dr. Manpreet Kaur Madaan, Junior Resident, Department of Dermatology, Venereology, & Leprology, Chhattisgarh Institute of Medical Sciences, Bilaspur.

[3]Dr. Ankur Raj Upadhyay**,** Assistant Professor, Department of Dermatology, Venereology & Leprology, Ajay Sangaal Institute of Medical Sciences & Research, Shamli, Uttar Pradesh, India.

Corresponding Author: Dr Swati Gupta, Associate Professor, Department of Dermatology, Venereology & Leprology, Ajay Sangaal Institute of Medical Sciences & Research, Shamli, Uttar Pradesh, India.

How to citation this article: Dr. Swati Gupta, Dr. Manpreet Kaur Madaan, Dr. Ankur Raj Upadhyay, "Epidemiological Study to determine infectious causative organisms other than Propionibacterium acnes and its association with pus culture and sensitivity in acneiform lesions of face in adult population of tertiary care hospital in Western U.P. India", IJMACR– August – 2026, Volume – 9, Issue – 4, P. No. 479 – 488.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Acneiform lesions which resemble acne vulgar is are common dermatological conditions that can significantly affect individual's quality of life. These lesions can arise from various etiologies including hormonal changes, increased sebum production and microbial colonization. Understanding the spectrum of causative organisms beyond Propionibacteriumacnes is crucial for effective treatment.

Objectives: To determine the causative organisms other than Propionibacterium acnes and to evaluate the pus culture and antibiotic sensitivity reports for causative organisms on acneiform lesions of face.

Methods: This observational study included 80 patients aged 20-60 years with acneiform lesions conducted at Tertiary Care Hospital in Western U.P. over 6 months with pus culture and antibiotic sensitivity using the Kirby - Bauer disk diffusion method.

Results: Majority of patients (78.75%) were between 20-30 years age. The study found a predominance of Gram-positive cocci, particularly Methicillin - sensitive Coagulase-Negative Staphylococci (37.5%) which were most sensitive to Tetracycline group of antibiotics. The

most common clinical diagnosis was acne vulgaris (77.5%), followed by gram-negative folliculitis, perioral dermatitis, and rosacea (7.5% each). These findings suggest the need for appropriate antibiotic treatments and comprehensive patient management.

Conclusion: The study reveals that Coagulase Negative Staphylococci is the most prevalent organism in pus cultures, with significant anti biotic sensitivity differences across various organisms. This data provides valuable insights for the importance of antibiotic therapy and comprehensive patient management.

Keywords: Acneiform Lesions, Coagulase Negative Staphylococci, Propionibacterium Acnes, Antibiotic Sensitivity, Acne Vulgaris, Microbial Profile

Introduction

Inflammatory lesions such as papule or pustules or both characterized by follicular reactions pathologically are called as Acneiform lesions[1] Pilosebaceous unit is affected with propensity for affecting densely distributed sebaceous glands like on the face, upper chest, trunk, and neck making it a chronic inflammatory disease.[2]

The prevalence of acneiform lesions is unclear nonetheless, acne is thought to affect 9.4% of the general population worldwide, making it the eighth most common disease worldwide.[3,4] A number of conditions are represented by acne-like eruptions such as rosacea, perioral dermatitis, folliculitis, steroid acne, acneiform drug eruptions, adenoma sebaceum, miliaria, favre racouchot syndrome and chloracne.[5]

Microorganisms such as Propionibacterium acnes, Staphylococcus aureus, Staphylococcus epidermidis, Proteus mirabilis, Klebsiella pneumoniae, Escherichia coli, Enterobacter and Pseudomonas aeruginosa can cause acneiform lesions by abnormally colonizing the skin.[6] Drugs are one of the most frequent causes of acneiform eruptions, despite the fact that there are numerous subgroups of acneiform eruptions. This clinical condition is known as drug-induced acneiform eruptions.[7] It is also thought that dietary factors such as consuming large amounts of milk and other dairy products as well as foods with a high glycemic index contribute to the development of acneiform lesions.[8]

Androgens, Estrogens, Insulin and Insulin-like growth factor - 1, Corticotrophin Releasing Hormone, Adrenocorticotropic hormone, melanocortins, glucocorticoids, and growth hormone are among the hormones linked to the pathophysiology of acneiform lesions.[9]

The necessity of having a wide range of treatment options that target its many pathogenic causes is highlighted by the prevalence of acneiform eruptions and their impact on quality of life.[10] The etiology of acneiform lesions determines the treatment.

If an organism or medication is the cause, exposure should usually be stopped. Drug withdrawal, topical or oral retinoid, topical or oral antibiotic can be used for the treatment of any residual lesions. Skin cleansers like benzoyl peroxide or salicylic acid can be used to reduce oily skin. For itching, antihistamines can be taken.[11]

There are difficulties with adequate treatment response of acneiform eruptions because of new microbial resistance strains from conventional antibiotics. To determine the causative organism for acneiform lesions, it becomes necessity to undergo the use of pus culture and drug sensitivity patterns.

Material and Methods

This was a hospital based prospective study which was conducted in a tertiary care hospital done on80patients of either sex with Acneiform lesions who came to the OPD; were included in the study by simple random

sampling. Study was done for a period of6months i. e. January 2026 to June 2026.

A detailed history of every patient along with the name, age, sex, occupation, address, phone number was taken. Chief complaint, total duration, age and site of onset, mode of onset, symptoms, evolution and progression of symptoms were asked.

Aggravating factors along with photo aggravation, history of any systemic medications, topical medications and its total duration of application and its response, past history of systemic diseases, menstrual history from females, personal history were asked. Pus culture, sensitivity, and its associated causative organisms (other than Propionibacterium acnes) was done from acneiform lesions. Sample of Pus swab was collected and incubated under special media.

After streaking of pus sample on blood, nutrient and mac - conkey agar for 24 hrs incubation, under aerobic conditions, growth was seen and antibiotic sensitivity testing was done by Kirby-bauer disk diffusion method where measuring the diameter of zone of inhibition around each disc and then interpretation of results was done by Clinical Laboratory Standards Institute guidelines (CLSI).[12]

Inclusion criteria

- Acneiform caused by other than Propionibacterium acnes.
- Patient of either sex aged >18 years.
- Patients who gave their consent.

Exclusion criteria

- Acneiform lesion caused by Propionibacterium acnes and other anaerobic organisms.
- Patient whose aged less than 18 year.
- Patients who didn't give consent.

Statistical Analysis

This study was a descriptive observational study. As it did not involve hypothesis testing, intervention, or comparative arms, no inferential statistical analysis was performed. Data was expressed in percentage and frequency distributions.

Results

Table 1 illustrates the socio-demographic profile of the participants reveals that the majority (78.75%) were between 20-30 years old. The next largest age group is 30-40 years old (16.25%), followed by 40-50 years old (3.75%) and 50-60 years old (1.25%). Regarding gender, 60% of participants were male, while 40% were female. In terms of residence, 56.25% of participants live in urban areas, whereas 43.75% reside in rural areas.

Table 2 illustrates the distribution of 80 patients based on the causative organisms isolated in pus cultures. Staphylococcus aureus (methicillin resistant) was seen in 7.5% of cases, Staphylococcus aureus (methicillin sensitive) was seen in 12.5% of cases. Escherichiacoli was seen in3.75 percentage of cases, Pseudomonas aeruginosa was seen in 1.25% of cases, Klebsiella pneumonia was seen in 3.75% of cases and Proteus mirabilis was seen in 1.25% of cases. Coagulase negative staphylococci (methicillin resistant) was seen in 12.5% of cases whereas coagulase negative staphylococci (methicillin sensitive) was seen in 37.5% of cases.

Table 3 illustrates Coagulase Negative Staphylococci (methicillin sensitive) were 30 cases among total 80 cases. Macrolide group: azithromycin sensitivity was present in 14 cases (46.6%) and erythromycin sensitivity was present in 13 cases (43. 3%).Tetracycline group: minocycline sensitivity was present in 29 cases (96.6%), doxycycline sensitivity was present in 25 cases (83.3%),

tetracycline sensitivity was present in 24 cases (80%). Amoxicillin clavulanate antibiotic showed sensitivity in 46.6% (14 cases). Fluoroquinolone group: ciprofloxacin sensitivity was seen in 11 cases (36.6%) while of loxacin sensitivity was seen in 14 cases (46.6%). Lincosamide group of antibiotic: clindamycin sensitivity was seen in 15 cases (50%).

Figure 1 illustrates Grade 2 lesions were found in 30% of cases, Grade 3 in 36.25%, and Grade 4 lesions in 33.75% of cases.

Table 1: Socio-demographic profile of participants.

Variables	Number	Percentage
Age group (in years)		
20-30	63	78.75%
30-40	13	16.25%
40-50	3	3.75%
50-60	1	1.25%
Gender		
Male	48	60%
Female	32	40%
Residence		
Urban	45	56.25%
Rural	35	43.75%

Table 2: Distribution of patients according to organism isolated in pus culture: (N=80)

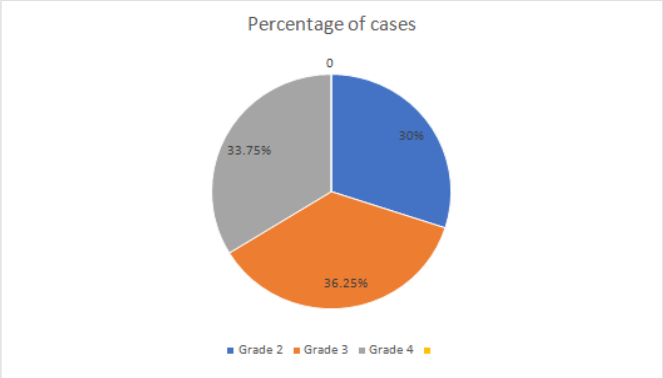
Causative Organism	No. of cases	Percentage (%)
Staphylococcusaureus (methicillin resistant)	6	7.5 %
Staphylococcusaureus (methicillin sensitive)	10	12.5%
Escherichia coli	03	3.75%
Proteus mirabilis	01	1.25%
Pseudomonas aeruginosa	01	1.25%
Klebsiella pneumoniae	03	3.75%
Coagulase negative staphylococci (methicillin resistant)	10	12.5%
Coagulase negative staphylococci (methicillin sensitive)	30	37.5%
No growth	16	20%

Table 3: Distribution of antibiotic sensitivity with different causative organisms: (N=80) MR = Methicillin Resistant, MS = Methicillin Sensitive A = Azithromycin, E = Erythromycin, S = Sensitive, R=Resistant, Mi = Minocycline, D = Doxycycline T=Tetracycline, C= Ciprofloxacin, O= Ofloxacin

Type of organism isolated	Macrolide sensitivity	Tetracycline sensitivity	Amoxicillin clavulanate sensitivity	Fluoroquinolone sensitivity	Lincosamide sensitivity
Staphylococcus aureus(MR)	AS- 3 ES- 3 ER-3 AR-3	Mi S-4 DS-3 TS-2 Mi R-2 DR-3 TR-4	S-1 R-5	CS-2 OS-1 CR-4 OR-5	S-5 R-1
Staphylococcus aureus (MS)	AS- 6 ES- 6 ER-4 AR-4	Mi S-9 DS-8 TS-7 MiR-1 DR-2 TR-3	S-6 R-4	CS-6 OS-7 CR-4 OR-3	S-7 R-3
Escherichia coli	AS- 0 ES- 0 ER-3 AR-3	S-0 R-3	S-3 R-0	CS-3 OS-2 CR-0 OR-1	S-1 R-2
Proteus mirabilis	AS- 0 ES- 0 ER-1 AR-1	S-0 R-1	S-1 R-0	CS-1 OS-1 CR-0 OR-0	S-0 R-1
Pseudomonas aeruginosa	AS- 0 ES- 0 ER-1 AR-1	S-0 R-1	S-0 R-1	CS-1 OS-1 CR-0 OR-0	S-0 R-1
Klebsiella pneumoniae	AS- 2 ES- 2 ER-1 AR-1	Mi S-2 DS-2 TS-1 Mi R-1 DR-1 TR-2	S-0 R-3	CS-1 OS-1 CR-2 OR-2	S-2 R-1
Coagulase Negative Staphylococci (MR)	AS- 4 ES- 4	Mi S-8 DS-7	S-3 R-7	CS-3 OS-4	S-4 R-6

	ER-6 AR-6	TS-7 Mi R-2 DR-3 TR-3		CR-7 OR-10	
Coagulase Negative Staphylococci(MS)	AS-14 ES-13 ER-17 AR-16	Mi S-29 DS-25 TS-24 Mi R-1 DR-5 TR-6	S-14 R-16	CS-11 OS-14 CR-19 OR-16	S-15 R-15

Graph 1: Distribution of patients according to grade of acneiform lesions (N=80)



Representative Images

Figure 1: Antibiotic sensitivity testing on Muller hinton agar for Gram Negative Bacilli.

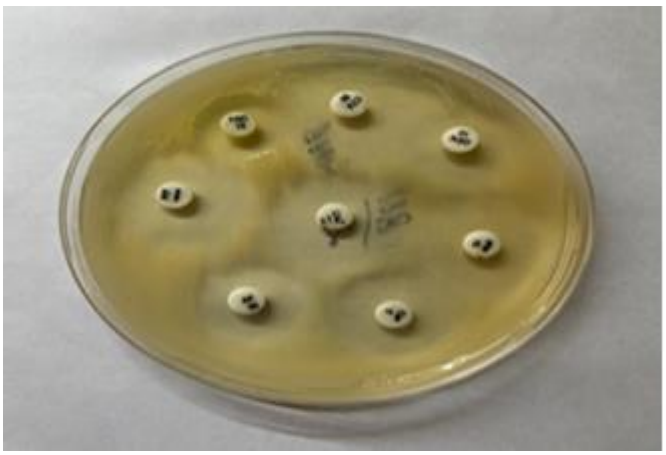
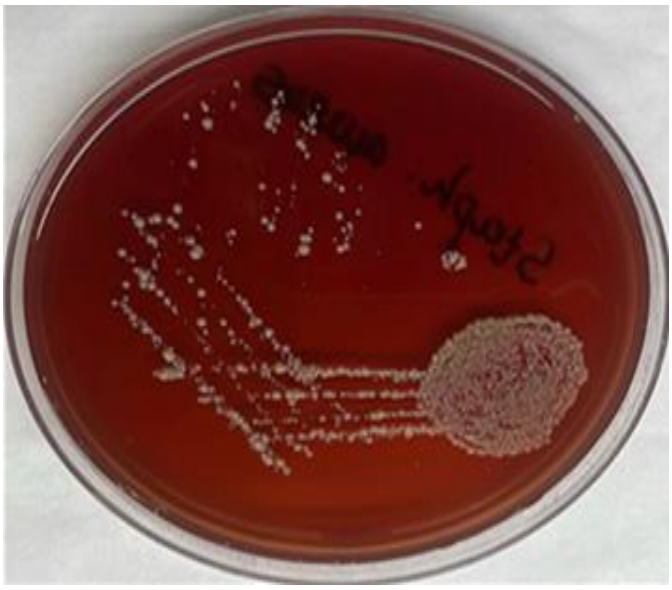


Figure 2: Antibiotic sensitivity testing on Muller hinton agar for Gram Positive Cocci.

Figure 3: Growth of Escherichia Coli on Mac conkey agar.

The colonies showed smooth and bright pink growth due to lactose fermentation.

Figure 4: Growth of Staphylococcus aureus on blood agar.



The growth showed large, circular, golden yellow, convex, smooth, slightly opaque and hemolytic colonies.

Figure 5: Growth of Coagulase Negative Staphylococci (Staphylococcus epidermidis) on blood agar.

The growth showed white, raised, non- hemolytic smooth colonies with slightly translucent to opaque texture.

Figure 6: There is involvement of bilateral cheeks, forehead in form of multiple, well defined, erythematous papules, pustules and nodule – Nodulocystic acne

Discussion

In present study, the age group of the participants showed that the majority (78.75%) were between 20-30 years old. According to Bhate K et al. (2013), adolescents and young adults showed higher prevalence of acne with 64% in their third decade and 43% in their 4th decade with a significant decline after the age of 30. This aligns with the current study, where 78.75% of patients were between 20 and 30 years old.[13]

There were 60% male and 40% females in the present study. Collier et al. (2008), found that adult women are more likely to report having acne than men, with 51% of women and 42.5% of men reporting acne in third decade (20-29 yrs), with 35% of women and 20% of men reporting acne in fourth decade (30-39 yrs).[14] This contrasts with the higher male prevalence in the current study may be due to more occupational exposure, ultraviolet radiation exposure of males due to outdoor activities.

In present study, 56.25% were residents of urban area and 43.75% were residents of rural area. Pandey SS

(1980), observed that acne vulgaris was less severe and less frequent in rural populations compared to urban populations in India, indicating a higher prevalence in urban areas.[15] These findings correlate with our study.

In our study, 30% had Grade 2 lesions, 36.25% had Grade 3 and 33.75% had Grade 4 lesions. In a study done by Patro M et al., 60% of patients presenting with grade 2 disease followed by 20.99% of patients with grade 3, 7.02% of patients with grade 4 and 11.98% of patients with grade1.[16] This is in contrast with our study.

In our study, Coagulase Negative Staphylococci (Methicillin Sensitive) were the most prevalent, accounting for 30 cases, which represents 37.5% of the total. This was followed by Staphylococcus aureus (Methicillin Sensitive) with 10 cases (12.5%) and Coagulase Negative Staphylococci (Methicillin Resistant), also with 10 cases (12. 5%).Staphylococcus aureus (Methicillin Resistant) was isolated in 6 cases (7.5%). In a study done by Srikanth M et al., Staphylococcus epidermidis was the predominant aerobic bacterial isolate which is in accordance with our study.[17]

In a study done bySinha K et alshowed that out of 100 patients, Methicillin Sensitive Coagulase Negative Staphylococci were 51%, Methicillin Resistant Coagulase Negative Staphylococci were 14%, Methicillin Sensitive Staphylococci aureus were 4% and Methicillin Resistant Staphylococci aureus were 3%. Escherichia coli was 2%, Pseudomonas aeruginosa was 2%, Klebsiella pneumoniae was 1% and no growth was seen in 20% of cases.[18] These results are in accordance with our study.

In a study done by Sari L et al involving 97 patients, 52 patients were identified with Coagulase Negative Staphylococci. Among these patients, themacrolide group of antibiotics showed a sensitivity rate of 40.3%, with 21 cases being sensitive.

All cases in the tetracycline group, including minocycline (100%) and doxycycline (82.6%) demonstrated sensitivity. Ciprofloxacin was sensitive in 48 out of 52 patients, resulting in 92% sensitivity rate. 21 cases (40.3%) were sensitive to lincosamide group. Regarding Staphylococcus aureus, which was found in 7 cases out of the 97 patients, the macrolide group displayed a sensitivity of 71.4%, observed in 5 out of 7 cases. All cases were sensitive to minocycline, 71.4% sensitive to doxycycline. All cases were sensitive to fluoroquinolone group. In the lincosamide group, 3 cases were sensitive to clindamycin, which accounts for approximately 42.8%.[19] This is in accordance with our study.

Conclusion

The results reveal a significant prevalence of acne in younger individuals, with 78.75% of cases occurring in the 20-30 age group. This demographic trend underscores the necessity for targeted interventions and educational initiatives aimed at younger populations, as acne can have profound psychological and social implications.

Gender distribution in the study indicated a higher prevalence of acne in males (60%) compared to females (40%), suggesting potential societal factors influencing the reporting and management of skin conditions. Additionally, the majority of patients resided in urban areas (56.25%), which may correlate with lifestyle and environmental factors contributing to the development of acneiform lesions.

The severity of acne was assessed using the Comprehensive Acne Severity System, revealing that 36.25% of patients had Grade 3 lesions, while 33.75%

had Grade 4 lesions. This highlights the need for effective treatment strategies, as a significant proportion of patients presented with moderate to severe forms of acne.

Microbiological analysis of pus cultures identified a predominance of Gram-positive cocci, particularly Methicillin-Sensitive Coagulase-Negative Staphylococci (37.5%) which were most sensitive to tetracycline group of antibiotics; minocycline (96.6%).

This finding emphasizes the importance of appropriate antibiotic therapies, especially in light of the varying resistance patterns observed among different organisms.

Limitations

Small sample size, Single centre study, Exclusion criteria: By excluding patients with lesions caused by Propionibacterium acnes, Short duration of data collection, Antibiotic resistance variation: The study assessed antibiotic sensitivity using the Kirby-Bauer disk diffusion method, which may not capture all resistance mechanisms.

References

1. Plewig G, Jansen T. Acneiform dermatoses. Dermatology. 1998;196(1):102-7

2. Sutaria AH, MasoodS, Saleh HM, Schles singer J. Acne Vulgaris. 2023 Aug 17.

3. Vos, T.; Flaxman, A.D.; Naghavi, M.; Lozano, R.; Michaud, C.; Ezzati, M.; Shibuya, K.; Salomon, J.A.; Abdalla, S.; Aboyans, V.; et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: A systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012 Dec 15; 380(9859) :2163–96.

4. HayRJ, JohnsNE, WilliamsHC, Bolliger IW, DellavalleRP, MargolisDJ, MarksR, NaldiL, WeinstockMA, WulfSK, Michaud C, JL Murray C, Naghavi M. The global burden of Skin Disease in 2010: an analysis of the prevalence and impact of skin conditions. J. Invest Dermatol. 2014 Jun;134(6): 1527–1534.

5. Dessinioti C, Antoniou C, Katsambas A. Acneiform eruptions. Clin Dermatol. 2014 Jan-Feb;32(1):24-34

6. Mohiuddin Ak. A comprehensive Review of Acne Vulgaris. J Clin Pharm; Vol 1,Issue:1;17-4

7. Ozlu E,Karadag AS. (2018). Drug-Induced Acneiform Eruptions. Acne and Acneiform Eruptions. InTech;2017.

8. Chilicka K, Dzieńdziora-Urbińska I, Szyguła R, Asanova B, Nowicka D. Microbiome and Probiotics in Acne Vulgaris-A Narrative Review. Life (Basel). 2022 Mar 15;12(3):422

9. Balachandrudu B, Niveditadevi V, Rani TP. Hormonal pathogenesis of acne – simplified. Int J Sci Stud.2015;3 (1):183–185.

10. Cruz S, Vecerek N, Elbuluk N. Targeting Inflammation in Acne: Current Treatments and Future Prospects. Am J Clin Dermatol. 2023 Sep;24(5):681-694.

11. Adityan B, Kumari R, Thappa DM. Scoring systems in acne vulgaris. Indian J Dermatol Venereol Leprol 2009;75:323-326.

12. Clinical and Laboratory Standards Institute; [2024]

13. Bhate K, Williams HC. Epidemiology of acne vulgaris. Br J Dermatol. 2013 Mar;168(3): 474-85.

14. Collier CN, Harper JC, Cafardi JA, Cantrell WC, Wang W, Foster KW, Elewski BE. The prevalence of acne in adults 20 years and older. J Am Acad Dermatol. 2008;58(1):56-9.

15. Pandey SS, Kaur P, Singh G. Has Acne Urban Bias ? Indian J Dermatol Venereol Leprol. 1980 Mar-Apr;46(2):80-82

16. Patro N, Jena M, Panda M, Dash M. A study on the prescribing pattern of drugs for acne in a tertiary care teaching hospital in odisha. J Clin Diagn Res. 2015 Mar;9(3):WC04-6.

17. Srikanth M, Kalyani C S, Mohan N, Sridhar K, Padmaja I J. ―Bacteriology of Acne‖. Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 19, March 05; Page: 3267-3274.

18. Sinha, K. (2018). Secondary Infection in Acne – Bacterial Culture and Sensitivity Profile. International Journal of Scientific Research (IJSR).

19. Sari L, Jusuf NK, Putra IB. Bacterial sensitivity pattern to antibiotics in acne vulgaris at Universitas Sumatera Utara Hospital Medan,Indonesia in 2019. J Gen-Proced Dermatol Venereol Indones.2022; 6(1):1-6.