

Positive correlation of psoriasis vulgaris severity and HOMA-IR



Made Wardhana^{1,2*}, Made Swastika Adiguna^{1,2}, Putu Ayu Diah Nareswari^{1,3}

ABSTRACT

Background: Psoriasis vulgaris is a chronic inflammatory skin disease that its aetiology is still not completely known. A chronic inflammation in psoriasis can cause organ dysfunctions. Elevation of proinflammatory cytokines gives rise to insulin resistance by inhibiting insulin and glucose transport mechanism signals. Insulin resistance is the underlying pathogenesis of metabolic syndrome.

Objective: This study aimed to understand any correlation in the severity of psoriasis vulgaris with HOMA-IR.

Methods: A cross sectional research involving 35 subjects with psoriasis vulgaris and 15 subjects without who met the selection criteria. HOMA-IR is a formula used to measure insulin resistance which calculates the fasting insulin value in $\mu\text{U/ml}$ x fasting glucose in $\text{mg/dL}/405$ taken from the blood veins of subjects. PASI score was

used to determine psoriasis vulgaris severity.

Results: This study shows that the HOMA-IR median value was higher in psoriasis subject than the subjects without psoriasis ($p < 0.05$). The correlation analysis shows a moderate positive correlation between psoriasis vulgaris severity and HOMA-IR ($r = 0.427$; $p < 0.05$). The prevalence ratio was 8.57, which means psoriasis vulgaris subjects were 8.57 times more likely to have HOMA-IR compared to those without psoriasis vulgaris ($p < 0.05$; 95%CI: 1.26-58.1).

Conclusion: This study concludes that there is a moderate positive correlation between severity of psoriasis vulgaris and HOMA-IR values.

Keywords: psoriasis vulgaris, insulin resistance, HOMA-IR.

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¹Department of Dermatology and Venereology, Medical Faculty of Universitas Udayana, Bali, Indonesia

²Department of Dermatology and Venereology, Sanglah General Hospital, Denpasar, Bali, Indonesia

³Program of Biomedical Master Science Study, Medical Faculty of Universitas Udayana

*Corresponding to:
Made Wardhana
Dermatology and Venereology
Departement, Faculty of Medicine,
Universitas Udayana/Sanglah
General Hospital Denpasar, Bali,
Indonesia
wardhanamade@unud.ac.id

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INTRODUCTION

Psoriasis vulgaris remains a complex and not fully understood disease. The pathophysiology involves numerous factors which include genetic, biochemical, immunologic, and vascular factors. Combination of these factors can lead to epidermal hyperproliferation, abnormal keratinocyte differentiation, angiogenesis, and excessive T helper (Th) 1 inflammatory cell response, which are the main characteristics of Psoriasis.^{1,2} In the recent years, a significant amount of research has shown that psoriasis vulgaris can give rise to other comorbid which can increase both morbidity and mortality rates of the patients.³ One example of the comorbid is insulin resistance. Insulin resistance is defined as the inability of both endogenous and exogenous insulins to increase uptake and usage of glucose in an individual, compared with normal population.⁴ Insulin resistance can lead to metabolic syndrome. Insulin resistance can be measured with homeostasis model assessment of insulin resistance (HOMA-IR). This method is commonly used due to its simplicity, high-correlation, popularity in epidemiological studies, and the ability to measure

insulin and fasting plasma glucose levels.^{5,6} Recently there are not many studies evaluate the correlation between HOMA-IR and psoriasis vulgaris severity. This study aimed to analyze the correlation between psoriasis vulgaris severity and HOMA-IR.

MATERIALS AND METHODS

This research used the design of a cross sectional research with the aim of understanding the differences of HOMA-IR levels between subjects with and without psoriasis vulgaris. This research was conducted at the Outpatient Clinic of Dermatology and Venereology of Sanglah General Hospital between January to March 2018. HOMA-IR level measurements were taken at the Sanglah General Hospital Clinical Pathology Laboratory. Subjects were taken using the consecutive sampling technique from reachable population. Both existing and newly diagnosed patients with psoriasis vulgaris on exacerbation and met the criteria for psoriasis vulgaris clinical diagnosis that went to the outpatient clinic during the research period are used as samples. Certain groups of patients were excluded from this study including patients who

received medications that interfere metabolism of insulin; patients who utilized corticosteroids one month preceding the research and patients with other underlying diseases or special conditions such as pregnancy, obesity, and diabetes mellitus. Psoriasis vulgaris severity was measured with PASI (psoriasis area and severity index) score. HOMA-IR is used to calculate insulin resistance levels using the formula of fasting insulin level ($\mu\text{U/ml}$) x fasting glucose level (mg/dL)/405 in plasma. Results of 2.5 and above indicate insulin resistance.

The required data was collected using interview, physical examination, and blood sample withdrawal. Questionnaires used for the interview were designed to obtain demographical information of research samples. Data collected was checked, coded, processed and analysed using

computer software. Statistical Package for Social Sciences (SPSS) program version 20.0 was used for statistical analysis. Protocols of the research for ethical clearance was granted by the Research Ethical Committee of Universitas Udayana Medical Faculty/Sanglah General Hospital before the research was conducted.

RESULTS

The research involves 50 subjects, consisted of 35 psoriasis vulgaris subjects and 15 non psoriasis vulgaris subjects. Research subjects characteristics are listed in the Table 1.

This research shows that there is a HOMA-IR median difference between subjects with and without psoriasis vulgaris. The HOMA-IR median level for subjects with psoriasis vulgaris was 2.57 with the interquartile range (IQR) of 1.52. On the other hand, the HOMA-IR median level for subjects without psoriasis vulgaris was 1.38 with IQR of 0.45. Based on Mann-Whitney test, p-value was 0.005 which indicates that the HOMA-IR levels of subjects with and without psoriasis vulgaris are significantly different (Table 2).

The Spearman correlation test was used to understand the correlation between psoriasis vulgaris severity index with HOMA-IR values. Results show that there is a moderately positive correlation between severity of psoriasis vulgaris and HOMA-IR values ($r = 0.427$; $p < 0.05$) which presented in Table 3.

Results show a beta (β) regression coefficient value of 0.053 which indicates there is a significant relationship between psoriasis vulgaris severity index with HOMA-IR values. Determination coefficient (R^2) of 0.133 by psoriasis vulgaris severity index was proven to significantly alter HOMA-IR values as far as 13.3% ($p < 0.05$; 95%CI: 0.014-0.093) (Table 4). Total 20 (57.1%) of the subjects with psoriasis vulgaris had high values of HOMA-IR. Meanwhile, 1 (6.7%) of the subjects without psoriasis vulgaris had high values of HOMA-IR with PR = 8.57 (95%CI: 1.26-58.1, $p = 0.001$). This Chi-square test shows that psoriasis vulgaris severity index increases the risk of increase of HOMA-IR values by 8.57 times (Table 5).

DISCUSSION

On this study, the distribution of psoriasis vulgaris based on sex was 25 (71.4%) male and 10 (28.6%) female. A research conducted by Coimbra *et al.* (2011) in Portugal also shows similar results where among 73 psoriasis vulgaris patients, 40 of them were male and 33 were female.⁷

Based on age distribution of this study, psoriasis

Table 1 Characteristics of research subjects

Characteristics	With psoriasis vulgaris n=35 (%)	Without psoriasis vulgaris n=15 (%)
Sex		
Male	25 (71.4)	8 (53.3)
Female	10 (28.6)	7 (46.7)
Age		
15-20 years old	0 (0)	0 (0)
21-30 years old	2 (5.7)	6 (40.0)
31-40 years old	10 (28.6)	2 (13.3)
41-50 years old	6 (17.1)	5 (33.3)
51-60 years old	13 (37.1)	2 (13.3)
61-65 years old	4 (11.4)	0 (0)
Mean $\pm$ SD	47.1 $\pm$ 10.7	37.9 $\pm$ 10.6
Body mass index (BMI)		
Underweight (<18.5)	5 (14.3)	3 (20)
Normal (18.5-22.9)	24 (68.6)	10 (66.7)
Overweight (23-24.9)	6 (17.1)	2 (13.3)
Obese I (25-29.9)	0 (0)	0 (0)
Obese II (≥ 30)	0 (0)	0 (0)
Mean $\pm$ SD	20.5 $\pm$ 2.2	20.7 $\pm$ 2.4
Psoriasis vulgaris severity		
Low (< 7)	17 (48.6)	N/A
Moderate (7-12)	12 (34.3)	N/A
Severe (>12)	6 (17.1)	N/A

Table 2 HOMA-IR difference between subjects with and without psoriasis vulgaris

Variable	With psoriasis vulgaris n=35	Without psoriasis vulgaris n=15	p-value
HOMA-IR	2.57 (1.52)	1.38 (0.45)	0.005*
Median (IQR)			

*p-value is significance if < 0.05 ; IQR: interquartile range

Table 3 Correlation between psoriasis vulgaris severity index and HOMA-IR value analysis result

Variable	r	p-value
PASI with HOMA-IR values	0.427	0.002*

r: correlation coefficient; *p-value is significance if < 0.05

Table 4 Linear regression analysis of psoriasis vulgaris severity index with HOMA-IR values

Variable	B	95% CI	p-value	R ²
HOMA-IR	0.053	0.014-0.093	0.009*	0.133

β: beta coefficient; CI: confidence interval; *p-value is significant if <0.05; R²: determination coefficient

Table 5 HOMA-IR analysis with psoriasis and non psoriasis subjects

Subjects	HOMA-IR		PR	95% CI	p-value
	High (%)	Normal (%)			
With psoriasis vulgaris	20 (57.1%)	15 (42.9%)	8.57	1.26-58.1	0.001*
Without psoriasis vulgaris	1 (6.7%)	14 (93.3%)			

*p-value is significance if <0.05; PR: prevalence ratio; CI: confidence interval

vulgaris was mostly found in the 51-60 years old group, with the total of 13 patients (37.1%) with the mean age of 47.1±10.7. The youngest sample with psoriasis vulgaris was 23 years old and the oldest was 65 years old. A study conducted by Brauchii *et al.* (2008) shows that the age distribution of psoriasis vulgaris patients was mostly found in the 30-59 years old group.⁸ Another study by Sinniah *et al.* (2010) in Malaysia show that psoriasis vulgaris was mostly found in the 40-60 years old group.⁹

Based on the severity index, this study shows that most of the cases found were low severity psoriasis vulgaris with total number of 17 (48.6%) patients, followed by moderate severity psoriasis vulgaris with number of 12 (34.3%) patients, then severe psoriasis vulgaris with the number of 6 (17.1%) patients. These results are supported with the similar results found in the past studies. Research conducted by Setyorini *et al.* (2012) in Jakarta shows that most of the cases found were low severity psoriasis vulgaris (40%), moderate (37.5%), and severe (22.5%).¹⁰ Similar study conducted by Huerta *et al.* (2007) states that most of the cases were low severity psoriasis vulgaris which make up to 45% of the

samples.¹¹ On the other hand, a study done by Pujol *et al.* (2013) in Spain shows that 40.4% out of 1217 samples were moderate severity psoriasis vulgaris.¹² This difference in results is caused by the severity of psoriasis vulgaris were affected by several factors, such as local, systemic, and genetic factors. Due to social, physical, and psychological problem caused by psoriasis vulgaris, most patients are reluctant to seek for treatment. This may be the cause why low severity psoriasis vulgaris was more frequently to be found on this study.

This current study presented significance HOMA-IR median levels difference between subjects with and without psoriasis vulgaris (p<0.05). The HOMA-IR median level of subjects with psoriasis vulgaris was 2.57 with the IQR of 1.52, while the HOMA-IR median level of subjects without psoriasis vulgaris was 1.38 with IQR of 0.45. This result gives answer to the hypothesis of the study in which states that HOMA-IR value in patients with psoriasis vulgaris is significantly higher than in patients without psoriasis vulgaris.

Normal HOMA-IR value was 2.12 found in this study. This number was found by calculating the cutoff point of all research samples. Thus, HOMA-IR value ≥ 2.5 indicates an elevation. Chi-square test was used to comprehend whether psoriasis vulgaris affects the risk of HOMA-IR value elevation. Based on the analysis results, psoriasis vulgaris subjects had an increased risk of HOMA-IR value elevation of 8.57 times. Significantly high HOMA-IR value compared between subjects with and without psoriasis vulgaris is also related to chronic inflammation as the underlying pathogenesis.¹³

This study presented positive correlation among psoriasis vulgaris severity index and HOMA-IR value (r=0.427; p<0.05). This result gives answer to the study hypothesis in which there is a significantly positive correlation between psoriasis vulgaris severity index and HOMA-IR values. Linear regression analysis was done to test the effects of psoriasis vulgaris severity to HOMA-IR values. Regression coefficient was found to be 0.053; determination coefficient was 13.3% and p value <0.05 shows that the 13.3% of psoriasis vulgaris severity alters HOMA-IR values, while 86.7% was due to other factors. These other factors include genetic predisposition, obesity, daily physical activities, and food intake to increase HOMA-IR values.¹⁴ Another research is suggested to prove cause-effect relationship of psoriasis vulgaris severity index and HOMA-IR value elevation through a case control study.

CONCLUSION

HOMA-IR in subject with psoriasis vulgaris were

higher compared to subjects without the disease. Psoriasis vulgaris severity index was moderately positively correlated to HOMA-IR values.

ETHICAL CLEARANCE

Study approval was stated by Faculty of Medicine, Universitas Udayana Research Ethic Commission with the registered code: 2301/UN.14.2/KEP/2017.

CONFLICT OF INTEREST

None.

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AUTHOR CONTRIBUTION

Authors participated and contributed in every aspects of this study.

REFERENCES

1. Azfar RS, Gelfand GM. Psoriasis and Metabolic Disease: Epidemiology and Pathophysiology. *Curr Opin Rheumatol*. 2008;20(4):416–422.
2. Adiguna MS, Wardhana M, Rahardjo FN. The positive correlation between psoriasis vulgaris severity degree with HbA1C level. *Bali Dermatology and Venereology Journal*. 2018;1(2):28–31.
3. Fitzgerald R, Sadlier M, Connolly M, Tobin AM. Psoriasis and Insulin Resistance: A Review. *J Diabet Res & Clin Metab*. 2014;1–5.
4. Fu Z, Gilbert ER, Liu D. Regulation of Insulin Synthesis and Secretion and Pancreatic Beta Cell Dysfunction in Diabetes. *Curr Diabetes Rev*. 2013;9(1):25–53.
5. Lestari, WAA. Resistensi Insulin: Definisi, Mekanisme dan Pemeriksaan Laboratoriumnya. *Buku Ilmiah Clinical Pathology Update on SURAMADE 1*. Surabaya. 2011. (Indonesian)
6. Napolitano M, Megna M, Monfrecola G. Insulin Resistance and Skin Diseases. *The Scientific World Journal*. 2015;p.1–11.
7. Coimbra S, Figueiredo A, Castro E, Rocha-Pereira P, Santos-Silva A. The role of cells and cytokines in the pathogenesis of psoriasis. *International Journal of Dermatology*. 2012;51:389–398.
8. Brauchli YB, Jick SS, Meier CR. Psoriasis and the risk of incident diabetes mellitus: a population-based study. *Br J Dermatol*. 2008; 159: 1331–7.
9. Sinniah B, Saraswathy DS, Prashant BS. Epidemiology of psoriasis in Malaysia: a hospital based study. *Med J Malaysia*. 2010;65(2):112–4.
10. Setyorini M, Triestianawati W, Wiryadi BE, Jacoeb TN. Proporsi sindrom metabolik pada pasien psoriasis vulgaris berdasarkan kriteria national cholesterol education program adult treatment panel III di Rumah Sakit Dr Cipto Mangunkusumo dan sebuah klinik swasta di Jakarta. *MDVI*. 2012;39(1): 2–9. (Indonesian)
11. Huerta C, Rivero E, Rodriguez LA. Incidence and risk factors for psoriasis in the general population. *Arch Dermatol*. 2007;143(12):1559–65.
12. Pujol RM, Puig L, Dauden E, Carazo S, Toribo J, Vanaclocha F, Yebenes M, Sabater E, Casado MA, Caloto MT. Mental health self-assessment in patient with moderate to severe psoriasis: An observational, multicenter study of 1164 patients in Spain (the VACAP study). 2013. *Actas Dermatosifiliogr*. 2013;100(10):1–7.
13. Gerkowicz A, Pietrzak A, Szepletowski JC, Radej S, Chodorowska G. Biochemical Markers of Psoriasis as a Metabolic Disease. *Folia Histochemica et Cytobiologica*. 2012;50(2):155–170.
14. Aruna C, Rao V, Ramanamurthy P, Rambabu P. Prevalence of metabolic syndrome in patients with psoriasis: a hospital-based case control study from a tertiary care centre in Andhra Pradesh. *NTR Univ Health Sci*. 2016;5:13–6.



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