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Original Research

Otorhinological disorders among pregnant women attending the obstetric clinic at Benjamin Mkapa Hospital, Tanzania

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Abstract

Background: Pregnancy leads to physiological changes primarily driven by hormones like oestrogen and progesterone. Such changes are multi-systemic in nature including involvement of the ear, nose and throat. Such changes impair the quality of the life of pregnant women and thus requires prompt intervention during pregnancy. This study aimed to determine otorhinological disorders among pregnant women attending obstetric clinic at Benjamin Mkapa Hospital.

Methodology: A hospital-based descriptive cross-sectional study was conducted at Benjamin Mkapa Hospital from June to August 2023. A total of 246 pregnant women were recruited after consenting where data on their age, gestational age, and otological and rhinological disorders were obtained. Otoscopic and rhinoscopic examination were done and recorded in the data collection sheet. Data was analysed using a Statistical Package for Social Sciences (SPSS) version 23. A p-value<0.05 was statistically significant.

Results: This study recruited 246 pregnant women with majority 135(52.8%) in the 3rd trimester. Pertaining otological disorders manifested by pregnant women, majority 39(15.9%) of them presented with hearing loss/reduced hearing ability, and conductive hearing loss was the most common type, 19(48.7%). Regarding rhinological disorders, 47(19.1%) pregnant women had allergic rhinitis and most of them presented with nasal obstruction 41(87.2%), nasal bleeding 12(25.5%) and pale pinkish inferior turbinate,3(6.4%). Eighty (32.7%) pregnant women had olfactory disturbance whereby most of them had reduced sense of smell 41(51.3%). The association between otorhinological disorders and gestational age was significant for only allergic rhinitis and olfactory disturbance (p-value<0.05).

Conclusion: The study concludes that otorhinological disorders are common among pregnant women, with a significant number experiencing hearing loss, allergic rhinitis, and olfactory disturbances. Specifically, allergic rhinitis and olfactory disturbances are significantly associated with the trimesters of pregnancy, while other disorders like hearing loss, Bell's palsy, otitis externa, and sinusitis do not show a significant association with the pregnancy trimesters. This highlights the need for prompt intervention to manage these conditions and improve the quality of life for pregnant women.

Keywords: Otological; Rhinological; Clinical Manifestations; Pregnant Women; Obstetrics.

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Introduction

Otological and rhinological disorders are common during pregnancy due to physiological changes brought with hormones. Most hormonal changes during pregnancy lead to physiological adjustments in the mother and fetus, but a few may result in pathological conditions. During pregnancy, the person who had any pre-existing disease gets either exacerbated or may show remission. [1]

Otological disorders are often seen in pregnant women due to changes in oestrogen and progesterone hormones as they impart changes to the audio-vestibular system. [2,3] The oestrogen A and B receptors have been noted to have a unique distribution in the auditory pathways and the water and electrolyte regulating regions. [4] Hearing impairment during pregnancy can result from fluid and sodium retention, although speech audiometry findings typically remain within normal limits, and lower frequency hearing loss never reaches pathological level but returns to normal post-delivery. [2]

Sudden sensorineural hearing loss can be seen in pregnant women; this can be due to a hypercoagulable state during pregnancy which may lead to occlusion of microcirculation in the labyrinth. [5] Otitis externa is usually seen in the third trimester and is mainly due to an increase of sebum secretion in the ear canal under the influence of oestrogen. [6] Other reported otological disorders during pregnancy include tinnitus, bell's palsy, middle ear effusion and vestibular disorders such as imbalance, feeling of floating and falls. [1,7-11]

Pertaining hearing loss, a study from India found the prevalence of hearing loss among pregnant women to be 21.42% and in this study, sensorineural hearing loss accounted for 38.88% while conductive hearing loss accounted for 44.44% and the mixed subtype accounted for 16.66% of the types of hearing loss. [3] A study that was conducted in Nigeria found a prevalence of tinnitus to be 6%[12] and from India the prevalence of tinnitus among pregnant women was 14.28% [13] and on the other hand a case-control study from Brazil found the prevalence of tinnitus to be 33% among pregnant women and 11% among non-pregnant women[14].

A systematic review from Canada found the prevalence of Bell's palsy among pregnant women to be 71.1% and occurring mainly in the third trimester [15] and a study from the United States found a prevalence of 5.1% in the first trimester, 6.4% in the second trimester, 70.5% in the third trimester and 17.9% developed bell's palsy seven days prior delivery. [7].

A study from Nigeria found the prevalence of vertigo to be 7.5% among pregnant women [16] and in the same country, another study found the prevalence of the same otological disorder to be 6.5%. [12] An almost similar prevalence of vertigo in India among pregnant women was found to be 5.96%. [3]

Regarding specific otological disorders among pregnant women, a study that was done in Nigeria found the following disorders: ear blockage(37.25%), hearing loss(21.56%), autophony (13.72%), tinnitus (7.84%), otitis externa (7.84%), vertigo (5.88%), bell's palsy (5.88%).The specified types of hearing loss in this study included conductive hearing loss (45.45%), sensorineural hearing loss (36.36%) and mixed hearing loss (18.18%). [17]

Pertaining otomycosis during pregnancy, a study that was conducted in Nigeria found the prevalence of such otological disorder to be 6.25% among pregnant women [18] and similarly the prevalence of the same disorder in the same country among pregnant women was found to be 24% in another study. [18] In India the prevalence of Otomycosis among pregnant women was 5.3%. [14]A study from Nigeria found the prevalence of otalgia to be 2.7% among pregnant women. [19]

Rhinological disorders have also been reported during pregnancy where it's approximated that 30% of pregnant women suffers from rhinological disorders such as rhinitis, epistaxis and rhinosinusitis. [20-22] Estrogen causes engorgements of the vascular bed in the nasal mucosa same as it does engorgements of

the uterus. Such hormones cause edema of the mucosa of the nasal cavity through direct cholinergic effect by increasing acetylcholine production. Such tendency of engorgement of the vascular bed of the nasal mucosa becomes remarkable during the third trimester. [23] The phenomenon of nasal congestion during pregnancy is attributed to increased plasma volume and tissue fluid retention. [24,25]

Available studies have documented various rhinological disorders during pregnancy where a study from Nigeria found the following rhinological disorders; rhinitis (35.48%), epistaxis (29.03%), olfactory disturbances/hyperosmia (22.58%) and pyogenic granuloma (12.9%). [17]

Despite the documented studies from different parts of the world on otological and rhinological disorders among pregnant women, there is no study to date that has been done in Tanzania. This study aimed to address such a gap.

Material and Methods

Study design, settings and duration

This was a hospital-based, cross-sectional study employing a quantitative approach to determine otological and rhinological disorders among pregnant women at Benjamin Mkapa Hospital in Dodoma, Tanzania. Data was collected from June to August 2023.

Sampling technique and sample size

Convenience sampling technique was utilized to recruit two hundred and forty-six pregnant women upon consenting to participate. The study sample size was estimated using a Kish Leslie formula (1965) for a cross-sectional study considering the prevalence of rhinological disorders among pregnant women in a study that was conducted at a tertiary care teaching hospital in East India being taken as 37.8% (18).The sample size involved 246 participants. The Kish Leslie formula is commonly used to calculate sample size in cross-sectional studies, ensuring adequate statistical power.

Inclusion criteria

All pregnant women who attended obstetric clinic at Benjamin Mkapa Hospital and consented to participate in the study

Exclusion criteria

Pregnant women in labour and pregnant women with known otological and/or rhinological disorders before conception

Data collection tools or methods

A structured questionnaire adopted from previously published studies and thereafter modified accordingly to fit the current study was used to collect the relevant data. [1,17,18,23] The first version was prepared in English and the final draft was translated to Swahili since the study participants in the chosen study area were more conversant with Kiswahili. The questionnaire comprised the following parts: (i) Socio-demographic characteristics of study participants (ii) Information on otological disorders among pregnant women (iii) Information on rhinological disorders among pregnant women. The questionnaire comprised both open and closed ended questions. When participants encountered difficulties in interpretation of the set questions the principal investigator assisted them accordingly. The procedure included self-introduction by the principal researcher, introduction of the topic and purpose of the study. The researcher then requested their participation in the study. Participants were assured of free participation and withdrawal from the study at any time if they wished to do so. Moreover, reviewing the literature as well as pilot testing the instrument prior to the study by involving 10% of the actual sample size from the health facility and who were excluded from the actual study assessed validity of the tool.

Measurement of variables

Dependent variables: The dependent variables for the study were Otological disorders among pregnant women and Rhinological disorders among pregnant women

Independent variables: The independent variable for the study was gravid status of the recruited women (being pregnant)

Data processing and analysis

The collected data were cleaned and analyzed using SPSS version 23 software package. Descriptive statistics were performed to present frequency distribution for socio-demographic characteristics and otorhinological disorders among pregnant women at Benjamin Mkapa Hospital.

A chi-square test was performed to establish the relationship between the selected independent and dependent variables. All the independent variables with p-value <0.05 were regarded to be statistically significant.

Ethical approval and consent to participate

The study was submitted to the Directorate of Research, Publication and Consultancy of the University of Dodoma for ethical approval. The ethical committee assessed and gave the ethical approval for this study being dated 5thJune 2023 with reference number MA.84/261/02/'A'/63/64. Furthermore, permission for conducting the research was obtained from the Directorate of Research at Benjamin Mkapa Hospital. The individual informed consent, both verbal and written, was obtained from the study participants after being fully informed about the study goals and the process involved. The participants were ensured privacy and confidentiality. Anonymity was maintained using code number on the questionnaire instead of the participant's name and the participant had an absolute freedom and right to withdraw from the study at any time.

Results

Distribution of pregnant women by their age

In this study, 246 pregnant women were recruited. The majority (41.5%) were aged 30-34 years, while the smallest group (3.7%) was aged 40-44 years. (Table 1)

Table1: Distribution of pregnant women by their age

Variable	Sub variable	N (%)
Age (years)	18-24	39(15.9)
	25-29	63(25.6)
	30-34	102(41.5)
	35-39	33(13.4)
	40-44	9(3.7)
	Total	246(100)

Distribution of pregnant women by trimester of pregnancy

Out of 246 pregnant women who attended antenatal clinic, majority were in the 3rd trimester 135(52.8%), 2nd trimester was accounted by 73(30%) pregnant women and 42(17.1%) pregnant women were in 1st trimester.

Otological disorders manifested by pregnant women

Pertaining otological disorders manifested by pregnant women, majority of them presented with hearing loss/reduced hearing ability, 39(15.9%), with the right ear being most affected, 15(48.7%). Conductive hearing loss was the most common type of hearing loss reported by 19(48.7%) pregnant women. Otitis externa was reported in 8(3.3%) pregnant women and with predominance of the left ear (75%) and all pregnant women (100%) with otitis externa reported ear itching and ear fullness while reduced hearing loss was reported in 7(87.5%) pregnant women and few, 3(37.5%) pregnant women had obstructed ears while 4(1.6%) pregnant women presented with bell's palsy. (Table 2)

Table 2: Otological disorders manifested by pregnant women.

Variable	Sub variable	N (%)
Hearing loss/reduced hearing ability	Yes	39(15.9)
	No	207(84.1)
	Total	246(100)
Affected ear by hearing loss	Right ear	19(48.7)
	Left ear	14(35.9)
	Both ears	6(15.4)
	Total	39(100)
Type of hearing loss	Conductive HL	19(48.7)
	Sensorineural HL	16(41.0)
	Mixed HL	4(10.3)
	Total	39(100)
Otitis externa	Yes	8(3.3)
	No	238(96.7)
	Total	246(100)
Affected ear by otitis externa	Right ear	2(25)
	Left ear	6(75)
	Total	8(100)

Clinical presentation of otitis externa	Ear itching	8(100)
	Ear fullness	8(100)
	Reduced hearing ability	7(87.5)
	Obstructed ear	3(37.5)
	Total	8(100)
Bell's palsy	Yes	4(1.6)
	No	242(98.4)
	Total	246(100)

Rhinological disorders reported by pregnant women

Regarding rhinological disorders, 47(19.1%) pregnant women had allergic rhinitis and most of them presented with nasal obstruction 41(87.2%), nasal bleeding, 12(25.5%) and pale pinkish inferior turbinate,3(6.4%). Only one pregnant woman presented with sinusitis where facial tenderness corresponding with the affected sinus was the only presenting symptom. Pertaining olfactory disorders, majority presented with olfactory disturbance, 80(32.7%) where most of them had reduced sense of smell, 41 (51.3%) and 27(33.8%) pregnant women had increased sense of smell and absence of smell was reported in 13(16.3%) pregnant women. Also, there were other otorhinological manifestations reported by pregnant women; these include epistaxis 20(8.1%), obstructive sleep apnea, 21(8.5%) and eustachian tube dysfunction was reported in 1(0.41%) pregnant woman. (Table 3)

Table 3: Distribution by rhinological manifestations

Variable	**Sub variable**	**N (%)**
Allergic rhinitis	Yes	47(19.1)
	No	199(80.9)
	Total	246(100)
Symptoms of allergic rhinitis reported	Nasal obstruction	41(87.2)
	Nasal itching	36(76.6)
	Excessive sneezing	35(74.5)
	Watery nasal discharge	32(68.1)
	Nasal bleeding	12(25.5)
	Pale pinkish inferior turbinate	3(6.4)

	Eye tearing	33(70.2)
	Total	47(100)
Sinusitis	Yes	1(0.4)
	No	245(99.6)
	Total	246(100)
Symptoms of sinusitis reported	Tenderness on facial area corresponding with affected sinus	1(100)
	Total 1 (100)	
Olfactory disturbances	Yes	80(32.5)
	No	166(67.5)
	Total	246(100)
Olfactory disturbance reported	Reduced sense of smelling	41(51.3)
	Absence of smelling	13(16.3)
	Increased sense of smell	27(33.8)
	Total	80(100)
Epistaxis	Yes	20(8.1)
	No	226(91.9)
	Total	246(100)
Eustachian tube dysfunction	Yes	1(0.41)
	No	245(99.59)
	Total	246(100)
Obstructive sleep apnea	Yes	21(8.5)
	No	225(91.5)
	Total	246(100)

Association between trimesters of pregnancy and otorhinological manifestations among pregnant women

Regarding the association between otorhinological disorders and the trimesters of pregnancy among pregnant women, the study has found only allergic rhinitis and olfactory disturbance to have significant association with trimesters of pregnancy (p values were less than 0.05). The other otorhinological disorders (hearing loss, bell's palsy, otitis externa and sinusitis) had no significant association with trimesters of pregnancy (p values were greater than 0.05). (Table 4)

Table 4: Association between trimesters of pregnancy and otorhinological manifestations

Variable	Sub-variable	Trimester of pregnancy, N (%)			P value
		1	2	3	
Hearing loss/reduced hearing ability	Yes	5(12.8)	17(43.6)	17(43.6)	0.429
	No	37(17.9)	57(27.5)	113(54.6)	
Bell's palsy	Yes	2(50)	1(25)	1(25)	0.201
	No	40(16.5)	73(30.2)	129(53.3)	
Otitis externa	Yes	2(25)	3(37.5)	3(37.5)	0.756
	No	40(16.8)	71(29.8)	127(53.4)	
Allergic rhinitis	Yes	5(10.6)	16(34.1)	26(55.3)	0.01
	No	37(19.1)	58(29.6)	104(51.3)	
Sinusitis	Yes	0(0)	0(0)	1(100)	0.125
	No	42(17.1)	74(30.2)	129(52.7)	
Olfactory disturbance	Yes	19(23.8)	22(27.5)	39(48.7)	0.03
	No	23(13.9)	52(31.3)	91(54.8)	

Discussion

Otorhinological disorders are common during pregnancy due to physiological changes mediated by hormones. Most of the hormonal changes during pregnancy cause physiological changes to the mother and fetus, whereas few can lead to certain pathological disorders. [1,26] During pregnancy, the person who had any pre-existing disease gets either exacerbated or may show remission. Otorhinological disorders that occur during pregnancy include hearing loss/reduced hearing ability, otitis externa, allergic rhinitis, sinusitis and olfactory disturbances. The study aimed at determining the otorhinological disorders among pregnant women attending obstetric clinic at Benjamin Mkapa Hospital in Dodoma region, Tanzania.

Among the otological disorders observed in pregnant women, 15.9% presented with hearing loss or reduced hearing acuity with the right ear being most affected, (38.6%) than the left ear, (36%) and only 15.4% of the pregnant women had both ears being affected. These results align with findings from a

study conducted at the First Affiliated Hospital of Chongqing Medical University in China where the right ear was more affected (52.0%) than the left ear (48.0%). [5]

Regarding the burden of hearing loss among pregnant women, this study found prevalence of hearing loss to be 15.9% and such finding appear to be somehow similar to that from India where the prevalence of hearing loss among pregnant women was found to be 21.42%[3] and also another study from the same county found lesser prevalence of hearing loss among pregnant and thus being in line with what was found in our study. [10]

Conductive hearing loss was the commonest type of hearing loss, (48.7%), whereas sensorineural hearing loss was found in 41.0% of the pregnant women and 10.3% pregnant women had mixed type of hearing loss. These findings appear to be similar to those from India where the commonest type of hearing loss was the conductive type (44.44%) and other types were sensorineural hearing loss (38.88%) and mixed type of hearing loss (16.66%). [3]

Otitis externa was reported in 3.3% of the pregnant women and with predominance of the left ear being reported in 75% of the pregnant women and all pregnant women (100%) with otitis externa reported ear itching and ear fullness while reduced hearing ability was reported in 87.5% of the pregnant women who had otitis externa and few, (37.5%) pregnant women had obstructed ears. These findings are almost similar to those reported in India where otitis externa accounted for 5.95% of the cases and of the women with otitis externa in this study from India, 32.14% had ear blockage while 21.42% had reduced hearing ability. [27]

Bell's palsy constituted 1.6% of the pregnant women and this finding disagree with the Canadian study where Bell's palsy accounted for 71.1% of pregnant women. [15] This discrepancy may be because the finding in Canada was a pooled rate of events.

Olfactory disturbances predominated in 32.5% of cases. This appear to be dissimilar to what was found in a study that was done in the United States of America where olfactory disturbances accounted for 2.3% of the cases [28] and difference was noted in the study from Nigeria where olfactory disturbances accounted for 11.25% among pregnant women. [16]

Allergic rhinitis accounted for 19.1% of cases. Similarity can be observed in what has been found in a study from Nigeria where allergic rhinitis accounted for 17.5% of cases. [16] On the other hand, dissimilar finding has been reported in Poland where allergic rhinitis accounted for 39% of cases. [29]

Epistaxis was seen in 8.1% of cases in this study. This appear to be lower than what has been found in the United States and India where epistaxis was reported in 20.3% and 29.03% of pregnant women respectively. [15,30]

On the other hand, obstructive sleep apnea was found to account for 8.5% of the manifestations in pregnant women. This appear to be dissimilar to what has been found in the United States where it accounted for 15.4% of cases (32) and also dissimilar findings can be noted in Turkey and Nigeria where obstructive sleep apnea was reported in 11.4% and 6.9% of cases respectively. [19,32]

Regarding eustachian tube dysfunction, this study reported 0.41% pregnant women to have presented with such manifestation. This finding appears dissimilar from the findings in a study from India where 22.2% of pregnant women presented with eustachian tube dysfunction. [3]

The association between otorhinological disorders and gestational age was significant only in allergic rhinitis and olfactory disturbance (p value<0.05). The other otorhinological disorders (hearing loss, bell's palsy, otitis externa and sinusitis) had no significant association with trimesters of pregnancy (p

value>0.05). Similar finding was reported from the study that was done in India which found a significant association between allergic rhinitis, olfactory disturbance and the trimesters of pregnancy (p values<0.05), and similarly other otorhinological disorders had no significant association.[1] Dissimilar findings were revealed by the study that was done in India where there was a significant association between hearing loss/reduced hearing acuity and trimesters of pregnancy (p value <0.05). [26]

Conclusion

In conclusion, otorhinological disorders are common during pregnancy though this study found a lower prevalence of otorhinological disorders compared to previous studies, with specific types varying in prevalence across different regions. The findings underscore the importance of monitoring these conditions during pregnancy, particularly allergic rhinitis and olfactory disturbances, which show a significant correlation with gestational age. Further research is necessary to understand the underlying causes of the observed discrepancies in disorder prevalence between regions as well as to explore the underlying mechanisms of these disorders in pregnant women and investigate effective intervention strategies.

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