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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/15982
DOI URL: http://dx.doi.org/10.21474/IJAR01/15982

RESEARCH ARTICLE

RISK FACTORS AND PREVALENCE OF CATAMENIAL ASTHMA (PERIMENSTRUAL ASTHMA, PMA): A CROSS-SECTIONAL STUDY

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Manuscript Info

Manuscript History
Received: 31 October 2022
Final Accepted: 30 November 2022
Published: December 2022

Abstract

Objective: To determine the risk factors and prevalence of catamenial asthma among women globally.

Methods: This research employed a cross-sectional study design to gather and analyze the relevant data that leads to its findings. Wang and Cheng describe a cross-sectional study as an observational study that analyzes data from a population at a single point in time. Cross-sectional studies are helpful when establishing preliminary evidence while planning for a more advanced study in the future. Cross-sectional research requires researchers to record information, but not manipulate variables, as the case in this research study.

Results: Study included 437 female participants. They had their menarche at different ages. They had their first menstrual period between the age of 12-14 years (n= 187, 42.8%) and between the age of 10-12 years (n= 176, 40.3%). It is noticed from the table that half of study participants experience worsening of asthma symptoms during menstruation (n= 219, 51.1%). More than half of study participants take painkillers medications for menstrual pain (n= 266, 60.9%). The last premenstrual asthma experience was before more than 1 year among 247 participants (56.5%) while it was before less than 1 year among 190 participants (43.5%). Most of study participants encountered it 2 times (n= 142, 32.5%) or 3-4 times (n= 140, 32%). The most frequent approach was via doctors' advice (n= 205, 46.9%) followed by using over the counter drugs (n= 176, 40.3%). On the other hand, 20 participants just let it pass without any management (4.6%) and 36 participants attended at the emergency department (8.2%).

Conclusion: Study results showed that most participants had their menarche at the age of 12-14 years. and more than one third of them encounter symptoms of catamenial asthma. Most of participants depend on doctor's advice regarding the management with some of them attend

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at the emergency department to relieve their symptoms. More than half of study participants don't know how to manage their symptoms and avoid risks related to exposure to catamenial asthma.

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Introduction:-

Asthma is a prevalent medical disorder in children and adolescents, and it places a significant burden on healthcare systems because of its high incidence (about 5-10%), chronic nature, potentially severe symptoms, and related cost.

Asthma incidence varies greatly across regions of the world, being greatest in industrialized nations and lowest in emerging ones; nonetheless, its burden is fast growing in developing nations as they adopt Western ways of life [3,4]. Asthma affects around 300 million individuals worldwide (including nearly 25 million in the United States) [5]. The Centers for Disease Control and Prevention report that 9.1–9.7 percent of adult females and 5.1–5.5% of adult males have it [6].

Respiratory symptoms of asthma include coughing, wheezing, shortness of breath, chest tightness, and increased mucus production, all of which may change over time. During pulmonary function tests, it is often accompanied by hyperresponsiveness and fluctuating airflow restriction, and in certain individuals, it is also linked to signs of airways inflammation [2]. A condition known as perimenstrual asthma occurs when asthma symptoms intensify in the days leading up to menstruation (PMA). Although the exact etiology of PMA is unknown, environmental hormones may have a role. Because asthma worsens cyclically during the luteal phase and/or the first days of the menstrual cycle, it seems that fluctuations in estrogens during ovulation and before periods, as well as progesterone release during the luteal phase and its subsequent withdrawal, are to blame.

Up to 40% of asthmatic women of childbearing age have PMA [7]. Hormonal therapies, leukotriene receptor antagonists, and microbially-targeted therapies have all been recommended as potential remedies for the condition [8–17]. Adolescent PMA is poorly understood, and there is no clear protocol for treating the condition.

Catamenial asthma [Perimenstrual Asthma (PMA)] is surprisingly common, but what exactly causes it? A systematic review of the literature on the topic and an internet search turned up no clear answers. Asthma prevalence statistics during the previous several years were published, and the reasons for the gender gap in asthma prevalence were examined in the literature. Catamenial/perimenstrual asthma has been a scarce topic in the literature. Despite evidence from the vast majority of research showing that females, not males, are at a higher risk of dying from asthma-related complications, no studies have examined the causes and frequency of catamenial asthma. Due to a dearth of relevant research, the causes and incidence of catamenial asthma remain poorly understood. Filling this knowledge gap would benefit both patients and medical practitioners. The current research aimed to determine the risk factors and prevalence of catamenial asthma among women globally.

Methods:-

Study Design

This research employed a cross-sectional study design to gather and analyze the relevant data that leads to its findings. Wang and Cheng describe a cross-sectional study as an observational study that analyzes data from a population at a single point in time. Cross-sectional studies are helpful when establishing preliminary evidence while planning for a more advanced study in the future [18]. Cross-sectional research requires researchers to record information, but not manipulate variables [19], as the case in this research study.

Research Approach

This research employed a quantitative research approach for data collection and analysis. As the study aims to determine the risk factors and prevalence of catamenial asthma globally, a quantitative research approach would be appropriate because it supports observations and surveys using closed-ended questions, as the case in this study (See Appendix 1). A quantitative approach requires the collected data to be converted into numerical form to perform statistical calculations and draw conclusions [19]. The cross-sectional design combined with a quantitative research approach is inexpensive both in time and resources.

Research Tool

For this study, a closed-ended questionnaire was dispatched online for individuals worldwide to disclose their experience with catamenial asthma. The inclusion criteria was – only women who have experienced catamenial asthma in the last ten years are expected to participate. The exclusion criteria was - women who have not experienced catamenial asthma during the previous ten years should not participate.

Population and sample size

The study population involved 5000 women from around the world. There was at least 100 participants from every country chosen to participate. The study expects respondents from approximately 50 countries to reach the overall targeted population of 5000. Random sampling drew 250 participants from a random sample of data from each country that participated.

Data collection and analysis

Secondary sources and primarily journalswere gathered from online health databases for the literature review. As already stated, the primary data necessary for undertaking this research was collected using a closed-ended questionnaire. After data collection, the data was converted into numerical form to perform statistical calculations and draw conclusions. The study used SPSS as the preferred tool for data analysis.

Ethical Consideration

Results:-

Study included 437 female participants. They had their menarche at different ages. They had their first menstrual period between the age of 12-14 years (n= 187, 42.8%) and between the age of 10-12 years (n= 176, 40.3%). Figure 1 shows the age of menarche among study participants.

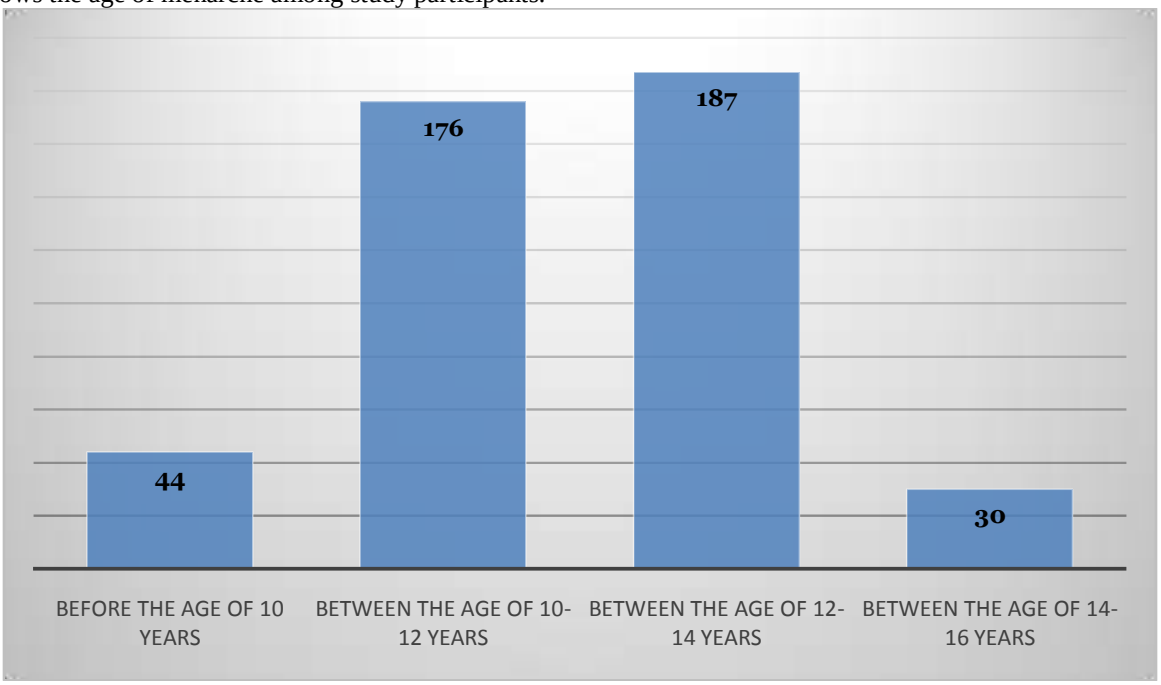

Figure 1:- Age of menarche among study participants.

Participants in the current study were asked about catamenial asthma (Premenstrual Asthma). Their answers are presented in table 1. It is noticed from the table that half of study participants experience worsening of asthma symptoms during menstruation (n= 219, 51.1%). More than half of study participants take painkillers medications for menstrual pain (n= 266, 60.9%). Participants' answers are presented in table 1.

Table 1:- Participants responses to survey items.

Item	Yes	No	Unknown / Nor routinely
Do you experience a worsening of asthma symptoms during	219	115	103

menstruation?	50.1%	26.3%	32.6%
Do you experience a worsening of asthma symptoms before menstruation?	121 27.7%	208 47.6%	108 24.7%
Have you ever attended to the emergency department for your menstrual pain?	127 29.1%	310 70.9%	0
Have you ever attended to the emergency department for worsening asthma before menstruation?	184 42.1%	253 57.9%	0
Do you take any painkillers during menstruation?	266 60.9%	171 39.1%	0
Were you ever told by a physician that you had premenstrual asthma?	175 40%	262 60%	0

The last premenstrual asthma experience was before more than 1 year among 247 participants (56.5%) while it was before less than 1 year among 190 participants (43.5%). The age at which participants experienced first episode of catamenial asthma varied among study participants. The most frequent age was 10-20 years (n= 155, 35.5%). Figure 2 shows the age of first episode of catamenial asthma.

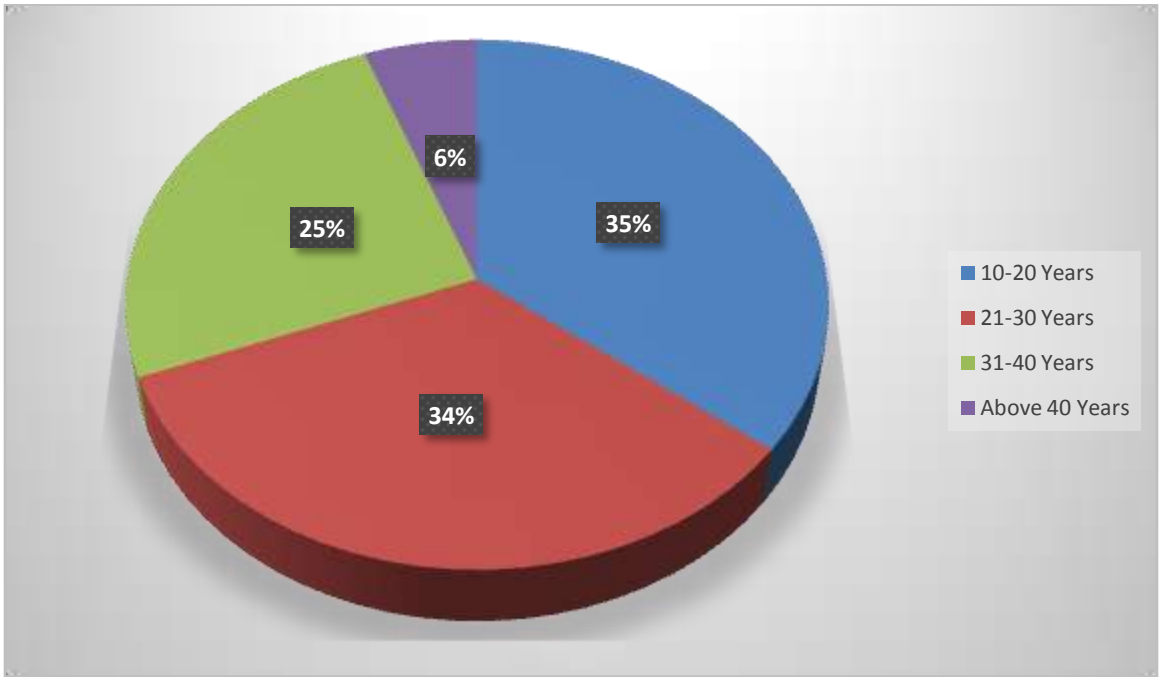

Figure 2:- Age at first episode of catamenial asthma.

Participants were also asked about the frequency of encountering catamenial asthma during the past two years. Most of study participants encountered it 2 times (n= 142, 32.5%) or 3-4 times (n= 140, 32%) as presented in figure 3.

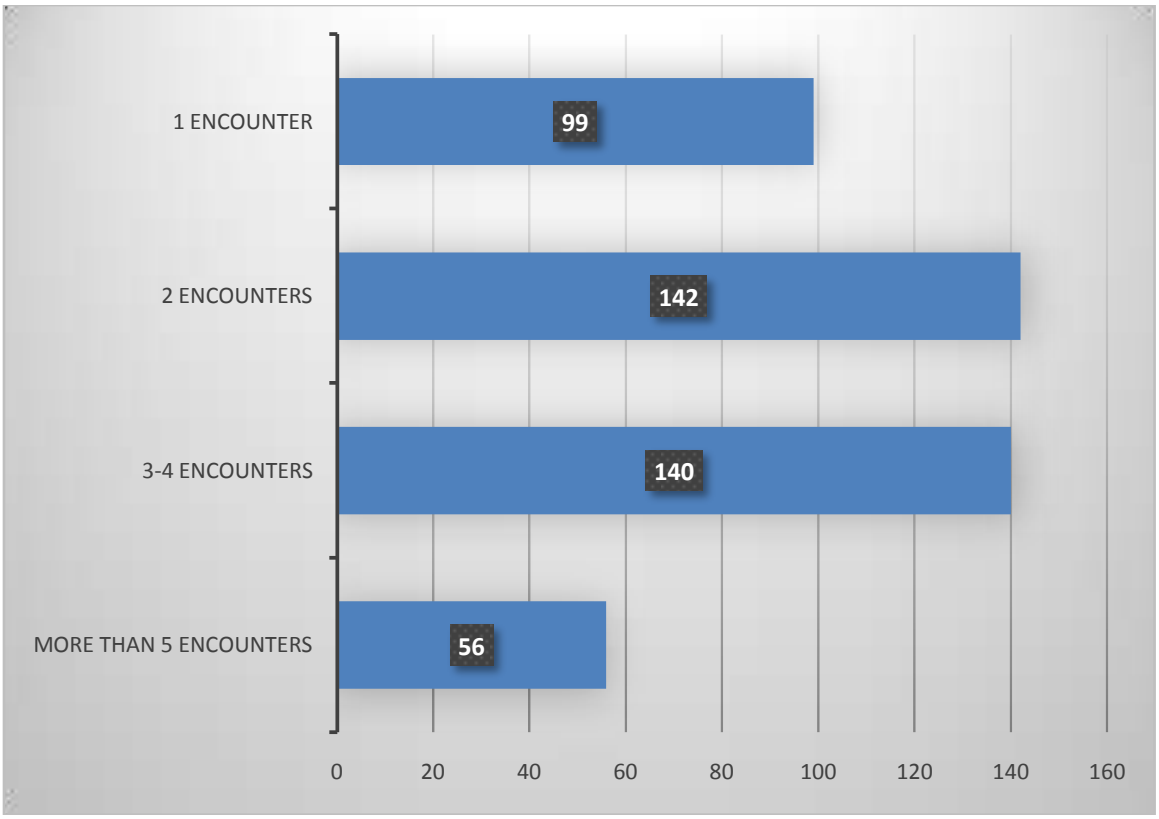

Figure 3:- Frequency of encountering of catamenial asthma.

Participants had different management approaches for their catamenial asthma. The most frequent approach was via doctors' advice (n= 205, 46.9%) followed by using over the counter drugs (n= 176, 40.3%). On the other hand, 20 participants just let it pass without any management (4.6%) and 36 participants attended at the emergency department (8.2%). Half of participants didn't know how to manage their symptoms and avoid risks related to exposure to catamenial asthma (n= 249, 57%).

Discussion:-

Sex variations in asthma are well-documented, adding a further layer of complexity to an already challenging condition. Women are more likely than males to suffer from adult-onset asthma, and they may be more severely affected by it [21-24]. In addition, women tend to report an asthma start later in life, which is often linked to hormonal transitions.

Small studies show that between 30 and 40 percent of women have an increase in their asthma symptoms during menstruation [25-28]. Increases in emergency department (ED) visits, hospitalizations, intensive care unit (ICU) admissions, intubations, and near-fatal and fatal events due to asthma are associated with perimenstrual asthma (PMA) [25]. Unfortunately, the sample sizes of the available studies are too low to accurately characterize the causes or consequences of PMA. Growing evidence suggests that severe asthma may be a good indicator of the presence of multiple phenotypes [29, 30]. Despite the recent identification of a female-predominant, late-onset phenotype [31] in the National Heart, Lung, and Blood Institute Severe Asthma Research Program (SARP), a comprehensive network to research severe asthma causes, no studies have focused on the link of severe asthma to PMA.

Asthma phenotypes and severity seem to be affected by hormonal factors. Girls and women see a rise in prevalence of asthma from puberty on [31–34]. Asthma is more frequent in males before puberty. The population of PMA-affected women is still little understood. Various research have used different definitions, and no comprehensive investigations have been conducted [35, 36]. For this reason, PMA was evaluated in more than 500 women with varying degrees of asthma who were enlisted for the SARP study. Aspirin sensitivity, reduced atopy, and decreased

lung capacity have all been linked to PMA [37], and the results of the biggest research done to date clearly show that PMA constitutes a distinct, highly symptomatic, and exacerbation-prone asthma phenotype.

In this study, PMA was defined as being present in premenopausal women who had asthma and who responded positively to a question about whether or not menstruation triggered their symptoms. Population-based studies have characterized PMA using subjective criteria comparable to the current research [37-41], however some smaller studies have used objective criteria such as lung function or Feno. Despite the clarity of this explanation, 14% of female respondents were unable to correctly identify PMA. Considering that just one in seven women (17%) reported having PMA, it is likely that the vast majority of women with asthma are able to answer this question correctly. This frequency is still greater than the 8.5% reported in a recent survey from the United Kingdom [42]. It is unclear why the current research found a greater frequency of reported PMA, however this may be due to large demographic variations.

Similarly prevalent PMA in women with asthma has been shown by several small retrospective investigations [35, 43–45]. 33% of women in one research had increasing asthma symptoms during this time [35], while 25% of women with asthma experienced a near-fatal asthma attack during this time [44]. Furthermore, 46% of 182 women who went to the ED for asthma exacerbations did so during the perimenstrual period (days 26 to 4 of a 28-day cycle) [45].

Preliminary evidence links PMA to asthma that is prone to exacerbations. This research adds on this by linking PMA to more severe asthma symptoms and HCU compared to those without PMA, as well as worse lung function and reduced lung capacity [37]. PMA was reported by 24% of patients with severe asthma and by 11% of those without severe asthma. Differences in asthma symptoms and exacerbations between individuals with and without PMA persisted even after controlling for severity, showing that PMA cannot be attributed only to more severe asthma. Lower projected forced vital capacity (FVC), gastroesophageal reflux disease (GERD), and, most notably, aspirin sensitivity were revealed as distinguishing features of PMA by the extensive modeling made feasible by the vast SARP database. Those with severe asthma and PMA had significantly lower IgE levels. When the impact of the disease was taken into account, however, age, body mass index, and anticipated fraction of forced expiratory volume in one second were not linked. Among conclusion, PMA reveals a phenotype of asthma in women at risk for poorly managed severe asthma, with unique contributing characteristics (aspirin sensitivity and lower IgE level) that set it apart from classic allergic asthma [37].

Unique and noteworthy is the link between PMA and aspirin sensitivity [46]. Consistent with this correlation [47, 48], PMA has also been linked to chronic sinusitis and nasal polyps [37]. Prostaglandins (PGs) are hormone-like substances that have significant ties to menstruation and are inhibited by aspirin and other nonsteroidal anti-inflammatory medicines (37). Progesterone withdrawal causes a rise in PGE2, which causes vasodilation and contributes to endometrial edema [49]. This occurs just before and during the commencement of menstruation. When menstruation first begins, the endometrium produces more of the vasoconstrictive peptide fibroblast growth factor 2 (PGF2) [48]. It is unknown whether and how systemic quantities of these eicosanoids influence the lung in asthma, or how their suppression by cyclooxygenase inhibitors relates to the disease. Loss of PGE2 protective levels may have an unfavorable effect on asthma if perimenstrual-associated PGE2 elevations are reduced [50-52]. Therefore, it becomes sense that PG anomalies connect these two diseases. Alternatively, a small research indicated that aspirin sensitivity was more likely to be recognized in women with PMA who used nonsteroidal antiinflammatory medicines to address perimenstrual symptoms [37, 46].

Even after controlling for potential confounding factors, IgE levels were considerably lower in women with severe asthma and PMA. Women with severe asthma and PMA are less likely to develop classic allergic asthma, according to a trend that was seen in all participants with PMA but did not achieve statistical significance [37]. There was also a reduction in atopic dermatitis and the frequency of positive skin prick tests in PMA participants, which corroborates this finding. This finding has to be verified in further investigations [37].

Reduced projected forced vital capacity was the last factor linked with PMA in the multivariate analysis [37]. In order to determine if this is the result of air trapping, obesity-related consequences, or a genuine restrictive process, lung volumes are required. Exacerbation-prone, severe asthma has been linked to air trapping and obesity [53–55]. Breathlessness, a symptom historically linked with air trapping (and fat), may be more common in those with lower

FVC% expected [53]. Notably, the findings of the modeling suggested that low FVC% predicted was more strongly connected with PMA than obesity.

Notably, Farha et al. [38] found that FEV1, FVC, and gas transfer did not improve for PMA patients over the menstrual cycle in women with asthma. Airflow blockage is thought to be exacerbated by the menstrual cycle-related changes in pulmonary function, which have been connected to angiogenic processes or remodeling [38]. Irrespective of whether or whether these variations are more prominent in women with PMA and contribute to the decreased FVC, more research is needed [37].

These results have clinical significance due to the robust associations between PMA and both high symptom burden and high symptom frequency [37]. The association between PMA and exacerbations and symptoms was examined after controlling for a number of characteristics, including the fact that women with more severe asthma, aspirin-sensitivity asthma, and air trapping might also show low levels of asthma control. PMA was consistently related to more frequent and more severe symptoms [37].

Conclusion:-

Study results showed that most participants had their menarche at the age of 12-14 years. and more than one third of them encounter symptoms of catamenial asthma. Most of participants depend on doctor's advice regarding the management with some of them attend at the emergency department to relieve their symptoms. More than half of study participants don't know how to manage their symptoms and avoid risks related to exposure to catamenial asthma.

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APPENDIX 1: Data collection sheet

1. When did you have your first menstrual period?

□ Before the age of 10 years □ Between the age of 10-12 years □ Between the age of 12-14 years □ Between the age of 14-16 years

2. Do you experience a worsening of asthma symptoms during menstruation?

□ Yes □ No □ Unknown

If yes; please explain: ----------

3. Do you experience a worsening of asthma symptoms before menstruation?

□ Yes □ No □ Unknown

If yes; please explain: ----------

4. Have you ever attended to the emergency department for your menstrual pain?

□ Yes □ No □ Not routinely

5. Have you ever attended to the emergency department for worsening asthma before menstruation?

□ Yes □ No □ Not routinely

6. Do you take any painkillers during menstruation?

□ Yes □ No □ Not routinely

7. Were you ever told by a physician that you had premenstrual asthma?

□ Yes □ No □ Unknown

8. When did you experience premenstrual asthma last?

□ Before less than 1 year □ Before more than 1 year

9. How old were you when you first had an encounter with catamenial asthma?

□ 10-20 years □ 21-30 □ 31-40 □ Above 40 years

10. How many catamenial asthma encounters have you had in the last two years?

□ More than 5 encounters □ 3-4 encounters □ 2 encounters □ 1 encounter

11. How did you manage the symptoms associated with catamenial asthma?

□ Emergency department visit
□ Via doctor's advice
□ Using over the counter drugs
□ Just let it pass

12. Do you know ways to manage yourself and avoid the risks related to exposure to catamenial asthma?

□ Yes □ No

If yes, please explain: ----------