# PREVALENCE OF ASTHMA IN PREGNANT WOMEN AT RUMAH SAKIT UNIVERSITAS AIRLANGGA IN 2022–2023

**Raghda Amanda Ardyan[a]\*| Arief Bakhtiar [b]| Sofia Al Farizi[a]**
[a] Department of Midwifery, Faculty of Medicine, Universitas Airlangga
[b] Department of Pulmonary and Respiratory Medicine, Faculty of Medicine, Universitas Airlangga
\*Corresponding Author: raghda.amanda.ardyan-2021@fk.unair.ac.id

| ARTICLE INFORMATION | ABSTRACT |
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| | ***Introduction:*** *Asthma is a heterogeneous disease, typically characterized by chronic airway inflammation. The condition is defined by a history of respiratory symptoms, including wheezing, shortness of breath, chest tightness, and coughing, which vary over time and intensity, in addition to variable expiratory airflow limitation. As the prevalence of asthma in the community continues to increase, cases of asthma in pregnancy are also becoming more common. This study aims to determine the prevalence of asthma among pregnant women at Rumah Sakit Universitas Airlangga during 2022-2023.* ***Objectives:*** *The objective of this study is to determine the prevalence of asthma among pregnant women at Rumah Sakit Universitas Airlangga during the period of 2022-2023.* ***Methods:*** *This study employed a descriptive quantitative method with a cross-sectional research design. Data measurement and observation were conducted at a single time point using secondary data from January 2022 to December 2023 in a retrospective manner.* ***Results:*** *Among 8.170 pregnant women at Rumah Sakit Universitas Airlangga, 25 were diagnosed with asthma, resulting in a prevalence of 0,31%.* ***Conclusions:*** *The data indicates that the prevalence of pregnant women with asthma diagnoses at Rumah Sakit Universitas Airlangga was lower than the 0.31% reported in previous literature.* |

## Introduction

Asthma is a heterogeneous disease, typically characterized by chronic airway inflammation (Wisnu Wardana & Rosyid, 2021). The condition is typified by a history of respiratory symptoms, including wheezing, shortness of breath, chest tightness, and coughing, which can vary in intensity and frequency over time, as well as varying expiratory airflow limitation (Global Initiative for Asthma, 2023). Asthma, a chronic airway disease, affects 1-18% of the global population across various developed and developing countries (Perhimpunan Dokter Paru Indonesia (PDPI), 2021). According to data from the World Health Organization (WHO) in 2019, the global incidence of asthma is estimated to be approximately 262 million cases, contributing to 455,000 deaths annually.

Asthma prevalence is defined as the total number of asthma cases within a specific population or region at a given moment in time. It is imperative for communities, health services, and governments to understand the incidence of asthma to optimize preventive and therapeutic efforts, particularly for pregnant women. The 2023 Indonesian Health Survey activity report indicates a doctor-diagnosed asthma prevalence of 1.6% nationwide, with East Java reporting a slightly higher rate of 1.7% (Kementerian Kesehatan RI, 2023). The number of asthma patients at Rumah Sakit Universitas Airlangga during the 2022-2023 period reached 3,069.

One-third of women diagnosed with asthma experience symptoms that get worse during pregnancy, while another one-third see an improvement and the rest remain stable or show no

change (Habiburrahman & Rakasiwi, 2023). Concurrent with the rising prevalence of asthma in the community, cases of asthma in pregnancy are also increasing. Pregnancy in women with asthma is a health problem with a prevalence estimated to have increased over the past two decades. A study of pregnant women in the United States found that the prevalence of asthma increased by 3.7–8.4% from 1997 to 2001. In Indonesia, the prevalence of asthma in pregnant women ranges from 3.7% to 4% (Astik Umiyah et al., 2022).

The development and expression of asthma during pregnancy is influenced by various risk factors, including internal (host-related) and external (environmental) factors. Internal factors encompass genetics, obesity, gender, age, physical activity, and the expression of strong or excessive emotions. On the other hand, external factors include occupational irritants, viral infections in the airways, allergens, cigarette smoke, air pollution, medications, and temperature changes related to seasonal changes or other geographical conditions (Nursalam et al., 2009).

The effect of asthma on pregnancy varies depending on the severity of the asthma. Severe asthma can affect pregnancy outcomes, such as increased incidence of abortion, preterm birth, low birth weight (LBW) fetus and neonate hypoxia. Mechanisms underlying the effect of pregnant women with asthma include hypoxia, inflammation, corticosteroid treatment, history of exacerbations, maternal smoking, and changes in placental function (Damayanti & Pudyastuti, 2020). The majority of cases of severe asthma in pregnant women are attributable to the presence of a female foetus, while pregnant women with male foetuses tend to exhibit intermittent asthma (Octaviana et al., 2023).

During pregnancy, changes in lung function include Forced Vital Capacity (KVP), a lung function parameter on spirometry tests that typically falls within normal limits, followed by first second Forced Expiratory Volume (VEP1) and Peak Expiratory Flow (APE) (Maselli et al., 2013). The hormonal state during pregnancy differs significantly from that in non-pregnant individuals, and these changes can affect lung function (Damayanti & Pudyastuti, 2020).

A study by (Rai, 2009) at Sanglah Hospital in Denpasar revealed a prevalence of asthma exacerbation in pregnant women of 0.71%. However, there is a paucity of research on the prevalence of asthma in pregnant women, particularly at Rumah Sakit Universitas Airlangga. The objective of this study is to ascertain the prevalence of asthma in pregnant women at Rumah Sakit Universitas Airlangga during the 2022-2023 period.

## Methods

The study population consisted of pregnant women in their first to third trimester who were diagnosed with asthma at Rumah Sakit Universitas Airlangga in 2022-2023, as identified through medical records. The study sample included women from the same population whose records met specific inclusion and exclusion criteria. Inclusion criteria required complete and accessible medical records of pregnant women diagnosed with asthma during the study period. Exclusion criteria applied to cases in which the medical records contained specific notes indicating the patient's desire to have her data excluded from research purposes.

The study used a total sample, including all eligible cases that met the inclusion criteria (Imas Masturoh & Nauri Anggita T, 2018). A non-probability sampling technique was used, recognizing that not all elements in the population had an equal chance of selection. Data collection was conducted through systematic review of medical records, with particular attention to documenting asthma diagnosis, pregnancy information, and relevant maternal health parameters.

Descriptive statistical methods were used to analyze the data, and the results were scientifically presented and summarized in tables. The analysis included several parameters, including number of cases, asthma onset, age, occupation, weight, height, gestational age, gravida,

and referral source of study participants using Microsoft Excel. The prevalence was calculated using the (Centers for Disease Control and Prevention, 2012) formula P = n/N, where P is the prevalence, n is the number of asthma cases among pregnant women at Rumah Sakit Universitas Airlangga, and N is the total number of pregnant women at the facility during the study period. The population in this study was 8170 pregnant women with a research sample of 25 pregnant women.

## Results

The study found 28 cases of asthma in pregnant women during the 2022-2023 period. But only 25 cases met the inclusion criteria, so the prevalence can be calculated like this:

$$= \frac{\text{Number of asthma cases in pregnant women}}{\text{Number of pregnant women in Rumah Sakit Universitas Airlangga}} \times 100\%$$

$$= \frac{25}{8170} \times 100\%$$

= 0,30599755%

= 0,31%

Table 1 Frequency Distribution of Onset of Asthma in Pregnant Women in 2022-2023

| Onset of asthma in pregnant women | Number (people) | Percentage(%) |
|---|---|---|
| Pregnant women had a diagnosis of asthma before pregnancy | 15 | 60 |
| Pregnant women diagnosed with asthma during pregnancy | 10 | 40 |
| **Total** | 25 | 100 |

Based on Table 1 shows that the onset of asthma in pregnant women was predominantly diagnosed before pregnancy at 60% (15 cases).

Table 2 Frequency Distribution of Age in Pregnant Women with a Diagnosis of Asthma in 2022-2023

| Age | Number (people) | Percentage(%) |
|---|---|---|
| <20 years | 0 | 0 |
| 20 - 35 years | 20 | 80 |
| **Total** | 5 | 20 |

Based on Table 2 shows that the majority of pregnant women with asthma were in the 20-35 years age group at 80% (20 cases).

Table 3 Frequency Distribution of Occupation in Pregnant Women with a Diagnosis of Asthma in 2022-2023

| Occupation | Number (people) | Percentage(%) |
|---|---|---|
| Entrepreneur | 2 | 8 |
| Private employee | 9 | 36 |
| Teacher | 1 | 4 |
| Laborer | 0 | 0 |
| Retired | 0 | 0 |
| Housewife/Not Working | 13 | 52 |
| **Total** | 25 | 100 |

Based on Table 3 shows that the distribution of occupations among pregnant women with asthma was primarily housewife/not working at 52% (13 cases).

Table 4 Frequency Distribution of Body Mass Index in Pregnant Women with a Diagnosis of Asthma in 2022-2023

| Body Mass Index | Number (people) | Percentage(%) |
|---|---|---|
| Underweight (<18,5) | 0 | 0 |
| Normal (18,5 - 22,9) | 8 | 32 |
| Overweight (23 - 24,9) | 1 | 4 |
| Obesity I (25 - 29,9) | 5 | 20 |
| Obesity II (≥30) | 11 | 44 |
| **Total** | 25 | 100 |

Based on Table 4 shows that the Body Mass Index (BMI) distribution among pregnant women with asthma was predominantly obesity II at 44% (11 cases).

Table 5 Frequency Distribution of Gestational Age in Pregnant Women with a Diagnosis of Asthma in 2022-2023

| Gestational Age | Number (people) | Percentage(%) |
|---|---|---|
| Trimester 1 (0 - 12 weeks) | 0 | 0 |
| Trimester 2 (13 - 28 weeks) | 4 | 16 |
| Trimester 3 (29 - 40 weeks) | 21 | 84 |
| **Total** | 25 | 100 |

Based on Table 5 shows that gestational age distribution among pregnant women with asthma was highest in trimester 3 at 84% (21 cases).

Table 6 Frequency Distribution of Gravida in Pregnant Women with a Diagnosis of Asthma in 2022-2023

| Gravida | Number (people) | Percentage(%) |
|---|---|---|
| Primigravida, first pregnancy | 9 | 36 |
| Multigravida, >1 – <5 pregnancies | 15 | 60 |
| Grande multigravida, pregnancy ≥ 5 | 1 | 4 |
| **Total** | 25 | 100 |

Based on Table 6 shows that the gravida distribution among pregnant women with asthma was predominantly multigravida at 60% (15 cases).

Table 7 Frequency Distribution of Referral Origin in Pregnant Women with a Diagnosis of Asthma in 2022-2023

| Referral Origin | Number (people) | Percentage(%) |
|---|---|---|
| Came Independently | 12 | 48 |
| Obsgyn Clinic | 13 | 52 |
| External Hospital | 0 | 0 |
| General Practitioner Practice | 0 | 0 |
| Specialist Doctor Practice | 0 | 0 |
| Midwife Independent Practice | 0 | 0 |
| Community Health Center | 0 | 0 |
| **Total** | 25 | 100 |

Based on Table 7 shows that the referral origin distribution among pregnant women with asthma was primarily from obstetrics and gynecology clinic at 52% (13 cases).

## Discussion

**Prevalence of Asthma in Pregnant Women**

In a study of 8,170 pregnant women at Rumah Sakit Universitas Airlangga during 2022-2023, 25 cases met the inclusion criteria, resulting in a prevalence of 0.31%. This figure is notably lower than previously reported prevalence rates of 3.7-4% in Indonesia (Astik Umiyah et al., 2022) and 0.4-4% in international literature (Kwon et al., 2003). The lower prevalence in this study may be attributed to its specific geographic scope and population, being limited to a single tertiary care center. This finding suggests the need for broader multi-center studies to better understand regional variations in asthma prevalence among pregnant women.

**Onset of Asthma in Pregnant Women**

Regarding asthma onset, 60% of cases had pre-existing asthma diagnoses before pregnancy, while 40% were diagnosed during pregnancy. Women with pre-existing asthma typically received more comprehensive care, including routine monitoring, education about asthma management, and established medication regimens proven safe in previous pregnancies (Couillard et al., 2021). This underscores the importance of pre-conception counseling and early asthma management for optimal maternal outcomes (Direktorat Jenderal Pengendalian Penyakit dan Penyehatan Lingkungan Departemen Kesehatan R.I., 2008).

**Age in Pregnant Women with a Diagnosis of Asthma**

A demographic analysis revealed that 80% of cases were women aged 20-35 years, consistent with previous studies reporting similar age distributions (Rejnö et al., 2014) and (Agustina, 2017). This finding is consistent with the higher prevalence of asthma in this age group, which may be attributable to increased exposure to asthma triggers through social and occupational activities, including air pollution, allergens, tobacco smoke, and physical activity (Nursalam et al., 2009).

**Occupation in Pregnant Women with a Diagnosis of Asthma**

The occupational distribution revealed that 52% of the subjects were housewives, potentially due to greater exposure to indoor asthma triggers such as household dust, animal allergens, pollen, mold, and indoor air pollutants, including cleaning products and insecticides (Izzati, 2019). Psychosocial factors such as mental stress can also trigger asthma attacks (Chasanah, 2019).

**Body Mass Index in Pregnant Women with a Diagnosis of Asthma**

A further analysis of body mass index (BMI) revealed that 44% of cases were classified as obesity class II, followed by 32% with normal BMI. This significant proportion of obesity aligns with research indicating that pregnant women with obesity have higher proinflammatory serum markers compared to those with normal weight (Christian & Porter, 2014). The respiratory system is affected by obesity through multiple mechanisms, including direct mechanical changes from fat accumulation in the chest wall, abdomen, and upper airways, as well as through systemic inflammation (Direktorat Jenderal Pengendalian Penyakit dan Penyehatan Lingkungan Departemen Kesehatan R.I., 2008). The augmented mechanical load in obese individuals engenders diminished chest wall and lung compliance, culminating in elevated respiratory work (Brazzale et al., 2015).

**Gestational Age in Pregnant Women with a Diagnosis of Asthma**

The gestational age distribution exhibited that 84% of cases occurred in the third trimester, followed by 16% in the second trimester. This trend can be ascribed to the physiological changes

during late pregnancy, where the expanding uterus prompts alterations in lung volume and chest wall dynamics. The upward displacement of the diaphragm leads to increased end-expiratory abdominal pressure, resulting in early closure of small airways and reduced functional residual capacity and expiratory reserve volume.These changes, combined with hormonal factors such as decreased progesterone and increased prostaglandin levels, may contribute to asthma exacerbations during the third trimester (Damayanti & Pudyastuti, 2020).

**Gravida in Pregnant Women with a Diagnosis of Asthma**

The obstetric history of the subjects revealed that 60% of the cases were multigravida. These subjects generally exhibited a positive response to prior pregnancy experiences, having received counseling regarding pregnancy and asthma interactions, therapy adjustments for optimal respiratory function, allergen avoidance strategies, and early referral practices during antenatal care (Handayani & Rodiani, 2016).

**Referral Origin in Pregnant Women with a Diagnosis of Asthma**

In terms of access to care, 52% of cases were referred through the obstetrics and gynecology clinic, while 48% were came independently. This distribution is indicative of the hospital's status as a tertiary healthcare facility capable of providing subspecialized care (Rahayu & Hosizah, 2021), with internal referral systems demonstrating greater efficiency compared to external referrals due to enhanced communication and resource availability within the institution (Yonara & Wulandari, 2015).

**Conclusion**

1. The prevalence of asthma in pregnant women at Rumah Sakit Universitas Airlangga is 0,31%.
2. The onset of asthma events in pregnant women with asthma at Rumah Sakit Universitas Airlangga in 2022-2023 is most prevalent among pregnant women with a preexisting asthma diagnosis, accounting for 60% of cases.
3. The age demographic of pregnant women with asthma at Rumah Sakit Universitas Airlangga in 2022-2023 is predominantly in the 20-35 age range, constituting 80% of the total sample.
4. The occupational status of pregnant women with asthma at Rumah Sakit Universitas Airlangga in 2022-2023 is primarily housewives or non-working, accounting for 52% of the study population.
5. The body mass index of pregnant women with asthma at Rumah Sakit Universitas Airlangga in 2022-2023 is predominantly classified as obesity II, accounting for 44%.
6. The gestational age of pregnant women with asthma at Rumah Sakit Universitas Airlangga in 2022-2023 is primarily in the third trimester, constituting 84%.
7. The percentage of gravida in pregnant women with asthma at Rumah Sakit Universitas Airlangga in 2022-2023 is predominantly in multigravida, which is 60%.
8. The percentage of referral origin in pregnant women with asthma at Rumah Sakit Universitas Airlangga in 2022-2023 is predominantly in obsgyn clinic, which is 52%.

**Ethics approval and consent to participate**

This study has been reviewed and received approval from the Research Ethics Committee of Rumah Sakit Universitas Airlangga. The ethical approval was granted under approval number 116/KE/P/2024.

## Acknowledgments

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