

Relationship between severity of psoriasis vulgaris based on Psoriasis Area And Severity Index (PASI) scores and depression

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Abstract

Background Psoriasis vulgaris is a chronic inflammatory disease that attacks the skin and can manifest systemically. Psoriasis vulgaris patients usually have physical disabilities, social discomfort and psychological disorders. The psoriasis vulgaris patients have higher psychological comorbidities such as anxiety, depression and suicidal idea compared to the general population, by 40-90%.

Objective To determine the relationship between psoriasis disease severity is based on PASI scores and depression.

Methods An observational analytic study conducted on the psoriasis vulgaris patients at Dermatology and Venereology Department, Dr. Moewardi hospital in March-April 2022. Data collection and statistical analysis were carried out afterwards. All data were statistically analyzed using SPSS version 22 with Spearman rank test and p value <0.05 was considered to have a significant relationship.

Results Most of the research subjects had mild PASI score of 54.2% and mild depression of 58.3%. The results of statistical tests showed significant relationship ($p = 0.010$) and moderate relationship ($r = 0.513$) between the psoriasis vulgaris severities based on the PASI score with depression.

Conclusion The psoriasis vulgaris increases risk of depression. Higher severity of psoriasis vulgaris indicates higher depression behaviour. The psoriasis vulgaris and the depression are two-way relationship because the psoriasis vulgaris will stimulate the production of proinflammatory cytokines that trigger depression, while depression increases stress hormones due to the severity of psoriasis vulgaris.

Key words

Beck Depression Inventory, depression, psoriasis vulgaris, psoriasis area and severity index.

Introduction

Psoriasis vulgaris is a chronic inflammatory skin disease that generally onset starting at the age of

<40 years and most affects prone body parts to trauma such as elbow, head, hand, foot and joints with clinical symptoms of itching, irritation, burning and pain.¹ Psoriasis vulgaris pathogenesis is very complex and unknown exactly. Dendritic cell, keratinocyte, T cell, macrophage and cytokine play a role in the psoriasis vulgaris pathogenesis to activate myeloid dendritic cell, keratinocyte proliferation, angiogenic mediator expression,

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endothelial adhesion molecule and immune cell infiltration into the skin.²

The globally psoriasis vulgaris prevalence is 1-3% on the average of the total population.³ Research conducted by Prakoeswa et al stated that the psoriasis vulgaris prevalence in general hospital Dr. Soetomo Surabaya was 98.1% aged >18 years with 28.8% of stress as the trigger factor.⁴ Psoriasis vulgaris severity was measured using the area Psoriasis score and Severity Index (PASI) with score range among 0-72 and divided into three categories, namely mild, moderate and severe.⁵

Psoriasis vulgaris patients have higher psychological comorbidities compared to the general population, 40-90%.⁶ Research conducted by Charite et al showed the depression prevalence in the psoriasis vulgaris patients was 28%.⁷ Physical disability, social discomfort, psychological disorder, social anxiety are able to cause social life conflict causing self-isolation and depression and associated with the psoriasis vulgaris severity.⁸ The fifth edition of the Diagnostic and Statistical Manual of Mental disorder (DSM) included the presence of ≥ 5 symptoms, including mood depression, sadness, emptiness, suicidal idea, and loss and interest decrease in doing daily activities for 2 weeks continuously. Depression is divided into three categories, namely mild, moderate and severe.⁹ The Beck Depression Inventory (BDI) is a screening method that describes depression with 21 questions based on their feeling during the last two weeks and the score range is 0-63, divided into four categories, including undepressed, mild depression, moderate and severe.¹⁰

This study aims to determine the relationship between the psoriasis vulgaris severities based on the PASI score with the depression so that it can be prevention effort and multidisciplinary

management to reduce recurrence in the psoriasis vulgaris patients.

Methods

This research is an observational analytic study using a cross-sectional design conducted at General hospital Dr. Moewardi Surakarta from March to April 2022. The research data used primary data of psoriasis vulgaris patients assessed by PASI and BDI scores. PASI scores were divided into mild grade psoriasis vulgaris (PASI score <10), moderate grade (PASI score 10-20) and severe grade (PASI score 20). The depression symptoms were measured using the BDI questionnaire. The BDI score interpretation is mild depression (score 14-19), moderate depression (score 20-28) and major depression (score 29-63). The inclusion criteria in this study were the psoriasis vulgaris patients visiting the Dermatology and Venereology Department from March-April 2022, aged >18 years and the agreeable patients to sign the informed consent. The exclusion criteria were the patients having diabetes mellitus history, heart disease and malignancy and the patients having been diagnosed with depression or taking antidepressant drugs. This study used the Spearman rank test to determine the relationship between the psoriasis vulgaris severity and the depression. The data was analyzed using SPSS 21 version (IBM corporation) with significant value of $p < 0.05$.

Result

This study involved 24 subjects of the psoriasis vulgaris patients by taking data in the form of PASI score and BDI questionnaire. We assessed the respondent by age gender, disease duration, PASI and BDI scores. **Table 1** shows 14 male subjects (58.3%) and 10 female subjects (41.7%). The mean age was 48.17 ± 12.14 years and the median age was 49.00 (21.00-68.00)

Table 1 The data characteristic of the research result.

<i>Data Characteristic</i>	<i>Result</i>
Sex	
Male	14 (58.3%)
Female	10 (41.7%)
Age	
Mean±Sd	48.17±12.14
Median (Min Max)	49.00 (21.00-68.00)
Illness Duration	
Mean±Sd	8.58±7.60
Median (Min Max)	7.00 (1.00-30.00)
PASI Score	
Mean±Sd	10.42±7.08
Median (Min Max)	8.60 (0.90-27.20)
Mild (PASI < 10)	13 (54.2%)
Moderate (PASI 10-20)	8 (33.3%)
Severe (PASI > 20)	3 (12.5%)
BDI Score (Depression)	
Mean±Sd	19.08±9.49
Median (Min Max)	18.00 (9.00-49.00)
Mild (skor 14-19)	14 (58.3%)
Moderate (skor 20-28)	8 (33.3%)
Severe (skor 29-63)	2 (8.3%)

Note: Mean= middle value; Sd= The standart of the deviation; Min= minimal; Max= maximal; Median= Middle value; BDI= *Beck depression inventory*; PASI= *Psoriasis area and severity index*.

years. The mean duration of illness was 8.58±7.60 years. The mean PASI score was 10.42±7.08. The psoriasis vulgaris severity included the mild degree of 13 subjects (54.2%), the moderate degree of 8 subjects (33.3%) and the severe degree of 3 subjects (12.5%). The average BDI score was 19.08±9.49 and the mild depression subjects were 14 subjects (58.3%), 8 moderate depression subjects (33.3%) and 2 severe depression subjects (8.3%).

The relationship between the psoriasis vulgaris severities to depression was analyzed using the Spearman rank correlation test. Statistical test

result was obtained value of $r=0.513$ and p value=0.010 showing significant relationship between the psoriasis vulgaris severities to the moderate depression relationship ($r=0.400-0.599$). Most of the mild grade psoriasis vulgaris subjects experienced mild depression were 10 subjects (76.9%), moderate grade psoriasis vulgaris subjects also experienced mild depression were 4 subjects (50.0%), while severe severe psoriasis vulgaris subjects experienced severe depression were 2 subjects (66.7%). This shows that the more severe the psoriasis vulgaris severity is, the more severe the depression is (**Table 2**).

Discussion

Psoriasis vulgaris is a chronic erythrosquamous disease requiring long-term treatment. The psoriasis vulgaris has characteristics of well-defined erythematous plaques, generally symmetrical with micaceous scales. Active lesion may be itchy or painful.¹¹ The psoriasis vulgaris is an inflammatory disease mediated immune complex including the interaction between T cells and Human Leukocyte Antigen (HLA) class 1 at the PSORS1 gene locus. One of the HLA class 1 serotypes is HLA-Cw6 in associated with family history of similar disease, severe plaque psoriasis lesion, comorbid diseases such as diabetes mellitus (DM), hypertension and obesity.¹²

The subject characteristics in this study are described in **Table 1**, the number of male subjects is 58.3% more than female subjects 41.7% with the average age of the 48 year-old

Table 2 The relationship between the psoriasis vulgaris severities to depression.

<i>Variable</i>	<i>Depression (BDI)</i>			<i>r</i>	<i>p</i>
	<i>Mild</i>	<i>Moderate</i>	<i>Severe</i>		
PASI score				0.513	0.010
Mild	10 (76.9%)	3 (23.1%)	0 (0.0%)		
Moderate	4 (50.0%)	3 (37.5%)	1 (12.5%)		
Severe	0 (0.0%)	2 (66.7%)	1 (33.3%)		

Note: PASI= *Psoriasis area and severity index*; BDI= *Beck depression inventory*; r = Spearman correlation coefficient; p = significance value.

research subjects. The results of this study are in accordance with the research of Jensen et al stating that the average age of the psoriasis vulgaris was 44 years with more male subjects, 50.6%.¹³ The research of Springate et al showed that the age of the psoriasis vulgaris onset was divided into two, early and late. The early onset psoriasis vulgaris generally affects patients aged <40 years and the higher incidence in women, while advanced psoriasis vulgaris affects patients aged >40 years.¹⁴ The research of Bayaraa et al showed the psoriasis vulgaris often affected men more than women in the 2:1 ratio and the onset age in women was generally early while late in men. This is because women have habit of smoking and drinking alcohol less compared with men associating with free radical exposure and suffering more comorbid diseases such as diabetes, hypertension, cardiovascular disease, thereby increasing the risk of psoriasis vulgaris.¹⁵

The influencing factors of depression etiology include genetic factors, social factors, health status and comorbid illness duration. Individuals have double of the depression risk if one of their family has depression history and four times of the risk if both parents suffer depression. Social factors influencing depression are family social status, parental separation, divorce, lifestyle and parental marital status.⁹ The age also affects depression, namely adolescent and adult are more affected by depression with the highest prevalence in young adults, 18-44 years old. Psychological factors such as mindset, closed personality, self-concept and negative thought patterns increase the depression risk in the individuals.⁹ The research conducted by Derry stated that women experienced depression more because the level of inflammatory mediators and the autoimmune disease risk in women were higher than that in the men.¹⁶

The average psoriasis vulgaris duration in this

study was 8 years. This is in accordance with the study conducted by Jagtiani et al showed that there was relationship between illness duration and depression and the average psoriasis vulgaris duration increasing the depression risk was 64 months.¹⁷ The research by Jensen et al stated that the average psoriasis vulgaris disease duration increasing the depression risk was 8.3 years.¹³ This is because the long disease duration will increase psychological stress, so that it causes negative feeling and reduce self-acceptance of the disease.¹⁸ Chronic diseases such as psoriasis vulgaris causes self-confidence and self-esteem loss and depression caused by emotional stress due to life change. The poor adjustment strategy to an event increases the depression risk.

The depression causes the increase of proinflammatory cytokine production such as IL-1 β , TNF- α and C-reactive protein (CRP) so that it will have an effect on the metabolism of several neurotransmitters such as dopamine, serotonin and glutamate and influence neuroendocrine function resulting in neurotoxicity and neuronal apoptosis. The depression mechanism in the patients with chronic inflammation such as psoriasis vulgaris is by hyperactivity of the hypothalamus pituitary axis (HPA) causing the release and increase of ocorticotropin releasing hormone (CRH) level, adenocorticotopic hormone (ACTH), cortisol, nuclear factor transcription stimulation (Nf) - κ B and proinflammatory cytokine in the skin. The proinflammatory cytokine such as IL-6 and IL-11 is stimulated by CRH and causing the intracellular adhesion molecule expression (ICAM)-1 on keratinocytes, thereby causing immune cell migration and facilitating immune response. The depression also causes cortisol receptor dysfunction such as mineralocorticoids and glucocorticoids, thereby decreasing the HPA axis sensitivity and the cortisol anti-inflammatory effect.¹⁹

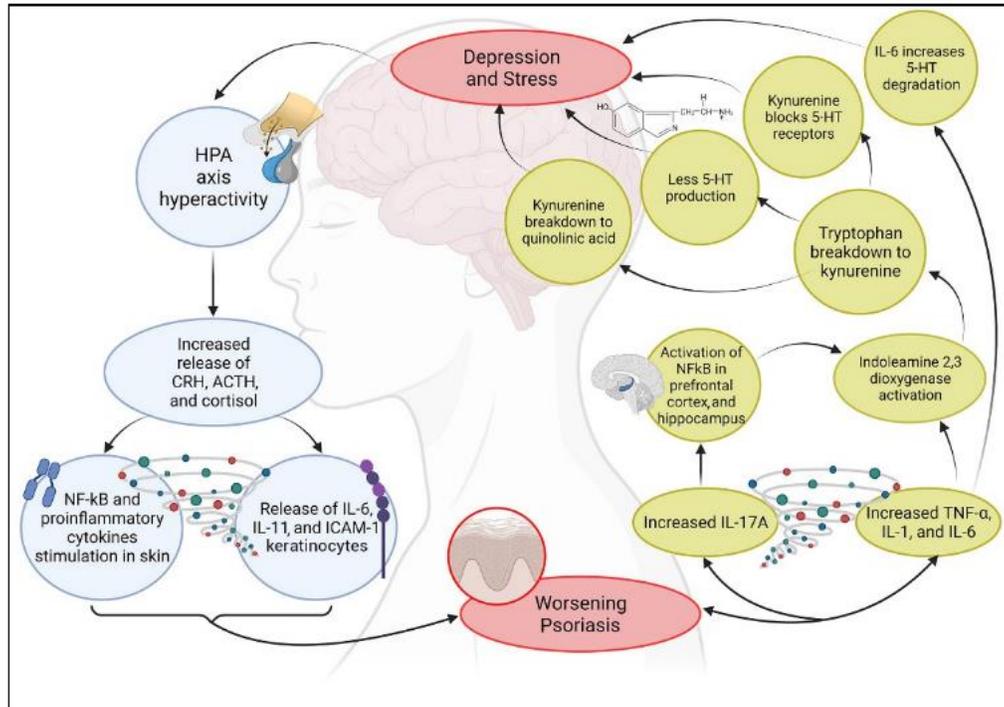


Figure 1 Relationship between psoriasis and depression.[19]

The psychological stress affects the immune response activity by increasing the proinflammatory cytokine cascade. The proinflammatory cytokine causes HPA axis hyperactivity and interferes the negative feedback inhibition to circulating corticosteroids so that it reduces the neurotransmitter serotonin level. Two types of stress neurotransmitters are associated with psoriasis vulgaris, namely serotonin and dopamine (DOPA). Serotonin is a potent neurotransmitter in the nervous, immune and endocrine systems. Low serotonin level can increase several inflammatory mediator productions such as TNF- α , IL-1 β and IL-17A. Inflammation also activates tryptophan, a serotonin precursor that induces depressive symptoms. Interleukin 6 will also increase the serotonin degradation so that it will increase the depression symptoms (**Figure 1**).^{19, 20}

The relationship between the psoriasis vulgaris severity and the depression is showing significant result. The average of PASI score

and BDI score in this study was 10.42 and 19.08 indicating that the average patients have severe psoriasis vulgaris and moderate depression. The results of this study are in accordance with the study of Bakaar et al showing that 8.5% of psoriasis vulgaris patients had suffering risk from depression and they were suggested screening especially in the psoriasis vulgaris patients with low life quality.⁶ Lakuta et al also stated that the relationship between the psoriasis vulgaris and the depression was the multifactorial combination of genetic predisposition, cytokine dysfunction and psychosocial risk factor.²¹ The research conducted by Nishal et al also stated that the depression was 26.8% of psoriasis vulgaris patients and showed the significant relationship between the psoriasis vulgaris severity and the depression.¹⁷ The research conducted by Tian et al stated that moderate to severe psoriasis vulgaris patients had high BDI and anxiety score.¹⁸ The research of Tohid et al stated that the psoriasis vulgaris severity was associated

Table 3 Inflammatory mediator in the psoriasis vulgaris and the depression.[2]

Inflammatory Mediator	Psoriasis vulgaris level	Depression level
IL-1 β , IL-2, IL-6, TNF- α , IFN- γ	Increase	Increase
Melatonin level	Decrease	Decrease
CRP	Increase	Increase
Brain derived neutrophilic factor	Decrease	Decrease
CXCL-10	Increase	Increase
Serotonin	Increase	Increase
Limfosit CD2, CD4, CD8	Increase	Increase
CD4/CD8 ratio	Increase	Increase
E2 Prostaglandin	Increase	Increase

Note: CRP: C-reactive protein, CXCL: chemokine ligand; CD: cluster of differentiation; IL: interleukin; TNF: tumor necrosis factor; IFN: interferon.

with the proinflammatory cytokine increase inducing abnormal behavioral pattern such as depression.²⁰

The inflammatory markers playing role in the pathogenesis of the psoriasis vulgaris and depression include IL-1 β , IL-2, IL-6, IL-10, IL-13, IL-17, IL-23, TNF- α , interferon (IFN)- γ mediated by Th1 and Th17 lymphocytes. The proinflammatory cytokine production is also associated with the HPA axis hyperreactivity, increasing serotonin and decreasing serotonergic neurotransmitters (Table 3).²²

The limitation of this study includes single center research, small sample size and limited research time and cannot show how much the psoriasis vulgaris severity can increase the depression risk so that the further research is still needed.

Conclusion

This study showed that there was significant relationship between the psoriasis vulgaris severities assessed by the PASI score and depression based on BDI score with p value = 0.010 and the relationship was moderate, r = 0.513. The psoriasis vulgaris and the depression are two-way relationship because the psoriasis vulgaris will stimulate the proinflammatory cytokine production increase so that it triggers the depression, while the depression triggers

stress hormone increase and the psoriasis vulgaris severity.

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