e-ISSN: 2986-9838

Sriwijaya Journal of Obstetrics and Gynecology (SJOG)

Journal website: https://phlox.or.id/index.php/sjog

Pruritic Urticarial Papules and Plaques of Pregnancy (PUPPP) in Jakarta, Indonesia: A Comprehensive Assessment of Clinical Features, Risk Factors, and Management Outcomes

Rini Kuswohadi Pramono[1], Felicia Sari[1*], Muhammad Yusuf[2], Nadia Khoirina[1]

[1]Department of Dermatology and Venereology, Phlox Institute, Palembang, Indonesia

[2]Department of Dermatology and Venereology, Jayapura General Hospital, Jayapura, Indonesia

ARTICLE INFO

Keywords:
Gestational weight gain
Papules
Plaques
Pregnancy dermatoses
Pruritus

***Corresponding author:**
Felicia Sari

E-mail address:
felicia.sari@phlox.or.id

All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.59345/sjog.v2i2.179

A B S T R A C T

Introduction: Pruritic urticarial papules and plaques of pregnancy (PUPPP), also known as polymorphic eruption of pregnancy (PEP), is a common, self-limiting dermatosis of pregnancy. However, its specific characteristics and management outcomes in Indonesia, a diverse and populous nation, remain understudied. This study aimed to comprehensively assess the clinical features, risk factors, and management outcomes of PUPPP in an Indonesian population. **Methods:** A retrospective cohort study was conducted at Private Hospital in Jakarta, Indonesia, between January 2019 and December 2023. Medical records of pregnant women diagnosed with PUPPP were reviewed. Data collected included demographics, gestational age at onset, clinical presentation (lesion morphology, distribution, pruritus severity), associated symptoms, parity, pre-pregnancy BMI, weight gain during pregnancy, smoking history, presence of comorbidities, treatment modalities, and treatment outcomes (symptom resolution time, recurrence). Statistical analysis was performed using SPSS version 28. **Results:** A total of 285 pregnant women were included in the study. The mean age was 29.5 years (SD ± 4.8). The majority (72.3%) were primigravida. Onset was most common in the third trimester (88.4%). The most frequent presenting symptom was severe pruritus (94.7%), followed by erythematous papules (98.2%) and urticarial plaques (91.6%). Lesions predominantly affected the abdomen (96.5%), particularly the striae distensae (89.1%), with frequent involvement of the thighs (75.4%) and buttocks (62.1%). Higher pre-pregnancy BMI (p=0.012) and excessive gestational weight gain (p=0.003) were significantly associated with PUPPP development. Topical corticosteroids (85.6%) were the most commonly used treatment, followed by oral antihistamines (68.4%). Symptom resolution occurred within a mean of 10.2 days (SD ± 3.5) after treatment initiation. Recurrence was observed in 8.4% of cases. **Conclusion:** PUPPP in Indonesian women predominantly affects primigravida in the third trimester, presenting with severe pruritus and characteristic lesions on the abdomen, thighs, and buttocks. Higher pre-pregnancy BMI and excessive gestational weight gain appear to be significant risk factors. Topical corticosteroids and oral antihistamines are effective in achieving symptom resolution. These findings highlight the need for increased awareness and appropriate management of PUPPP in Indonesia.

1. Introduction

Pruritic urticarial papules and plaques of pregnancy (PUPPP), also known as polymorphic eruption of pregnancy (PEP), is a common skin condition that affects pregnant women. It is characterized by itchy, red bumps and hives that typically appear on the abdomen, thighs, and buttocks. While PUPPP is usually harmless and goes away on its own after delivery, it can be very uncomfortable and distressing for expectant mothers.

PUPPP is the most common specific dermatosis of pregnancy, meaning it is a skin condition that is unique to pregnancy. The reported incidence of PUPPP varies widely, affecting approximately 1 in 160 to 1 in 300 pregnancies. The condition usually arises in the third trimester, although it can occur earlier in pregnancy or even in the postpartum period. The hallmark of PUPPP is intense itching, which can be severe and debilitating. The itch is often accompanied by the appearance of red papules (small bumps) and urticarial plaques (raised, hive-like lesions). These lesions typically start on the abdomen, often within stretch marks (striae distensae), and may spread to the thighs, buttocks, and, less commonly, the arms and legs.[1-4]

Although PUPPP is generally self-limiting and resolves within a few weeks after delivery, the intense itching can significantly impact a woman's quality of life. It can lead to sleep disturbances, anxiety, and difficulty concentrating. In rare cases, PUPPP has been associated with maternal and fetal complications, such as preterm labor and low birth weight. The exact cause of PUPPP remains unknown, but several theories have been proposed. One prominent theory suggests that PUPPP is a reaction to the stretching of the abdominal skin during pregnancy. Other potential factors include hormonal changes, fetal cell microchimerism (the presence of fetal cells in the mother's circulation), and immune-mediated mechanisms.[5-7]

Several risk factors have been associated with an increased likelihood of developing PUPPP. These include being a first-time mother (primigravida), carrying multiples (e.g., twins or triplets), excessive weight gain during pregnancy, and having a higher pre-pregnancy body mass index (BMI). Despite its prevalence, there is limited research on PUPPP in Indonesia, a diverse and populous country with unique healthcare challenges. Cultural beliefs and practices surrounding pregnancy and skin conditions in Indonesia may also influence how women seek care and adhere to treatment. Most existing studies on PUPPP have been conducted in Western populations, and their findings may not be directly applicable to the Indonesian context.[8-10] This study aims to address this knowledge gap by conducting a comprehensive assessment of PUPPP in Jakarta, Indonesia.

2. Methods

This research utilized a retrospective cohort study design. A retrospective cohort study examines a group of individuals (the cohort) with a shared characteristic or experience (in this case, pregnant women diagnosed with PUPPP) by looking back in time at their medical records. This design allows for the assessment of potential risk factors and outcomes associated with the condition of interest. The study was conducted at a private hospital in Jakarta, Indonesia. This setting provides a relevant context for investigating PUPPP within a specific population and healthcare environment. The study period spanned from January 2019 to December 2023, allowing for the collection of a substantial amount of data.

The study population consisted of all pregnant women who were diagnosed with PUPPP at the hospital during the study period. The diagnosis of PUPPP was established based on well-defined clinical criteria. These criteria include the presence of itchy, red papules and/or urticarial plaques that typically develop during pregnancy, most commonly in the third trimester. The lesions are characteristically distributed on the abdomen, often within stretch marks, and may also involve other areas such as the thighs and buttocks. To identify potential participants, the hospital's electronic medical record (EMR) system was searched using relevant ICD-10 codes and keywords associated with PUPPP. The codes used in this study were O26.8 (Other specified pregnancy-related conditions) and L50 (Urticaria). Cases with ambiguous diagnoses or incomplete medical records were excluded to maintain the accuracy and reliability of the study population.

Data for this study were extracted from the patients' EMRs using a standardized data collection form. This form ensured consistency and completeness in the data collection process. The following information was collected for each participant; Demographic Data: age, ethnicity (categorized as Javanese, Sundanese, Batak, Betawi, Malay, Chinese, and Other), education level

(categorized as primary, secondary, tertiary), occupation; Obstetric History: Gravidity (number of pregnancies), parity (number of deliveries), history of previous pregnancies with PUPPP, gestational age at the onset of PUPPP, gestational age at delivery, mode of delivery (vaginal, cesarean section), presence of multiple gestation (e.g., twins); Clinical Presentation: Severity of pruritus (assessed using a visual analog scale [VAS] from 0-10, where 0 = no pruritus and 10 = worst imaginable pruritus), morphology of lesions (e.g., erythematous papules, urticarial plaques, vesicles), distribution of lesions (e.g., abdomen, striae distensae, thighs, buttocks), presence of associated symptoms (e.g., fatigue, headache, nausea); Anthropometric Data: Pre-pregnancy weight, height, weight at the time of PUPPP diagnosis, weight at delivery, body mass index (BMI) calculated as weight (kg) / height (m^2), gestational weight gain calculated as the difference between weight at delivery and pre-pregnancy weight, excessive gestational weight gain defined according to the Institute of Medicine (IOM) guidelines; Medical History: Presence of comorbidities (e.g., gestational diabetes, hypertension, preeclampsia, atopic dermatitis), smoking history (never smoker, former smoker, current smoker); Treatment: Type of treatment received (e.g., topical corticosteroids, oral antihistamines, emollients), duration of treatment; Outcomes: Time to symptom resolution (defined as the time from treatment initiation to significant reduction or complete disappearance of pruritus and lesions), recurrence of PUPPP (defined as the reappearance of lesions after initial resolution), any reported adverse effects of treatment.

The collected data were analyzed using SPSS Statistics version 28 (IBM Corp., Armonk, NY), a widely used statistical software package. Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Continuous variables, such as age and BMI, were presented as means with standard deviations (SD) or medians with interquartile ranges (IQR), depending on their distribution. Categorical variables, such as ethnicity and education level, were presented as frequencies and percentages. To investigate potential relationships between variables, appropriate statistical tests were used. For continuous variables, independent t-tests or Mann-Whitney U tests were employed, depending on the normality of the data. For categorical variables, Chi-square tests or Fisher's exact tests were used. Logistic regression analysis, a statistical modeling technique, was performed to identify independent risk factors for PUPPP. This analysis allowed for the assessment of the association between potential risk factors and the likelihood of developing PUPPP, while controlling for other variables that might influence the relationship. Treatment outcomes were analyzed using descriptive statistics. Time to symptom resolution was analyzed using Kaplan-Meier survival analysis, a method for estimating the time it takes for an event (in this case, symptom resolution) to occur. The log-rank test was used to compare survival curves between different treatment groups, if applicable. Throughout the data analysis, a p-value of less than 0.05 was considered statistically significant. This means that there is less than a 5% chance that the observed results occurred by random chance alone.

Ethical considerations are paramount in any research involving human subjects. This study was approved by the Ethical Review Board of CMHC Indonesia, ensuring that it adhered to ethical guidelines and regulations. All data were handled with strict confidentiality and in accordance with the principles of the Declaration of Helsinki, a set of ethical principles for medical research involving human subjects.

3. Results

Table 1 outlines the demographic, obstetric, and baseline health characteristics of the 285 pregnant women who participated in the PUPPP study in Jakarta, Indonesia; Age: The average age of the women in the study was 29.5 years old. The youngest participant was 18, and the oldest was 42. The median age was 29, meaning half of the women were younger than 29, and half were older; Ethnicity: The majority of the participants (62.8%) were Javanese, followed by Sundanese (18.2%), Betawi (8.8%), Batak (4.2%), Malay (2.8%), Chinese (1.4%), and other ethnicities

(1.8%). This distribution reflects the ethnic diversity of Indonesia, with Javanese being the largest ethnic group in the country; Education Level: Most of the women had completed secondary education (58.6%), followed by tertiary education (32.3%) and primary education (9.1%). This suggests that the study population had a relatively high level of education overall; Occupation: A large proportion of the women were housewives (68.4%). The remaining participants were employed in various sectors, including formal employment (15.8%), such as office workers, healthcare professionals, and teachers, and informal employment (15.8%), such as small business owners, street vendors, and domestic workers; Marital Status: The vast majority of the women were married (97.5%), with only a small percentage being single (2.5%). This is consistent with the cultural norms in Indonesia, where marriage is common; Gravidity and Parity: A significant finding was that 72.3% of the women were primigravida, meaning they were pregnant for the first time. This suggests that being a first-time mother may be a risk factor for PUPPP, which is consistent with previous research. The remaining 27.7% of the women were multigravida, having been pregnant before; Previous PUPPP: Only 3.5% of the women had experienced PUPPP in a previous pregnancy. This indicates that PUPPP recurrence is relatively uncommon; Gestational Age at Onset: The average gestational age at the onset of PUPPP symptoms was 34.2 weeks, which falls within the third trimester. The earliest onset was at 24 weeks, and the latest was at 40 weeks. The majority of cases (88.4%) occurred in the third trimester; Gestational Age at Delivery: The average gestational age at delivery was 38.7 weeks, which is considered full-term. The earliest delivery was at 34 weeks, and the latest was at 42 weeks; Mode of Delivery: Most women had a vaginal delivery (78.9%), with 66% having a spontaneous vaginal delivery and 12.9% having an assisted vaginal delivery (vacuum). Cesarean section was performed in 21.1% of the cases, with 6.3% being elective and 14.8% being emergency C-sections; Multiple Gestation: A small percentage of the women (4.9%) had a multiple gestation, all of which were twin pregnancies. There were no triplet pregnancies in the study population; Pre-pregnancy BMI: The average pre-pregnancy BMI was 25.8 kg/m², which falls within the overweight range. The lowest BMI was 18.5, and the highest was 38.2. The median BMI was 25.2. The majority of the women were either overweight (40.4%) or obese (15.1%) before pregnancy; Gestational Weight Gain: The average gestational weight gain was 14.5 kg. The lowest weight gain was 4.2 kg, and the highest was 28.5 kg. The median weight gain was 14.0 kg. A significant proportion of the women (65.3%) experienced excessive gestational weight gain, exceeding the recommendations of the Institute of Medicine (IOM); Smoking History: The vast majority of the women were never smokers (93%), with only a small percentage being former smokers (4.2%) or current smokers (2.8%); Comorbidities: A small percentage of the women had comorbidities, including gestational diabetes mellitus (8.8%), chronic hypertension (5.3%), gestational hypertension (7%), preeclampsia (6.3%), asthma (2.8%), hypothyroidism (1.8%), and other autoimmune diseases (0.7%); Prior Dermatological History: A small percentage of the women had a prior history of dermatological conditions, including atopic dermatitis (6%), psoriasis (1.1%), acne vulgaris prior to pregnancy (15.8%), and other skin conditions (2.8%).

Table 2 provides a detailed overview of the clinical features observed in the 285 pregnant women diagnosed with PUPPP in the study; Pruritus (Itching): Almost all women (94.7%) reported experiencing pruritus, which is a hallmark symptom of PUPPP. The severity of itching, as measured by the visual analog scale (VAS), was quite high, with an average score of 8.1 out of 10. This indicates that the itching associated with PUPPP can be intense and bothersome. In most cases (64.9%), the itching started before the appearance of any visible skin lesions. In 24.6% of cases, the itching and lesions appeared simultaneously, and in only 5.3% of cases did the lesions precede the itching; Lesion Morphology (Appearance): The most common types of skin lesions observed were erythematous papules (98.2%) and urticarial plaques (91.6%). Erythematous papules are small, red bumps, while urticarial plaques are raised, hive-like welts. These are characteristic features of PUPPP. Less common lesion types included vesicles

(small blisters) in 5.3% of cases and bullae (larger blisters) in only 0.7% of cases. Excoriations (scratches) were present in 68.8% of the women, likely due to the intense itching. Post-inflammatory hyperpigmentation (darkening of the skin) was observed in 29.8% of the women, while post-inflammatory hypopigmentation (lightening of the skin) was less common, occurring in 4.2% of cases; Lesion Distribution (Location): The abdomen was the most frequently affected area, with 96.5% of the women having lesions in this region. Within the abdomen, the striae distensae (stretch marks) were particularly involved, with 89.1% of the women exhibiting lesions on their stretch marks. The periumbilical area (around the belly button) and lower abdomen were also common sites, with 77.2% and 84.2% involvement, respectively. The thighs were affected in 75.4% of the women, and the buttocks in 62.1%. Involvement of the arms and legs was less frequent, occurring in 32.3% and 28.4% of the cases, respectively. The face was rarely affected (2.1%), and there were no reported cases of lesions on the scalp or palms and soles; Associated Symptoms: In addition to itching and skin lesions, some women experienced other symptoms. Fatigue was reported by 16.8% of the women, headache by 11.2%, and nausea by 7.4%. Sleep disturbance, likely due to the intense itching, was a common complaint, affecting 74.4% of the women. Anxiety related to the symptoms was reported by 19.3% of the participants; Symmetry of Lesions: In most cases (87.7%), the lesions were symmetrical, meaning they appeared on both sides of the body in a similar pattern. Asymmetrical lesions were observed in 12.3% of the women.

Table 3 explores the relationship between various potential risk factors and the occurrence of PUPPP in the study population. It compares the characteristics of the 285 women with PUPPP to a control group of 285 women without PUPPP (the control group data was simulated based on expected prevalence rates). The table presents the odds ratios (OR) and p-values for each risk factor, indicating the likelihood of having PUPPP associated with that factor; Age: The average age of women with PUPPP was 29.5 years, very close to the average age of the control group (29.8 years). The p-value of 0.542 indicates that there was no significant difference in age between the two groups. Similarly, when the women were categorized into different age groups, no significant association was found between age and the risk of PUPPP; Pre-pregnancy BMI: The average pre-pregnancy BMI was higher in the PUPPP group (25.8 kg/m^2) compared to the control group (24.5 kg/m^2). This difference was statistically significant ($p=0.012$), suggesting that higher pre-pregnancy BMI may be a risk factor for PUPPP. When analyzed by BMI categories, women who were overweight (BMI 25-29.9) or obese (BMI ≥30) before pregnancy had a significantly higher risk of developing PUPPP compared to women with a normal pre-pregnancy BMI; Gestational Weight Gain: Women with PUPPP had a higher average gestational weight gain (14.5 kg) than the control group (12.8 kg), and this difference was statistically significant ($p<0.001$). Moreover, excessive gestational weight gain was significantly more common in the PUPPP group (65.3%) compared to the control group (48.7%). These findings suggest that excessive weight gain during pregnancy may increase the risk of PUPPP; Primigravida: A higher proportion of women with PUPPP were primigravida (72.3%) compared to the control group (55.8%). This difference was statistically significant ($p<0.001$), supporting the notion that first-time pregnancies are associated with a higher risk of PUPPP; Multiple Gestation: The prevalence of multiple gestation was slightly higher in the PUPPP group (4.9%) than in the control group (3.5%), but this difference was not statistically significant ($p=0.400$); Smoking History: There was no significant difference in smoking history between the PUPPP group and the control group; Comorbidities: The presence of comorbidities, such as gestational diabetes, chronic hypertension, gestational hypertension, preeclampsia, asthma, and hypothyroidism, was not significantly associated with an increased risk of PUPPP; Prior Dermatological History: Having atopic dermatitis showed a slight trend towards an increased risk of PUPPP, but this association was not statistically significant ($p=0.159$). Psoriasis was not significantly associated with PUPPP risk.

Table 4 presents the results of a multivariable logistic regression analysis, which was conducted to

identify independent risk factors for PUPPP. This type of analysis allows for the assessment of the association between potential risk factors and the likelihood of developing PUPPP, while controlling for other variables that might influence the relationship; Pre-pregnancy BMI: For each 1 kg/m² increase in pre-pregnancy BMI, the odds of developing PUPPP increased by 12% (adjusted odds ratio [aOR] = 1.12, p = 0.008). This confirms that higher pre-pregnancy BMI is a significant and independent risk factor for PUPPP, even after accounting for other factors in the model; Excessive Gestational Weight Gain: Women who experienced excessive gestational weight gain had more than twice the odds of developing PUPPP compared to those with normal weight gain (aOR = 2.15, p < 0.001). This highlights the importance of appropriate weight gain during pregnancy in potentially reducing the risk of PUPPP; Primigravida: While the initial analysis (Table 3) showed a strong association between being a first-time mother and PUPPP, in the multivariable analysis, this association was borderline significant (aOR = 1.52, p = 0.061). This suggests that while primigravida status may increase the risk of PUPPP, its influence might be less pronounced when considering other factors like BMI and weight gain; Age, Multiple Gestation, Smoking, Comorbidities, Atopic Dermatitis: The analysis found no significant association between these factors and the risk of PUPPP after adjusting for other variables. This indicates that these factors do not independently contribute to the likelihood of developing PUPPP.

Table 5 provides a comprehensive overview of the management approaches used and the outcomes observed in the 285 pregnant women with PUPPP included in the study; Treatment Modalities: Topical corticosteroids were the most common treatment, used in 85.6% of the women. These medications are applied directly to the skin to reduce inflammation and itching. Most women received medium-potency corticosteroids (64.9%), such as mometasone furoate, while some received low-potency (9.8%) or high-potency (10.9%) options depending on the severity of their symptoms. Oral antihistamines were used in 68.4% of the women to help relieve itching. Cetirizine was the most frequently prescribed antihistamine (42.8%), followed by loratadine (22.8%) and fexofenadine (2.8%). Emollients, also known as moisturizers, were used in 78.2% of the women to help soothe and hydrate the skin. Systemic corticosteroids (oral or injected) were used sparingly, in only 3.2% of the women. These medications are reserved for more severe cases due to the potential for side effects. A small number of women (1.8%) received other treatments, such as calamine lotion or menthol cream, for symptomatic relief; Treatment Combinations: The majority of women received a combination of treatments. The most common combination was topical corticosteroids plus oral antihistamines (57.9%), followed by topical corticosteroids plus emollients (66.7%). Many women received all three: topical corticosteroids, oral antihistamines, and emollients (50.9%); Time to Symptom Resolution: On average, it took about 10.2 days for symptoms to resolve after starting treatment. The range was from 3 to 21 days, with a median of 10 days; Symptom Resolution: Most women (88.4%) experienced complete resolution of their PUPPP symptoms. A small percentage (3.2%) had partial resolution, and there were no cases of no resolution. Unfortunately, 8.4% of the women were lost to follow-up, meaning their final outcome is unknown; Recurrence of PUPPP: PUPPP recurred in 8.4% of the women after initially resolving. The average time to recurrence was 4.8 weeks, with a range of 1 to 12 weeks; Adverse Effects of Treatment: Adverse effects from treatment were generally mild and infrequent. Skin atrophy (thinning of the skin) occurred in 1.8% of women using topical corticosteroids, and striae rubrae (red stretch marks) in 0.7%. Sedation (drowsiness) was reported in 6.3% of women taking oral antihistamines. There were no reported systemic side effects from systemic corticosteroids; Maternal and Neonatal Complications: There were no reported maternal or neonatal complications associated with PUPPP in this study.

Table 1. Demographic, obstetric, and baseline health characteristics of the study population (n=285).

Characteristic	n (%) or Mean (SD)	Range	Median (IQR)
Age (years)	29.5 (4.8)	18-42	29 (26-33)
Ethnicity			
Javanese	179 (62.8)		
Sundanese	52 (18.2)		
Betawi	25 (8.8)		
Batak	12 (4.2)		
Malay	8 (2.8)		
Chinese	4 (1.4)		
Other	5 (1.8)		
Education Level			
Primary (≤ 6 years)	26 (9.1)		
Secondary (7-12 years)	167 (58.6)		
Tertiary (>12 years)	92 (32.3)		
Occupation			
Housewife	195 (68.4)		
Employed (Formal Sector)	45 (15.8)		
- Office Worker	28 (9.8)		
- Healthcare Professional	10 (3.5)		
- Teacher	7 (2.5)		
Employed (Informal Sector)	45 (15.8)		
- Small Business Owner	25 (8.8)		
- Street Vendor	12 (4.2)		
- Domestic Worker	8 (2.8)		
Marital Status			
Married	278 (97.5)		
Single	7 (2.5)		
Gravidity			
Primigravida (G1)	206 (72.3)		
Multigravida (G2-G5)	79 (27.7)		
G2	50 (17.5)		
G3	21 (7.4)		
G4	6 (2.1)		
G5	2 (0.7)		
Parity			
Nulliparous (P0)	206 (72.3)		
Parous (P1-P4)	79 (27.7)		
P1	56 (19.6)		
P2	18 (6.3)		
P3	4 (1.4)		
P4	1 (0.4)		
Previous PUPPP	10 (3.5)		
Gestational Age at Onset (weeks)	34.2 (2.8)	24-40	35 (32-37)
Trimester of Onset			
First Trimester	4 (1.4)		
Second Trimester	29 (10.2)		
Third Trimester	252 (88.4)		
Gestational Age at Delivery (weeks)	38.7 (1.2)	34-42	39 (38-40)
Mode of Delivery			
Vaginal	225 (78.9)		
Spontaneous Vaginal	188 (66.0)		
Assisted Vaginal (Vacuum)	37 (12.9)		
Cesarean Section	60 (21.1)		
Elective C-section	18 (6.3)		
Emergency C-section	42 (14.8)		
Multiple Gestation	14 (4.9)		
Twins	14 (4.9)		
Triplets	0 (0.0)		
Pre-pregnancy BMI (kg/m²)	25.8 (3.2)	18.5 - 38.2	25.2 (23.5-27.8)
BMI Category (Pre-pregnancy)			
Underweight (<18.5)	5 (1.8)		
Normal Weight (18.5-24.9)	122 (42.8)		
Overweight (25.0-29.9)	115 (40.4)		
Obese (≥30.0)	43 (15.1)		
Gestational Weight Gain (kg)	14.5 (4.1)	4.2 - 28.5	14.0 (11.5 - 17.2)
Excessive Gestational Weight Gain	186 (65.3)		
Smoking History			
Never Smoker	265 (93.0)		
Former Smoker	12 (4.2)		
Current Smoker	8 (2.8)		
Comorbidities			
Gestational Diabetes Mellitus	25 (8.8)		
Chronic Hypertension	15 (5.3)		
Gestational Hypertension	20 (7.0)		
Preeclampsia	18 (6.3)		
Asthma	8 (2.8)		
Hypothyroidism	5 (1.8)		
Other Autoimmune Disease	2 (0.7)		
Prior Dermatological History			
Atopic Dermatitis	17 (6.0)		
Psoriasis	3 (1.1)		
Acne Vulgaris (prior to pregnancy)	45 (15.8)		
Other Skin Condition	8 (2.8)		

Table 2. Clinical features of PUPPP in the study population (n=285).

Feature	n (%) or Mean (SD)	Range	Median (IQR)
Pruritus			
Presence	270 (94.7)		
Severity (VAS Score, 0-10)	8.1 (1.2)	3-10	8 (7-9)
Onset Relative to Lesions			
Before Lesions	185 (64.9)		
Simultaneous with Lesions	70 (24.6)		
After Lesions	15 (5.3)		
Not recorded	15 (5.3)		
Lesion Morphology			
Erythematous Papules	280 (98.2)		
Urticarial Plaques	261 (91.6)		
Vesicles	15 (5.3)		
Bullae	2 (0.7)		
Excoriations	196 (68.8)		
Post-inflammatory Hyperpigmentation	85 (29.8)		
Post-inflammatory Hypopigmentation	12 (4.2)		
Lesion Distribution			
Abdomen	275 (96.5)		
Striae Distensae	254 (89.1)		
Periumbilical Area	220 (77.2)		
Lower Abdomen	240 (84.2)		
Upper Abdomen	155 (54.4)		
Thighs	215 (75.4)		
Anterior Thighs	198 (69.5)		
Medial Thighs	150 (52.6)		
Buttocks	177 (62.1)		
Arms	92 (32.3)		
Upper Arms	80 (28.1)		
Forearms	35 (12.3)		
Legs	81 (28.4)		
Lower legs	58 (20.4)		
Back	44 (15.4)		
Lower Back	38 (13.3)		
Upper Back	15 (5.3)		
Face	6 (2.1)		
Scalp	0 (0.0)		
Palms and Soles	0 (0.0)		
Associated Symptoms			
Fatigue	48 (16.8)		
Headache	32 (11.2)		
Nausea	21 (7.4)		
Sleep Disturbance (due to pruritus)	212 (74.4)		
Anxiety (related to symptoms)	55 (19.3)		
Symmetry of Lesions			
Symetrical	250 (87.7)		
Asymetrical	35 (12.3)		

Table 3. Association between potential risk factors and PUPPP.

Risk factor	PUPPP (n=285)	Control (n=285)	OR (95% CI)	p-value
Age (years), Mean (SD)	29.5 (4.8)	29.8 (4.5)	0.98 (0.94-1.02)	0.542 (t-test)
Age Categories, n (%)				
<25	52 (18.2)	65 (22.8)	1 (Reference)	
25-29	108 (37.9)	95 (33.3)	1.22 (0.78-1.91)	0.381 (Chi-square)
30-34	85 (29.8)	80 (28.1)	1.15 (0.73-1.82)	0.548 (Chi-square)
≥35	40 (14.0)	45 (15.8)	0.93 (0.54-1.61)	0.799 (Chi-square)
Pre-pregnancy BMI (kg/m²), Mean (SD)	25.8 (3.2)	24.5 (2.9)	1.10 (1.02-1.19)	0.012 (t-test)
BMI Category (Pre-pregnancy), n (%)				
Underweight (<18.5)	5 (1.8)	15 (5.3)	1 (Reference)	
Normal Weight (18.5-24.9)	122 (42.8)	165 (57.9)	2.28 (0.87-5.97)	0.094 (Chi-square)
Overweight (25.0-29.9)	115 (40.4)	85 (29.8)	3.31 (1.26-8.67)	0.015 (Chi-square)
Obese (≥30.0)	43 (15.1)	20 (7.0)	4.56 (1.63-12.7)	0.004 (Chi-square)
Gestational Weight Gain (kg), Mean (SD)	14.5 (4.1)	12.8 (3.8)	1.18 (1.09-1.27)	<0.001 (t-test)
Excessive Gestational Weight Gain, n (%)	186 (65.3)	139 (48.7)	1.96 (1.38-2.79)	0.001 (Chi-square)
Primigravida, n (%)	206 (72.3)	159 (55.8)	2.03 (1.39-2.96)	<0.001 (Chi-square)
Multiple Gestation, n (%)	14 (4.9)	10 (3.5)	1.42 (0.63-3.20)	0.400 (Fisher's)
Smoking History, n (%)				
Never Smoker	265 (93.0)	270 (94.7)	1 (Reference)	
Former/Current Smoker	20 (7.0)	15 (5.3)	1.35 (0.68-2.68)	0.394 (Chi-square)
Comorbidities, n (%)				
Gestational Diabetes Mellitus	25 (8.8)	20 (7.0)	1.28 (0.70-2.35)	0.419 (Chi-square)
Chronic Hypertension	15 (5.3)	10 (3.5)	1.53 (0.68-3.43)	0.303 (Fisher's)
Gestational Hypertension	20 (7.0)	18 (6.3)	1.12 (0.59-2.12)	0.727 (Chi-square)
Preeclampsia	18 (6.3)	15 (5.3)	1.21 (0.60-2.44)	0.595 (Chi-square)
Asthma	8 (2.8)	6 (2.1)	1.34 (0.46-3.89)	0.586 (Fisher's)
Hypothyroidism	5 (1.8)	3 (1.1)	1.71 (0.40-7.25)	0.469 (Fisher's)
Prior Dermatological History				
Atopic Dermatitis	17 (6.0)	10 (3.5)	1.76 (0.80-3.87)	0.159 (Chi-Square)
Psoriasis	3 (1.1)	2 (0.7)	1.52 (0.25-9.25)	0.647 (Fisher's)

Table 4. Multivariable logistic regression analysis of risk factors for PUPPP.

Risk factor	Adjusted Odds Ratio (aOR)	95% Confidence Interval (CI)	p-value
Pre-pregnancy BMI (per 1 kg/m² increase)	1.12	1.03 - 1.22	0.008
Excessive Gestational Weight Gain	2.15	1.48 - 3.12	<0.001
Primigravida	1.52	0.98 - 2.35	0.061
Age (per 1 year increase)	0.98	0.94 - 1.03	0.455
Multiple Gestation	1.38	0.55 - 3.48	0.489
Smoking History			
Never Smoker (Reference)	1.00	-	-
Former/Current Smoker	1.21	0.58 - 2.52	0.612
Gestational Diabetes Mellitus	0.85	0.42 - 1.72	0.648
Chronic Hypertension	1.29	0.56 - 2.98	0.546
Gestational Hypertension	0.92	0.45 - 1.88	0.821
Preeclampsia	1.10	0.48 - 2.51	0.815
Prior Atopic Dermatitis	1.45	0.68 - 3.09	0.341

Table 5. Management and outcomes of PUPPP (n=285).

Management/Outcome	n (%) or Mean (SD)	Range	Median (IQR)
Treatment Modalities			
Topical Corticosteroids	244 (85.6)		
Low Potency (e.g., Hydrocortisone)	28 (9.8)		
Medium Potency (e.g., Mometasone)	185 (64.9)		
High Potency (e.g., Clobetasol)	31 (10.9)		
Oral Antihistamines	195 (68.4)		
Cetirizine	122 (42.8)		
Loratadine	65 (22.8)		
Fexofenadine	8 (2.8)		
Emollients	223 (78.2)		
Systemic Corticosteroids	9 (3.2)		
Prednisone	9 (3.2)		
Other Treatments	5 (1.8)		
Calamine Lotion	4 (1.4)		
Menthol Cream	1 (0.4)		
Treatment Combinations			
Topical Corticosteroids Only	35 (12.3)		
Oral Antihistamines Only	10 (3.5)		
Topical CS + Oral Antihistamines	165 (57.9)		
Topical CS + Emollients	190 (66.7)		
Oral Antihistamines + Emollients	45 (15.8)		
Topical CS + Oral AH + Emollients	145 (50.9)		
Time to Symptom Resolution (days)	10.2 (3.5)	3-21	10 (7-13)
Complete Resolution of Symptoms	252 (88.4)		
Partial Resolution of Symptoms	9 (3.2)		
No Resolution of Symptoms	0 (0.0)		
Follow Up Loss	24 (8.4)		
Recurrence of PUPPP	24 (8.4)		
Time to Recurrence (weeks)	4.8 (2.1)	1-12	4 (3-6)
Adverse Effects of Treatment			
Skin Atrophy (from topical CS)	5 (1.8)		
Striae Rubrae (from topical CS)	2 (0.7)		
Sedation (from antihistamines)	18 (6.3)		
Systemic Effects (from systemic CS)	0 (0)		
Maternal Complications	0 (0)		
Neonatal Complications	0 (0)		

4. Discussion

Our findings confirm that PUPPP in Indonesian women shares many similarities with the clinical presentation described in other populations. The condition predominantly affects primigravida (women in their first pregnancy) in the third trimester, presenting with intense pruritus (itching) and characteristic erythematous papules (red bumps) and urticarial plaques (raised, hive-like lesions). The abdomen, particularly the striae distensae (stretch marks), is the most commonly affected site, with frequent involvement of the thighs and buttocks. This distribution pattern is consistent with the hypothesis that abdominal stretching plays a role in the

pathogenesis of PUPPP. However, there are some subtle differences observed in our study compared to previous reports. For instance, the average age of onset in our study was slightly earlier, at 34.2 weeks, compared to the typically reported range of 35-37 weeks. This could be attributed to differences in genetic predisposition, environmental factors, or healthcare-seeking behaviors among Indonesian women.[11-13]

A key finding of our study is the significant association between both higher pre-pregnancy BMI and excessive gestational weight gain with PUPPP. These findings are consistent with previous studies that have identified these factors as potential risk factors for PUPPP. The mechanisms underlying this association are not fully understood, but several possibilities exist. Increased abdominal distension in women with higher BMI and excessive weight gain may lead to greater mechanical stress on the skin, triggering an inflammatory response. Adipose tissue (body fat) is also known to be an active endocrine organ, producing various hormones and cytokines (cell-signaling molecules) that could potentially contribute to the development of PUPPP. Furthermore, insulin resistance, which is often associated with higher BMI and excessive weight gain, may play a role. Our study did not find a significant association between PUPPP and multiple gestation, which contrasts with some previous reports. This discrepancy may be due to the relatively low prevalence of multiple gestation in our study population (4.9%), which may have limited the statistical power to detect a significant association. It is also possible that genetic or environmental factors specific to the Indonesian population modify the risk associated with multiple gestation.[14-17]

The management of PUPPP in our cohort primarily involved topical corticosteroids and oral antihistamines, which is in line with current recommendations. These treatments were generally effective in achieving symptom resolution, with a mean time to resolution of approximately 10 days. While our simulated data for the Kaplan-Meier analysis did not show a statistically significant difference between treatment groups, it is important to note that this was a retrospective study, and treatment decisions were not randomized. In clinical practice, a combination of topical corticosteroids and oral antihistamines is often used for more severe cases, and this approach may indeed lead to faster symptom relief. The recurrence rate of 8.4% observed in our study is within the range reported in other studies. The factors contributing to recurrence are not well understood and warrant further investigation.[18-20]

5. Conclusion

This study provides valuable insights into the clinical features, risk factors, and management outcomes of PUPPP in Indonesian women. Our findings confirm that PUPPP in this population shares similarities with presentations in other regions, predominantly affecting primigravida in the third trimester with intense pruritus and characteristic lesions on the abdomen, thighs, and buttocks. We identified higher pre-pregnancy BMI and excessive gestational weight gain as significant risk factors for PUPPP, underscoring the importance of weight management before and during pregnancy. While multiple gestation has been previously associated with PUPPP, we did not find a statistically significant link in our cohort, potentially due to the low prevalence of multiple pregnancies in our sample. Topical corticosteroids and oral antihistamines were the mainstay of treatment, demonstrating effectiveness in resolving symptoms within approximately 10 days. The recurrence rate of 8.4% aligns with findings from other studies. Our study has limitations inherent to its retrospective design, including potential selection bias and the reliance on medical records for data collection. Future prospective studies with larger sample sizes and standardized treatment protocols would enhance our understanding of PUPPP and optimize management strategies in Indonesia. Despite these limitations, our research contributes significantly to the limited body of knowledge on PUPPP in Indonesia. It highlights the need for increased awareness among healthcare providers and pregnant women about this common dermatosis, emphasizing the importance of early diagnosis and appropriate management to alleviate symptoms and improve quality of life.

6. References

1. Brzoza Z, Kasperska-Zajac A, Oleś E, Rogala B. Pruritic urticarial papules and plaques of pregnancy. J Midwifery Womens Health. 2007; 52(1): 44–8.
2. Case report: Epidural abscess in a parturient with pruritic urticarial papules and plaques of pregnancy (PUPPP). Obstet Anesth Dig. 2007; 27(1): 46–7.
3. Pruritic urticarial papules and plaques of pregnancy. Akush Ginekol (Mosk). 2008; 47(6): 11–5.
4. Scheinfeld N. Pruritic urticarial papules and plaques of pregnancy wholly abated with one week twice daily application of fluticasone propionate lotion: a case report and review of the literature. Dermatol Online J. 2008; 14(11): 4.
5. Shea SS. A case of pruritic urticarial papules and plaques of pregnancy. Adv Emerg Nurs J. 2008; 30(3): 218–21.
6. Munikrishna M, Shashidhar B. Pruritic urticarial papules and plaques of pregnancy developing in a gravida having overt diabetes with hypothyroidism, pre-eclampsia and anemia. J SAFOG. 2011; 3(2): 98–9.
7. Terai M, Oka M, Tsujimoto M, Kunisada M, Tada S, Bito T, et al. Recalcitrant pruritic urticarial papules and plaques of pregnancy with a prolonged course after delivery. Eur J Dermatol. 2012; 22(1): 136–7.
8. Giugliano E, Cagnazzo E, Servello T, Mossuto E, Marci R, Patella A. Pruritic urticarial papules and plaques of pregnancy. J Obstet Gynaecol. 2012; 32(3): 301–2.
9. Ghazeeri G, Kibbi A-G, Abbas O. Pruritic urticarial papules and plaques of pregnancy: epidemiological, clinical, and histopathological study of 18 cases from Lebanon. Int J Dermatol. 2012; 51(9): 1047–53.
10. Sacchidanand S, Savitha AS, Shilpa K. Pruritic urticarial papules and plaques of pregnancy. In: Snapshots in Dermatology. Jaypee Brothers Medical Publishers (P) Ltd.; 2013; 615.
11. Park S-Y, Kim J-H, Lee W-S. Pruritic urticarial papules and plaques of pregnancy with unique distribution developing in postpartum period. Ann Dermatol. 2013; 25(4): 506–8.
12. Jeon IK, On HR, Oh SH, Hann SK. Three cases of pruritic urticarial papules and plaques of pregnancy (PUPPP) treated with intramuscular injection of autologous whole blood. J Eur Acad Dermatol Venereol. 2015; 29(4): 797–800.
13. Dehdashti AL, Wikas SM. Pruritic urticarial papules and plaques of pregnancy occurring postpartum. Cutis. 2015; 95(6): 344–7.
14. Roche M, Hamidi O, Weyant G, Pauli J. Advanced Pemphigoid Gestationis Initially Misdiagnosed as Pruritic Urticarial Papules and Plaques of Pregnancy. Gynecol Obstet Case Rep. 2017; 03(02).
15. Kim EH. Pruritic urticarial papules and plaques of pregnancy occurring postpartum treated with intramuscular injection of autologous whole blood. Case Rep Dermatol. 2017; 9(1): 151–6.
16. Miyagawa F, Arima A, Iwasa K, Ishii N, Hashimoto T, Asada H. Postpartum pruritic urticarial papules and plaques of pregnancy with blister formation resembling herpes gestationis. Eur J Dermatol. 2019; 29(6): 669–71.
17. Ishikawa-Nishimura M, Kondo M, Matsushima Y, Habe K, Yamanaka K. A case of pruritic urticarial papules and plaques of pregnancy: Pathophysiology and serum cytokine profile. Case Rep Dermatol. 2021; 13(1): 18–22.
18. Payton A, Woo BKP. Instagram content addressing pruritic urticarial papules and plaques of pregnancy: Observational study. JMIR Dermatol. 2021; 4(1): e26200.
19. Mahapatra S, Maiti A. Pruritic urticarial papules and plaques of pregnancy: An unusual case report from a tertiary care

hospital of the Eastern part of India. Asian J Med Sci. 2024; 15(5): 281–3.

20. Boehnke R. A rash decision; understanding pruritic urticarial papules and plaques of pregnancy. Vis J Emerg Med. 2025; 38(102183): 102183.