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Prevalence and risk factors of the pregnancy rhinitis at Tikrit General Hospital, Tikrit City, Iraq

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Abstract

Background: Pregnancy rhinitis (PR) is a relatively common condition with a prevalence of 20%. We aimed to identify the prevalence and risk factors of the PR. A prospective cohort study was conducted at the Obstetric and Gynecology and Otolaryngology Departments in the Tikrit General Hospital, Tikrit City, Iraq. The study covered 12 months (September 2019–September 2020). Pregnant women were divided into two groups; with and without PR. Data regarding the age, body mass index (BMI), occupation, smoking, clinical features, parity, gestational age, and sex of the baby were recorded. Visual analog scale (VAS) and nasal-obstructive-symptom-evaluation (NOSE) scale were used for the evaluation of the nasal obstruction.

Results: The prevalence of the PR was 11.65% (110/944 pregnant women). Rhinorrhea was the commonest associated feature with nasal obstruction of the PR ($n = 48$, 43.6%). Ninety percent of the patients were in the age group < 35 years. The majority of the subjects were housewives ($n = 551$, 58.4%), in the second trimester ($n = 456$, 48.3%), and in the parity group 0–2 ($n = 511$, 54.1%). The female baby was found in 56.5% of the patients ($n = 533$). There were statistically significant differences between the two groups: women with and without PR regarding the BMI and gestational age (first trimester) (P value = 0.001). No history of current smoking was found in all women.

Conclusion: The prevalence of PR was 11.65% and was mostly seen in the first trimester. High BMI and pregnant women in the first trimester were considered risk factors for the PR.

Keywords: Prevalence, Pregnancy Rhinitis, Rhinitis, Pregnancy

Background

Rhinitis (coryza) is defined as inflammation and irritation of the nasal mucous membrane. It is characterized by one or more of the following nasal symptoms: stuffiness or obstruction, rhinorrhea, sneezing, itching, and post-nasal discharge [1]. Pregnancy rhinitis (PR) can be defined as congestion of the nose of at least 6 weeks or more of pregnancy without evidence of features of upper respiratory tract infection (URTI) and allergic rhinitis and resolved fully within 2 weeks following delivery [2, 3].

PR is a relatively common condition but is never discussed in the national literature. It affects 20% of

pregnant women [4]. It gained importance in recent years, mainly due to the discovery of its association with snoring and obstructive sleep apnea during pregnancy [1, 5]. Besides, studies have shown its association with gestational hypertension, intrauterine growth retardation, and lower Apgar scores in neonates [1]. Despite its benign nature, it is one of the greatest bothering conditions affecting the quality of the life of pregnant women [6, 7]. PR is also considered a major concern facing doctors for its diagnosis and treatment [8, 9]. Despite the prevalence of PR being high among pregnant women, it is often underdiagnosed and even ignored during an antenatal visit [10]. The alterations of hormones through pregnancy especially estrogen, besides the rising blood volume are considered to be the principal causes of the PR [11].

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Despite PR being a common condition of pregnant women, to our best knowledge, no study in Iraq belongs to this important issue. Hence, it is of utmost importance to know the epidemiological aspects of this disease and give the dealing obstetricians an awareness of PR in their work during the antenatal visits. We aimed to detect the prevalence and risk factors of the PR in pregnant women at the Tikrit General Hospital, Tikrit City, Iraq.

Subjects and methods

A prospective cohort study was conducted at the Obstetric and Gynecology and Otolaryngology Departments in the Tikrit General Hospital, Tikrit City, Iraq. The study covered a one-year duration (September 2019–September 2020). Pregnant women who attended the antenatal care clinic during the first 2 months of the study were recruited in the current study. The patients were divided into two groups; those with suggestive features of PR (nasal obstruction alone or with other new nasal symptoms: rhinorrhea, postnasal discharge, sneezing, and itching) and without PR. Those with suggestive features of PR were referred and followed up at the Otolaryngology Department. We contacted the women with PR monthly during the first 6 months of the pregnancy and 2 weekly thereafter by phone to see whether the nasal obstruction resolved or not. The diagnosis of PR was established, if the suggestive features were continued for 6 weeks or more during the pregnancy and resolved at 3 weeks following delivery. While pregnant women without features of PR were followed-up at the antenatal clinic according to the routine schedule. During the follow-up, pregnant women who complained of PR suggestive features were referred to the Otolaryngology Department. The same protocol was applied to them. According to a thorough history and clinical examination (anterior rhinoscopy and nasal endoscopy), the otolaryngologist excluded the other causes of rhinitis and reached the provisional diagnosis of the PR.

The exclusion criteria include the following:

1. Previous sinonasal pathologies like allergic rhinitis, septal deviation, nasal polyposis, granuloma gravidarum, URTI, and drug-induced rhinitis.
2. Previous nasal and paranasal surgery.
3. Patients who did not want to participate in the study.
4. Pregnant women whose nasal obstruction remained for more than 3 weeks following the postpartum period.
5. Patients who lost to follow-up.

Data concerning the age, body mass index (BMI), occupation, smoking habit, clinical features, duration, parity, trimester, and sex of the baby were recorded for

every subject. The age of the patients was divided into 2 groups < 35 and ≥ 35 years. The BMI = body weight in kg/length in m^2 . Informed consent was taken from every patient. The present study was approved by the Ethical Approval Committee of the University Of Anbar (reference number 18 on 15–2-2021).

The pregnant women were told to fill the visual analog scale (VAS) and nasal-obstructive-symptom-evaluation (NOSE) scale. The specificity and the sensitivity of both were examined for their validity by prior investigations [12, 13]. The VAS comprises a scale from 0 to 10 cm where 0 is no obstruction and 10 is complete obstruction. While the NOSE scale consists of 5 gradings (0 = not a problem, 1 = very mild, 2 = moderate, 3 = fairly bad, and 4 = severe problem) for 5 complaints (nose obstruction and stuffiness, nose obstruction, trouble breathing through my nose, trouble sleeping, and unable to get enough air through my nose during exercise or exertion) [14]. The summation of the answers is multiplied by 5 to base the scale out of a possible score of 100 for analysis. For the study, the cut-off score of the nasal obstruction for the VAS was 5, and 45 for the NOSE scale according to their uses in previous investigations [12, 14, 15]. The results of these two scales were performed by well-trained personnel and obscured to the otolaryngologist to avoid bias.

Pregnant women with PR were treated by advising to avoid any irritating substances, steam inhalation, and normal saline nasal drops.

The data were analyzed using IBM-SPSS (Statistical Package for the Social Sciences) statistical software version 25. The results were presented in tables in terms of frequencies and percentages. The chi-squared test was used to compare categorical variables and the independent *t* test for continuous variables. *P* value was considered a statistically significant difference if it is less than 0.05.

Results

Out of 1651 pregnant women, there were 707 subjects were excluded from the study. Of the remaining 944 cases, 110 were with PR (11.65%) (Fig. 1). The mean age of our patients was 27.25 ± 6.654 years (age range from 20 to 43 years), while the median and mode were 26 and 20 years respectively. The duration of the clinical features of the PR ranged from 5 to 21 days (mean duration of 10.02 ± 3.319 days). The most common associated feature with nasal obstruction in the studied sample was rhinorrhea ($n = 48$, 43.6%), while the least was itching ($n = 10$, 9.1%) as shown in Table 1.

The highest age group affected was < 35 years ($n = 842$, 89.2%). The majority of cases were housewives ($n = 551$, 58.4%). Near half of the patients were in the second trimester. The majority of the pregnant women were in the

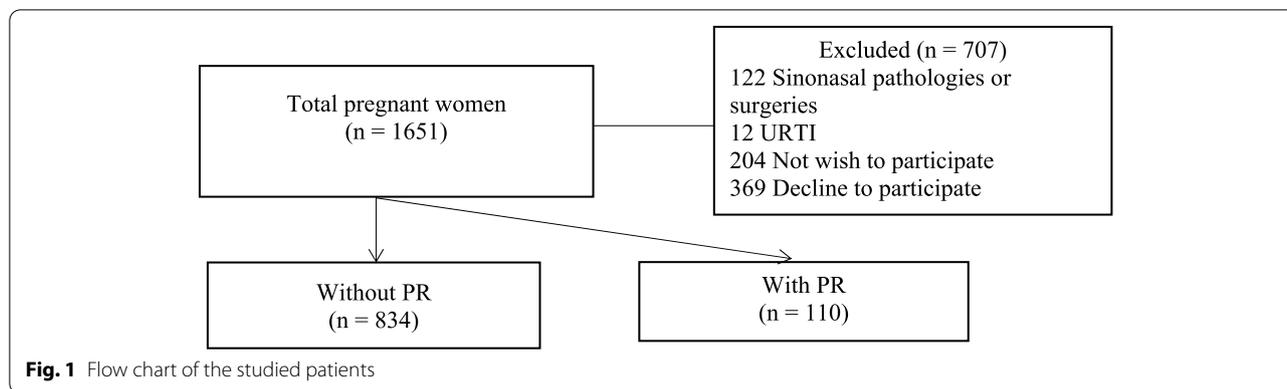


Table 1 Frequency of the associated features with nasal obstruction of the PR in 110 pregnant women

Feature	Number (%)
Rhinorrhea	48 (43.6%)
Inferior turbinate hypertrophy	46 (41.8%)
Sneezing	30 (27.3%)
Postnasal drip	18 (16.4%)
Itching	10 (9.1%)

parity group 0–2 ($n = 511$, 54.1%). Pregnant women with female sex babies were found in 56.5% ($n = 533$) as shown in Table 2. There were statistically significant differences between the pregnant women with and those without PR regarding the gestational age (first trimester) and BMI (P value = 0.001). While there were no statistically significant differences regarding other factors, namely the age of the pregnant women, occupation, parity, and sex of the baby (P value > 0.05) between the two groups (Table 2). No history of the active smoker was found in the studied sample.

Discussion

Women are subjected to unique changes as a result of cyclical hormonal changes in the period of the menstrual cycle, pregnancy, and menopause. The physiological changes affect the whole parts of the human body due to the effects of progesterone and estrogen. These 2 hormones affect the central nervous system. The majority of the hormonal changes cause no harm to the pregnant woman and her fetus [16]. However, in certain conditions, the hormonal changes lead to various rhinological problems like PR, epistaxis, and nasal blockage [16]. The PR might harm the quality of life in terms of snoring and obstructive sleep apnea with their sequelae [16]. Our results reported that the prevalence of PR was 11.65%, which was in the range of the previous studies

Table 2 The socio-clinical characteristics of the pregnant women with (110) and without (834) PR

Variable	Pregnant women			P value
	With PR (n = 110)	Without PR (n = 834)	Total (n = 944)	
Age group in years				0.970
< 35	98 (11.6%)	744 (88.4%)	842 (89.2%)	
≥ 35	12 (11.6%)	90 (33.3%)	102 (10.8%)	
BMI (mean ± SD)	27.94 ± 4.293	21.46 ± 2.871		0.001
Occupation				0.999
Housewife	64 (11.6%)	487 (88.4%)	551 (58.4%)	
Teacher	30 (11.7%)	227 (88.3%)	257 (27.2%)	
Employ	16 (11.8%)	120 (88.2%)	136 (14.4%)	
Trimester				0.001
First	54 (19.5%)	223 (80.5%)	277 (29.3%)	
Second	36 (7.9%)	420 (92.1%)	456 (48.3%)	
Third	20 (9.5%)	191 (90.5%)	211 (224%)	
Parity				0.820
0–2	62 (12.1%)	449 (38.7%)	511 (54.1%)	
3–5	34 (11.5%)	262 (41.2%)	296 (31.4%)	
≥ 6	14 (10.2%)	123 (42.9%)	137 (14.5%)	
Sex of the baby				0.531
Male	48 (11.7%)	363 (88.3%)	411 (43.5%)	
Female	62 (11.6%)	471 (88.4%)	533 (56.5%)	

from different geographical areas (9 to 53.3%) [10, 11, 14, 16–20]. The difference may be attributed to the following reasons: the difference in the place and design of the study (population or hospital-based study), inclusion and exclusion criteria, geographical location, the economic state of the patient, and ignorance of mild symptoms by the pregnant women. We cannot estimate the accurate prevalence of PR in our study owing to the exclusion of pregnant women with previous sinonasal diseases and surgeries and high percentages of pregnant lost to

follow-up or because they did not wish to participate in the study.

PR is considered a diagnosis of exclusion of other sinonasal pathologies such as septal deviation, nasal polyposis, allergic rhinitis, intrinsic rhinitis, and pyogenic gravida because there is no laboratory or specific test. The diagnosis depends on a thorough history and proper nasal examination either by anterior rhinoscopy or endoscopy. This is supported by certain subjective scales such as DIP (discharge-inflammation-polyps/edema), VAS, and NOSE scale, or by objective tests (rhinomanometry and acoustic rhinometry) [14]. Therefore, the VAS, NOSE, and DIP scoring systems are useful for the assessment of the PR.

The cardinal symptom of the PR is nasal obstruction. It harms sleep quality through mouth breathing, snoring, and obstructive sleep apnea syndrome. Besides, weight gain during pregnancy aggravates these conditions [21, 22]. As a result of the nasal obstruction, there is a decrease in the inspiration of nitric oxide, which is mainly produced in the maxillary sinuses, therefore, the vascular resistance in the lungs will be decreased. The low nitric oxide hurts the fetus, thus resulting in sinister complications to the mother and her fetus, including intrauterine growth retardation, a low Apgar score of the newborn, maternal hypertension, and preeclampsia [23, 24]. Furthermore, nasal obstruction with its sequel may lead to the overuse and abuse of sympathomimetic nasal decongestants resulting in rhinitis medicamentosa which does not improve following parturition [25]. Therefore, it is of utmost importance to manage the pregnant woman with rhinitis properly to relieve patient discomfort, avoid the above-mentioned complications and sequels, and avoidance of the side effects of the drugs such as antibiotics and oral steroids on the mother and fetus. The gestational age and BMI of the patients showed statistically significant differences between pregnant women with and without PR (P value = 0.001). While other factors such as the age, occupation, parity, and sex of the baby did not show significant differences between the two groups (P value > 0.05).

Rhinorrhea is considered one of the symptoms of PR. In the current study, rhinorrhea was the most common associated symptom with nasal obstruction. Of note, rhinorrhea with nasal obstruction increases the impact on pregnant women.

Tobacco smoke has a detrimental effect on the nasal mucociliary mechanism, therefore, it might aggravate or initiate nasal pathologies including the PR. The prevalence of active smokers among the Iraqi population was 29–31% for men and 3–4% for women [26, 27]. This prevalence is much lower than the Sweden female population [17]. Fortunately, no patient gave a history of active

smoking in our study. However, if the prevalence of the PR is more in smokers, then the prevalence of PR in the non-smoker female population may be so low [18]. This might be an additional factor for the relatively low prevalence of PR in our study.

Although the mechanisms of the PR remain obscure whether it is due to physiological changes during pregnancy or due to an aggravating nasal disease before the pregnancy. This is supported by several investigations that studied the association between demographic characteristics and PR, like age and social environment [10]. Our study did not show a significant association between the age and occupation of the pregnant women with and without PR (P value > 0.05).

PR can develop at any time in pregnancy [18, 28, 29]. In our study, the majority of the pregnant women were in the second trimester. However, there was a statistically significant difference between women with and without PR regarding gestational age (first trimester). This finding was consistent with a prior study, which reported that all cases of PR were found in the first trimester [16]. This may be explained by increasing blood volume and hormonal alteration which are typically noticed in the first two trimesters [30]. However, it was inconsistent with other investigations [10, 14, 17, 18].

In the current study, around 60% of the women carry a female fetus, this was in agreement with another study [17]. This may be due to the effects of hormones of both mother and fetus female on the initiation and severity of the PR [17]. However, no significant association was found between the sex of the baby between the two groups of pregnant women.

There is an ambiguity concerning many aspects of the PR, despite, the term PR was created in the late nineteenth century by McKenzie [21]. We started with the definition of the PR by Ellegard and Karlsson [2], the definition excludes the other symptoms of rhinitis as they are well known to the otolaryngologists such as rhinorrhea, facial pain, and postnasal discharge. Furthermore, the minimum duration of the PR is 8 weeks (6 weeks in the last period of the pregnancy and 2 weeks after delivery); therefore, it could be classified into subacute and chronic. Another issue that needs to be clarified, PR occurs due to hormonal changes in the pregnancy, so why not all pregnant women are affected by the condition? The third aspect, there is no scoring system for the severity of the condition which affects its course. The fourth issue is that PR, like other forms of rhinitis, predisposes to infective rhinitis and leads to chronic rhinosinusitis. As a result of the above-mentioned issues, we recommend further studies to answer these questions.

The limitations of the study included first, a relatively small sample size which did not reflect the actual prevalence rate of the PR. Second, the study period was short.

Conclusion

The prevalence of PR was 11.65% among pregnant women and was mostly seen in the first trimester. There was a significant effect on the gestational age and the BMI of the patients with and without PR.

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Authors' contributions

RAR collected the data and analyzed it. AAA wrote the introduction and searched the related published studies. RMA revised the introduction and the analysis and he was a major contributor in writing the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Written approval had been gained from the ethical committee at the University Of Anbar, Iraq. Study data/information was used for the research purpose only. Informed written consents were taken from all the patients to participate in this study. The confidentiality issue was intentionally considered. The participation was voluntary. Any participant has had the right to withdraw at any stage.

Consent for publication

Not applicable (no individual personal data included).

Competing interests

The authors declare that they have no competing interests.

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References

- Wallace DV, Dykewicz MS, Bernstein DI, Blessing-Moore J, Cox L, Khan DA et al (2008) The diagnosis and management of rhinitis: an updated practice parameter. *J Allergy Clin Immunol* 122(2):S1-84
- Ellegård E, Karlsson G (1999) Nasal congestion during pregnancy. *Clin Otolaryngol Allied Sci* 24(4):307–311
- Namazy JA, Schatz M (2014) Diagnosing rhinitis during pregnancy. *Curr Allergy Asthma Rep* 14(9):458
- Shah R, McGrath KG (2012) Nonallergic rhinitis. *Allergy and asthma proceedings*. OceanSide Publications, p 19
- Dzieciolowska-Baran E, Teul-Swiniarska I, Gawlikowska-Sroka A, Poziomkowska-Gesicka I, Zietek Z (2013) Rhinitis as a cause of respiratory disorders during pregnancy. *Respiratory Regulation-Clinical Advances*. Springer, pp 213–20
- Settipane RA, Charnock DR (2007) Epidemiology of rhinitis: allergic and nonallergic. *Clin Allergy Immunol* 19:23–34
- Abdulrahman H, Hadi U, Tarraf H, Gharagozlou M, Kamel M, Soliman A et al (2012) Nasal allergies in the Middle Eastern population: results from the "Allergies in Middle East Survey." *Am J Rhinol Allergy*. 26(6_suppl):S3-23
- Sabry EY (2011) Prevalence of allergic diseases in a sample of Taif citizens assessed by an original Arabic questionnaire (phase I): a pioneer study in Saudi Arabia. *Allergol Immunopathol (Madr)* 39(2):96–105
- Loock JW (2009) Allergic rhinitis and pregnancy—A Review of the literature, with recommendations for management. *Prof Nurs Today* 13(5):30–33
- Albahkaly S, Bahkali SM, Alotaibi MG, Alghamdi AM, Alswidan RS, bin Shafi MF et al (2016) Rhinitis in pregnancy among Saudi Women. *J US China Med Sci*. 13:233–9
- Zacharisen MC (2000) Rhinitis in children, adolescents, the elderly, and pregnant women: special considerations. *Immunol Allergy Clin North Am* 20(2):425–444
- Stewart MG, Witsell DL, Smith TL, Weaver EM, Yueh B, Hannley MT (2004) Development and validation of the Nasal Obstruction Symptom Evaluation (NOSE) scale. *Otolaryngol Neck Surg* 130(2):157–163
- Bousquet P-J, Combescurie C, Klossek J-M, Daurès J-P, Bousquet J (2009) Change in visual analog scale score in a pragmatic randomized cluster trial of allergic rhinitis. *J Allergy Clin Immunol* 123(6):1349–1354
- Ulkumen B, Ulkumen BA, Pala HG, Celik O, Sahin N, Karaca G et al (2016) Pregnancy rhinitis in Turkish women: do gestational week, BMI and parity affect nasal congestion? *Pakistan J Med Sci* 32(4):950
- Bousquet PJ, Combescurie C, Neukirch F, Klossek JM, Mechin H, Daures J et al (2007) Visual analog scales can assess the severity of rhinitis graded according to ARIA guidelines. *Allergy* 62(4):367–372
- Swain SK, Pattnaik T, Mohanty JN (2020) Otolaryngological and rhinological manifestations in pregnancy: our experiences at a tertiary care teaching hospital of East India. *Int J Heal Allied Sci* 9(2):159
- Indirani B, Raman R, Omar SZ (2013) Hormonal changes causing rhinitis in pregnancy among Malaysian women. *J Laryngol Otol* 127(9):876
- Ellegård E, Heggren M, Torén K, Karlsson G (2000) The incidence of pregnancy rhinitis. *Gynecol Obstet Invest* 49(2):98–101
- Shushan S, Sadan O, Lurie S, Evron S, Golan A, Roth Y (2006) Pregnancy-associated rhinitis. *Am J Perinatol* 23(07):431–433
- Baudoin T, Šimunjak T, Bacan N, Jelavić B, Kuna K, Košec A (2021) Redefining pregnancy-induced rhinitis. *Am J Rhinol Allergy* 35(3):315–22
- Caparroz FA, Gregorio LL, Bongiovanni G, Izu SC, Kosugi EM (2016) Rhinitis and pregnancy: literature review. *Braz J Otorhinolaryngol* 82(1):105–111
- Namazy JA, Schatz M (2011) Asthma and rhinitis during pregnancy. *Mt Sinai J Med A J Transl Pers Med* 78(5):661–670
- Ellegård EK (2006) Pregnancy rhinitis. *Immunol Allergy Clin* 26(1):119–135
- Franklin KA, Holmgren PÅ, Jönsson F, Poromaa N, Stenlund H, Svanborg E (2000) Snoring, pregnancy-induced hypertension, and growth retardation of the fetus. *Chest* 117(1):137–141
- Graf P (2005) Rhinitis medicamentosa. *Treat Respir Med* 4(1):21–29
- Maziak W, Nakkash R, Bahelah R, Husseini A, Fanous N, Eissenberg T (2014) Tobacco in the Arab world: old and new epidemics amidst policy paralysis. *Health Policy Plan* 29(6):784–794
- Hussain Z, Sullivan R (2017) Tobacco in post-conflict settings: the case of Iraq. *Ecancermedicalscience*. 11:735
- Ellegård EK (2004) Clinical and pathogenetic characteristics of pregnancy rhinitis. *Clin Rev Allergy Immunol* 26(3):149–159
- Dykewicz MS, Hamilos DL (2010) Rhinitis and sinusitis. *J Allergy Clin Immunol* 125(2):S103–S115
- Greiner AN, Hellings PW, Rotiroti G, Scadding GK (2011) Allergic rhinitis. *Lancet* 378(9809):2112–2122

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