The Relationship between Sleep Quality and Students' Acne Vulgaris Severity at Medical Faculty Universitas Kristen Indonesia

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The Relationship between Sleep Quality and Students' Acne Vulgaris Severity at Medical Faculty *Universitas Kristen Indonesia*

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Abstract

Acne vulgaris (AV) is a chronic inflammatory of the pilosebasea follicle caused by many factors with specific symptoms and usually occurs in adolescent and young adults. Sleep quality is one of many factors that likely affect the pathogenesis of AV. This study aimed to determine the relationship between sleep quality and AV severity. This study was observational with cross-sectional design conducted from October to November 2018. The sample was collected by using purposive sampling method on medical students of Universitas Kristen Indonesia Batch 2018. Sleep quality was defined by using the Pittsburgh Sleep Quality Index (PSQI). Acne vulgaris severity was defined based on Lehmann criteria. Statistical analysis was performed by using Chi-Square test (p <0.05). Result of the study is students who had mild AV 32 people (36,8%), moderate AV 48 people (55,2%), severe AV 7 people (8%), with 69% of students experience poor sleep quality. This study shows that there is a significant relationship between the sleep quality and severity of AV, with Chi-Square test obtained p-value = 0.000 (p < 0.05). This study suggested that there is a significant correlation between sleep qualities with AV severity.

Keywords: *acne vulgaris, sleep quality, acne vulgaris severity*

I. INTRODUCTION

Acne vulgaris (AV) is one of the most common skin diseases that generally occurs in adolescence, but also often continues into adulthood [1;2]. One population study in Germany stated that 64% of people aged 20-29 years and 43% of people aged 30-39 years suffer from AV [3]. Acne vulgaris or known as acne is a chronic skin disease that occurs due to chronic inflammation of the *pilosebaceous* follicles which is characterized by blackheads, papules, pustules, nodules, and cysts in their predilection sites, which are usually in large sebaceous glands such as the face, chest, and back part of the above [4;5]. One factor that contributes to the occurrence of acne vulgaris is increased sebum secretion. Sebum itself is produced by the sebaceous glands. Sebum secretion increases due to high androgen hormone secretion [6]. The synthesis of androgen hormones can be suppressed by the presence of the hormone melatonin [7]. The hormone melatonin functions to induce sleep and can improve sleep quality [8].

Sleep quality is the ability of individuals to be able to stay asleep, not only reaching the amount or duration of sleep but also to get the amount of rest that suits their needs [9]. In this modern era, human activity is increasingly increasing so that attention to aspects of adequate sleep (in quantity) and quality is still lacking. This was proven by the 2013 American International Assurance (AIA) healthy lifestyle index survey in Indonesia conducted by a global research company, Taylor Nelson Sofrens (TNS). The survey shows that Indonesian people who want to get sleep for 7, 8 hours apparently can only realize 6, 8 hours each day because their

activities are increasingly increasing [10]. Acne vulgaris itself has an effect that can damage a person's confidence because it attacks areas that are easily seen and important in one's appearance [1; 11] The problem of acne vulgaris should not be underestimated because it harms the psychososcopic aspects for sufferers [12].

Treatment can be done to overcome Acne Vulgaris, but prevention is also needed, one of which is to improve sleep quality. Previous studies have shown that maintaining good sleep quality where sufficient melatonin secretion can suppress the production of androgen hormones which play a role in the emergence of acne vulgaris [13; 14] Seeing the many AV events that are often found around us, then also research on this has never been done in the previous at the Medical Faculty, *Universitas Kristen Indonesia*, then based on the above background the writer was interested in researching the relationship of sleep quality with the severity of acne vulgaris on the Medical Faculty, *Universitas Kristen Indonesia* students.

II. METHOD

This type of research is an observational study using a cross-sectional design. The scope of the study is Skin Health and Sex. The scope of the research location is students of the Medical Faculty *Universitas Kristen Indonesia*. The time of the study was conducted from October to November 2018. The inclusion criteria of this study were the students of the Medical Faculty *Universitas Kristen Indonesia* who were willing to take part in the study, aged 18-22 years and were having acne on their faces. The exclusion criteria for this study were research subjects who were in the treatment of acne vulgaris at a general practitioner, dermatologist, or buying drugs at a store/pharmacy in the last 2 weeks, and those suffering from skin diseases on the face such as contact dermatitis, varicella, etc. other. A sampling of this study was conducted using a purposive sampling technique. Based on the sample size formula, the minimum sample used in this study was 61 samples. Data was collected by filling out the questionnaire of the Pittsburgh Sleep Quality Index (PSQI) by respondents. The PSQI questionnaire covers 7 components, namely subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleeping pills, and sleep dysfunction during the day. After completing the questionnaire, a physical examination was performed to assess the presence or absence of acne vulgaris along with its severity based on Lehmann criteria, then documentation was carried out with a Canon G7X camera. Data analysis was performed using the Statistical Product and Service Solution (SPSS) program 20.0 for Windows, with test results including univariate analysis using descriptive and bivariate analysis using the Chi-Square test.

III. RESULT AND DISCUSSION

The research data was collected in October - November 2018. The number of research subjects who met the inclusion and exclusion criteria was 87 respondents.

Table 1. Respondents' Frequency Distribution Characteristics

Characteristics	Number	
	n	%
age		
18 year	16	18,4
19 year	19	21,8
20 year	21	24,1
21 year	18	20,7
22 year	13	14,9
Total	87	100,0
Sex		
Female	56	64,4
male	13	35,6
Total	87	100,0
Acne Vulgaris Severity Level		
Mild Degree	32	36,8
Moderate Degree	48	55,2
Severe Degree	7	8,0
Total	87	100,0
Sleep quality		
Bad	60	69,0
good	27	31,0
Total	87	100,0

Based on the age frequency distribution of respondents, from 87 respondents, as many as 21 people (24.1%) were 20 years old and the least were respondents who were 22 years old namely as many as 13 people (14.9%). Based on the gender frequency distribution of respondents, out of 87 respondents, as many as 56 people (64.4%) were female and male as many as 13 people (35.6%). Based on the frequency distribution of the severity of acne vulgaris, from 87 respondents, 48 people (55.2%) suffered from a moderate degree of acne vulgaris and at least some respondents suffered from a severe degree of Vulgaris which were 7 people (8%). Based on the frequency distribution of sleep quality of respondents, from 87 respondents, as many as 60 people (69%) were those of poor sleep quality and respondents who had good sleep quality were as many as 27 people (31%).

Table 2. Cross Tabulation between Sleep Quality and Acne Vulgaris Severity

Acne	Sleep Quality				Number		P
	Good		Bad				
	n	%	n	%	n	%	
Mild	23	71.9	9	28.1	32	100.0	<0,05
Severe	4	7.3	51	92.7	55	100.0	

After analyzing the data using the Chi-Square test, it is showed 0,000 (p <0.05), which means that there is a significant relationship between sleep quality and the severity of acne vulgaris at Medical Faculty *Universitas Kristen Indonesia*.

In this study, 87 samples were obtained with a range of ages 18-22 years, as many as 16 people (18.4%) aged 18 years, 19 people (21.8%) aged 19 years. 21 people (24.1%) were 20 years old 18 people (20.7%) were 21 years old, and 13 people (14.9%) were 22 years old. The results of this study are consistent with the theory which says that acne vulgaris is often found in adolescence and can also continue into adulthood [1;15;16]. These results are also consistent with research on population studies in Germany by Schafer T et al., That 64% of people aged 20-29 years and 43% of people aged 30-39 years suffer from acne vulgaris [3;17].

Characteristics of research respondents based on sleep quality found as many as 60 people (69.0%) had poor sleep quality and 27 people (31.0%) had good sleep quality. These results are consistent with the results of research from the American International Assurance (AIA) conducted by a global research company, Taylor Nelson Sofrens (TNS) in Indonesia in 2013, that in this modern era, human activity is increasingly increasing so that attention to aspects of sleep that enough (in quantity) and quality is still very lacking. The survey shows that Indonesian people who want to get 7.8 hours of sleep can only realize 6.8 hours of sleep every day because of their increasing activity [18;19].

Characteristics of research respondents based on the severity of acne, from 87 people found 32 people (36.8%) suffered from mild degree Vulgaris, 48 people (55.2%) suffered from moderate degree Vulgaris, and 7 people (8%) suffered from acne vulgaris degree of weight. Acne severity was assessed based on Lehmann's criteria. Categorized mild acne if there are blackheads 20, or inflammatory lesions <15, or total lesions <30. Moderate acne if there are blackheads 20 - 100, or inflammatory lesions 15 - 50, or total lesions 30 - 125. Whereas said severe acne if there are cysts> 5 or blackheads <100, or inflammatory lesions> 50, or total lesions> 125.

Based on the cross-tabulation between sleep quality and severity of acne vulgaris (Table 2), out of 32 mild acne sufferers, there were 23 people (71.9%) included in the good sleep quality category, 9 people (28.1%) included in the sleep quality category poor, 55 patients with severe acne there were 4 people (7.3%) included in the category of good sleep quality, 51 people (92.7%) included in the category of poor sleep quality. The results of this study stated that there was a significant relationship between sleep quality and the severity of acne vulgaris (p = 0,000) in 2018 students of Medical Faculty *Universitas Kristen Indonesia*. These results are consistent with the study of cosmetic dermatology by Choi et al., That lack of sleep can worsen acne vulgaris with a percentage of 66% [9]. These results are also by existing theories. There is four pathogenesis of acne, namely increased sebum production, hypercornification of follicles and pilosebaceous ducts, Propionibacterium acnes colonization in follicles, and inflammatory processes and immune responses [15; 16] reach the surface of the skin through the infundibulum. Increased sebum production and follicular hypercornification result in the development of microcomedones and changes in the follicular environment that support the intensive growth of P. acnes. P acnes proliferates and secretes a variety of proinflammatory products including lipases, proteases, hyaluronidase, and chemotaxis factors. This is what triggers acne [17; 18].

Sleeping too late can cause a person to lack sleep, this can cause an increase in inflammatory factors, a decrease in body immunity, trigger insulin resistance and increase the stress level. Unhealthy lifestyles such as sleeping too late can affect the incidence and exacerbation of acne. Staying up late can cause an increase in the activity of androgen hormones.

Increased activity of this hormone causes an increase in sebum production, causing the skin to tend to be more oily and make acne easier [19; 20].

Sleep is an unconscious state that can be awakened by giving sensory stimuli or by other stimuli. The hormone that plays the most roles in the mechanism of sleep is melatonin [21;22;23]. Melatonin is a hormone that is synthesized and secreted by the pineal gland. Melatonin is secreted directly into circulation and distributed throughout the body. Sleep-wake cycle in humans follows the circadian rhythm that is regulated by the suprachiasmatic nucleus (SCN) located in the anterior hypothalamus in the brain. SCN is often referred to as the master circadian clock of the body because of its role in regulating all bodily functions related to circadian rhythms including core body temperature, cardio-pulmonary function, kidney, gastrointestinal, neurobehavioral function, and hormone secretion [24;25].

Melatonin production is very sensitive to the effect of light. Exposure to light at night, even in a short time with low light intensity, can cause melatonin production to decrease even fully depressed [26;27]. Experiments have been carried out using the Syrian hamster (Mesocricetus auratus) which is given a special treatment of light, to determine the role of melatonin in the production of cAMP and androgen biosynthesis. Melatonin through mel1a receptors found in Leydig cells can inhibit androgen production [7;28;29]. Androgen hormone is a crucial hormone in the pathogenesis of acne vulgaris, especially in adolescents. The term androgen means any steroid hormone that has a masculinizing effect, including testosterone, dihydrotestosterone (DHT), and androstenedione [30;31;32]. Androgens are mainly synthesized in testicular Leydig cells in men. In vivo androgens affect several functions of the human sebaceous gland, including proliferation, differentiation, and lipid synthesis [33;34]. The influence of the hormone melatonin on the synthesis of androgen hormones, it shows that melatonin can inhibit androgen production by decreasing the expression of Steroidogenic Acute Regulatory (StAR), P450 side-chain cleavage (P450 SCC), 3β-Hydroxysteroid Dehydrogenase (3β-HSD), and 17β-Hydroxysteroid Dehydrogenase (17β-HSD) which is a protein and steroidogenic enzyme that is important in the production of cAMP and androgens [35].

In individuals with acne, in general, the size of sebaceous follicles and the number of lobes per gland increases. Sebum excretion is under the control of androgen hormones. It is known that due to androgen hormone stimulation, sebaceous glands begin to develop at the age of 7-8 years. Androgen hormones play a role in the changes in sebocyte cells as well as follicular keratinocyte cells, causing microcytes and blackheads to develop into inflammatory lesions. The cells of the pilosebaceous follicle and keratinocyte have cellular mechanisms that are used to digest androgen hormones, namely 5-α-reductase (type 1) enzymes and 3β and 7β hydroxysteroid dehydrogenase which is found in basal cells that have not been differentiated. After the sebocyte cells differentiate then rupture and release sebum into the pilosebaceous duct. The process of differentiation of these sebocyte cells is triggered by androgen hormones which will bind to their receptors in the nucleus of the sebocyte cell, and then there will be stimulation of gene transcription and sebocyte differentiation. Increased activity of androgen hormones can increase sebum production by the sebaceous glands [36;37]. This excess sebum production causes imperfections and converts normal skin to oily and become nutrients for the bacterium Propionibacterium acnes. This bacterium has lipases that convert lipids to fatty acids, and produce proinflammatory mediators. This is what triggers acne [38].

Besides causing increased activity of androgen hormones, according to research by Heiskanen et al., Poor sleep quality can increase stress [39]. Increased proinflammatory cytokines in the body increase the tendency to produce inflammation. Acne vulgaris is

inflammation of the pores in the skin. This inflammation is triggered due to an increase in the number of cytokines in the body. Lack of sleep also causes insulin resistance to increase, thus forcing the body to produce more insulin. It also causes increased sebum production and inflammation which causes the potential for acne formation. [40] Stress is associated with increased sebaceous gland work, either directly or through stimulation of the pituitary gland. Increased sebum production is associated with an increase in free fatty acids. Free fatty acids can trigger inflammation which is one of the basic pathogenesis of acne [4;41]. As for poor sleep quality will cause a decrease in cortisol levels in the morning. Decreased cortisol levels that function to regulate gluconeogenesis and distribute eosinophils, basophils, monocytes, lymphocytes to the tissue cause increased stress and ease inflammation. Stress and inflammation easily trigger the pathogenesis of acne vulgaris [42].

Increased levels of androgen hormones are the main cause of acne vulgaris, the cause of the occurrence of acne vulgaris is multifactorial. Risk factors for acne vulgaris at puberty are increased levels of androgen hormones, cosmetic use, stress and unhealthy lifestyles [43;44]. Other factors that can influence acne vulgaris include genetic, racial, climate and environmental factors.4 For individuals who have acne vulgaris, it is best to avoid applying cosmetics and sunscreens containing oil in areas with acne, clean the face with warm water and soft face cloth (with a bar of mild soap if desired) to remove oil, if this makes the face feel oily, over-the-counter acne cleansers or cleansers containing salicylic acid, glycolic acid or benzoyl peroxide can help, avoid scrubs, toners and other cleansers abrasive to the skin. Avoid breaking or extracting acne by force because this can irritate inflamed lesions and is more likely to cause scarring. Avoid damp or hot areas and tight clothing in acne-prone areas. Follow a balanced or low-glycemic diet combined with regular exercise, and avoid smoking [45]. As well as to reduce the severity of acne vulgaris, sleep quality should also be improved by taking into account the factors that affect the quality of sleep, such as medications, lifestyle, sleep patterns, emotional stress, the environment, physical exercise, and food and calorie intake which enters the body.

IV. CONCLUSIONS

Based on the results of research on the relationship between sleep quality (X) with the severity of acne vulgaris (Y) it can be concluded that there is a significant relationship between the quality of sleep with the severity of acne vulgaris. For educational institutions, it is expected to be able to add books, magazines, or journals in libraries that contain information about sleep quality on the severity of acne vulgaris. For students of Medical Faculty *Universitas Kristen Indonesia*, it is better to pay more attention to the quality of their sleep, clean their face properly, and not break the zits by force. For further researchers, further research is needed and more in-depth, by adding more respondents to get the possibility of better results.

REFERENCES

[1] Williams, H. C., Dellavalle, R. P., & Garner, S. (2012). Acne vulgaris. *The Lancet*, *379*(9813), 361-372..

[2] Poli, F., Dreno, B., & Verschoore, M. (2001). An epidemiological study of acne in female adults: results of a survey conducted in France. *Journal of the European Academy of Dermatology and Venereology*, *15*(6), 541-545.

[3] Schäfer, T., Nienhaus, A., Vieluf, D., Berger, J., & Ring, J. (2001). Epidemiology of acne in the general population: the risk of smoking. *British journal of dermatology*, *145*(1).
[4] Ghodsi, S. Z., Orawa, H., & Zouboulis, C. C. (2009). Prevalence, severity, and severity risk factors of acne in high school pupils: a community-based study. *Journal of investigative Dermatology*, *129*(9), 2136-2141.
[5] Tasoula, E., Gregoriou, S., Chalikias, J., Lazarou, D., Danopoulou, I., Katsambas, A., & Rigopoulos, D. (2012). The impact of acne vulgaris on quality of life and psychic health in young adolescents in Greece: results of a population survey. *Anais brasileiros de dermatologia*, *87*(6), 862-869.
[6] Elsaie, M. L. (2016). Hormonal treatment of acne vulgaris: an update. *Clinical, cosmetic and investigational dermatology*, *9*, 241.
[7] Bhate, K., & Williams, H. C. (2013). Epidemiology of acne vulgaris. *British Journal of Dermatology*, *168*(3), 474-485.
[8] Miller, C. B., Kyle, S. D., Melehan, K. L., & Bartlett, D. J. (2015). Methodology for the assessment of sleep. In *Sleep and Affect* (pp. 65-90). Academic Press.
[9] Jung, J. Y., Yoon, M. Y., Min, S. U., Hong, J. S., Choi, Y. S., & Suh, D. H. (2010). The influence of dietary patterns on acne vulgaris in Koreans. *European Journal of Dermatology*, *20*(6), 768-772.
[10] Benham, G. (2010). Sleep: An important factor in stress-health models. *Stress and Health*, *26*(3), 204-214.
[11] Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry res*, *28*(2), 193-213.
[12] Ayer, J., & Burrows, N. (2006). Acne: more than skin deep. *Postgraduate medical journal*, *82*(970), 500-506..
[13] Frungieri, M. B., Mayerhofer, A., Zitta, K., Pignataro, O. P., Calandra, R. S., & Gonzalez-Calvar, S. I. (2005). Direct effect of melatonin on Syrian hamster testes: melatonin subtype 1a receptors, inhibition of androgen production, and interaction with the local corticotropin-releasing hormone system. *Endocrinology*, *146*(3), 1541-1552..
[14] Prasad, S. B. (2016). Acne vulgaris: A review on pathophysiology and treatment. *Asian J Pharm clin res*, *9*(4), 54-59..
[15] Ak, M. (2019). A Comprehensive Review of Acne Vulgaris. *J Clin Pharm*, *1*, 17-45.
[16] Dréno, B. (2017). What is new in the pathophysiology of acne, an overview. *Journal of the European Academy of Dermatology and Venereology*, *31*, 8-12..
[17] Do, J. E., Cho, S. M., In, S. I., Lim, K. Y., Lee, S., & Lee, E. S. (2009). Psychosocial aspects of acne vulgaris: a community-based study with Korean adolescents. *Annals of dermatology*, *21*(2), 125-129.
[18] Vgontzas, A. N., Zoumakis, E., Bixler, E. O., Lin, H. M., Follett, H., Kales, A., & Chrousos, G. P. (2004). Adverse effects of modest sleep restriction on sleepiness, performance, and inflammatory cytokines. *The Journal of Clinical Endocrinology & Metabolism*, *89*(5), 2119-2126.
[19] Porkka-Heiskanen, T., Zitting, K. M., & Wigren, H. K. (2013). Sleep, its regulation and possible mechanisms of sleep disturbances. *Acta physiologica*, *208*(4), 311-328.
[20] Perkins, A. C., Cheng, C. E., Hillebrand, G. G., Miyamoto, K., & Kimball, A. B. (2011). Comparison of the epidemiology of acne vulgaris among Caucasian, Asian, Continental

Indian and African American women. *Journal of the European Academy of Dermatology and Venereology*, *25*(9), 1054-1060.
[21] Zouboulis, C., Eady, A., Philpott, M., Goldsmith, L. A., Orfanos, C., Cunliffe, W. C., & Rosenfield, R. (2005). What is the pathogenesis of acne?. *Experimental dermatology*, *14*(2), 143-143.
[22] Yoshimura, K. (2008). Influence of Androgen on Acne. *Cosmetic Medicine in Japan*..
[23] Zouboulis, C. C. (2001). Is acne vulgaris a genuine inflammatory disease?. *Dermatology*, *203*(4), 277-279.
[24] Koutoukidis, G., Stainton, K., & Hughson, J. (2016). *Tabbner's Nursing Care: theory and practice*. Elsevier Health Sciences.
[25] Vilar, G. N., Santos, L. A. D., & Sobral Filho, J. F. (2015). Quality of life, self-esteem and psychosocial factors in adolescents with acne vulgaris. *Anais brasileiros de dermatologia*, *90*(5), 622-629.
[26] Tyas, E. H., & Naibaho, L. (2019, November). The urgency of entrepreneurship learning in the industrial age of 4.0. In *Journal of Physics: Conference Series* (Vol. 1387, No. 1, p. 012032). IOP Publishing.
[27] Tan, H. H., Tan, A. W. H., Barkham, T., Yan, X. Y., & Zhu, M. (2007). Community-based study of acne vulgaris in adolescents in Singapore. *British Journal of Dermatology*, *157*(3), 547-551.
[28] Gupta, A., Sharma, Y. K., Dash, K. N., Chaudhari, N. D., & Jethani, S. (2016). Quality of life in acne vulgaris: Relationship to clinical severity and demographic data. *Indian Journal of Dermatology, Venereology, and Leprology*, *82*(3), 292.
[29] Huang, X., Zhang, J., Li, J., Zhao, S., Xiao, Y., Huang, Y., ... & Kuang, Y. (2019). Daily intake of soft drinks and moderate-to-severe acne vulgaris in Chinese adolescents. *The Journal of pediatrics*, *204*, 256-262.
[30] Nadeak, B., Simanjuntak, D. R., Naibaho, L., Sormin, E., Juwita, C. P., & Pardede, S. O. (2019). Analysis of Nursing Quality Services. *Indian Journal of Public Health Research & Development*, *10*(6), 1380-1384.
[31] Cheng, C. E., Irwin, B., Mauriello, D., Liang, L., Pappert, A., & Kimball, A. B. (2010). Self-reported acne severity, treatment, and belief patterns across multiple racial and ethnic groups in adolescent students. *Pediatric dermatology*, *27*(5), 446-452.
[32] Yazmalar, L., Celepkolu, T., Batmaz, I., Sariyildiz, M. A., Sula, B., Alpayci, M., ... & Cevik, R. (2016). High frequency of fibromyalgia in patients with acne vulgaris. *Archives of rheumatology*, *31*(2), 170.
[33] Halvorsen, J. A., Vleugels, R. A., Bjertness, E., & Lien, L. (2012). A population-based study of acne and body mass index in adolescents. *Archives of dermatology*, *148*(1), 131-132.
[34] Wen, L., Jiang, G., Zhang, X., Lai, R., & Wen, X. (2015). Relationship between acne and psychological burden evaluated by ASLEC and HADS surveys in high school and college students from central China. *Cell biochemistry and biophysics*, *71*(2), 1083-1088.
[35] Su, P., Chen Wee Aw, D., Lee, S. H., & Han Sim Toh, M. P. (2015). Beliefs, perceptions and psychosocial impact of acne amongst Singaporean students in tertiary institutions. *JDDG: Journal der Deutschen Dermatologischen Gesellschaft*, *13*(3), 227-233.

[36] Gupta, M. A., Gupta, A. K., & Knapp, K. (2015). Dissatisfaction with cutaneous body image is directly correlated with insomnia severity: A prospective study in a non-clinical sample. *Journal of Dermatological Treatment*, *26*(2), 193-197.
[37] Nadeak, B., Iriani, U. E., Naibaho, L., Sormin, E., & Juwita, C. P. (2019). Building Employees' Mental Health: The Correlation between Transactional Leadership and Training Program with Employees' Work Motivation at XWJ Factory. *Indian Journal of Public Health Research & Development*, *10*(6), 1373-1379.
[38] Eyüboglu, M., Kalay, I., & Eyüboglu, D. (2018). Evaluation of adolescents diagnosed with acne vulgaris for quality of life and psychosocial challenges. *Indian journal of dermatology*, *63*(2), 131.
[39] Tuchayi, S. M., Makrantonaki, E., Ganceviciene, R., Dessinioti, C., Feldman, S. R., & Zouboulis, C. C. (2015). Acne vulgaris. *Nature reviews Disease primers*, *1*(1), 1-20.
[40] Tyas, E. H., & Sunarto, L. N. (2020). Building Superior Human Resources through Character Education.
[41] Sharma, R. K., Dogra, S., Singh, A., & Kanwar, A. J. (2017). Epidemiological patterns of acne vulgaris among adolescents in North India: A cross-sectional study and brief review of literature. *Indian Journal of Paediatric Dermatology*, *18*(3), 196.
[42] Ab Hadi, H., & Awadh, A. (2015). Study of psychological stress and acne vulgaris among pharmacy students. *Value in Health*, *18*(3), A179-A180.
[43] Nadeak, B., Naibaho, L., Sormin, E., & Juwita, C. P. (2019). Healthy Work Culture Stimulate Performance. *Indian Journal of Public Health Research & Development*, *10*(6), 1385-1389.
[44] Schrom, K. P., Ahsanuddin, S., Baechtold, M., Tripathi, R., Ramser, A., & Baron, E. (2019). Acne Severity and Sleep Quality in Adults. *Clocks & Sleep*, *1*(4), 510-516.

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