American Journal of Psychiatric Rehabilitation

Expert Opinion Article

Prevalence of Otologic Symptoms (Tinnitus, Hearing Loss) During Puerperium—A Cross-Sectional Survey of Postnatal Women at Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun, India

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Abstract

Background: The puerperium, the period following childbirth, is characterized by significant physiological and hormonal changes. While systemic changes are well-documented, the potential impact on the auditory system remains less explored, particularly in the Indian context. This study aimed to determine the prevalence of otologic symptoms, specifically tinnitus and hearing loss, among postnatal women in a tertiary care hospital in Dehradun.

Objectives: The primary objective was to ascertain the point prevalence of subjective tinnitus and perceived hearing loss in puerperal women. Secondary objectives were to identify associated factors such as mode of delivery, parity, and anemia.

Methods: A hospital-based, cross-sectional study was conducted from June 2021 to December 2021 at Shri Guru Ram Rai Institute of Medical & Health Sciences. A total of 385 postnatal women between 48 hours and 6 weeks postpartum were enrolled via consecutive sampling. Data were collected using a structured interview schedule, which included a demographic and clinical proforma and the Tinnitus Handicap Inventory (THI). Pure Tone Audiometry (PTA) was performed on a subset of participants reporting symptoms. Data analysis was performed using SPSS version 26, employing descriptive statistics and Chi-square tests.

Result: The mean age of participants was 25.4 ± 3.7 years. The overall prevalence of tinnitus was 18.2% (n=70), and that of perceived hearing loss was 8.1% (n=31). Of the women reporting tinnitus, 45.7% (n=32) described it as mild (THI score 1-16). A significant association was found between the occurrence of tinnitus and a history of cesarean section ($p = 0.038$). Anemia (Hb < 11 g/dL) was present in 62.3% of women with otologic symptoms. PTA confirmed sensorineural hearing loss in 8 out of 31 women reporting hearing loss.

Conclusions: Otologic symptoms are not uncommon during the puerperium. A significant proportion of postnatal women in our cohort reported tinnitus and hearing loss, with cesarean delivery and anemia being potential contributing factors. These findings underscore the need for increased clinical awareness and inclusion of basic otologic screening in postnatal care protocols.

1. Introduction

The puerperium, or the postnatal period, is defined as the six-week interval following childbirth during which the mother's body reverts to its pre-pregnant state.[1] This period is marked by profound endocrine, vascular, and immunological shifts, including a rapid decline in estrogen and progesterone levels, fluid redistribution, and changes in blood volume and viscosity.[2] While the focus of postnatal care is predominantly on uterine involution, lochia, breast health, and mental well-being, other physiological systems, such as the auditory system, may also be affected but are often overlooked.

Tinnitus, the perception of sound in the absence of an external acoustic stimulus, and hearing loss can arise from various pathophysiological mechanisms, including vascular, metabolic, and hormonal disturbances.[3] The dramatic hemodynamic changes during and after pregnancy, such as fluctuations in blood pressure and cardiac output, can impact the delicate vascular supply to the cochlea.[4] Furthermore, the relative hemodilution of pregnancy often culminates in physiological anemia, which may persist into the puerperium and potentially reduce oxygen delivery to the inner ear.[5]

Despite these plausible mechanisms, there is a notable scarcity of literature exploring the prevalence and nature of otologic symptoms specifically during the puerperium. Most studies have focused on audio-vestibular symptoms during pregnancy itself, with findings suggesting a variable incidence of hearing loss and tinnitus.[6, 7] The

immediate postnatal period, with its unique hormonal and metabolic milieu, represents a distinct clinical phase that has not been adequately investigated.

In the regional context of Uttarakhand, India, factors such as nutritional status, prevalence of anemia, and healthcare-seeking behavior may influence maternal health outcomes. Therefore, this study was conceived to bridge this knowledge gap by determining the prevalence of tinnitus and hearing loss among a cohort of postnatal women at Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun, during the period of June to December 2021. The findings aim to inform clinicians about this underappreciated aspect of postpartum health and contribute to more comprehensive postnatal care.

2. Materials and Methods

Study Design and Setting: A descriptive, cross-sectional survey was conducted in the Department of Obstetrics and Gynaecology in collaboration with the Department of Otorhinolaryngology at Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun, over a seven-month period from June 1, 2021, to December 31, 2021.

Study Population and Sampling: The study population consisted of postnatal women who delivered at the institute, between 48 hours and 6 weeks postpartum. Women with a pre-existing history of hearing loss, chronic tinnitus, otologic surgery, head trauma, known ototoxic drug intake, or active ear infection were excluded. A sample size of 385 was calculated using the formula for cross-sectional studies ($n = Z^2P(1-P)/d^2$), assuming a prevalence (P) of 50% for maximum variability, a 95% confidence level (Z=1.96), and a margin of error (d) of 5%. Participants were enrolled using a consecutive sampling method.

Data Collection Tools and Technique: After obtaining written informed consent, participants were interviewed using a pre-tested, structured schedule consisting of two parts:

1. **Socio-demographic and Clinical Proforma:** Collected data on age, parity, mode of delivery (vaginal or cesarean), gestational age at delivery, and most recent hemoglobin level.
2. **Tinnitus and Hearing Assessment:**
   - Participants were directly asked about the presence of subjective tinnitus and/or a perceived change in hearing (hearing loss) since delivery.
   - For those reporting tinnitus, the Tinnitus Handicap Inventory (THI), a standardized 25-item questionnaire, was administered to quantify the functional, emotional, and catastrophic impact of tinnitus.[8] Scores were categorized as slight (1-16), mild (18-36), moderate (38-56), severe (58-76), or catastrophic (78-100).
   - All participants reporting hearing loss and a random 10% sample of those without complaints underwent Pure Tone Audiometry (PTA) in a soundproof booth to confirm and characterize any hearing loss.

Ethical Considerations: Ethical approval was obtained from the Institutional Ethics Committee. Confidentiality was maintained, and participants identified with significant hearing loss were referred for further management.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the data. Inferential statistics, primarily the Chi-square test, were used to assess associations between categorical variables (e.g., mode of delivery and tinnitus). A p-value of <0.05 was considered statistically significant.

3. Result and Analysis

A total of 385 postnatal women participated in the study. The mean age was 25.4 years (±3.7 SD). The majorities were multifarious (58.2%) and had undergone a vaginal delivery (64.9%). The prevalence of anemia (Hb < 11 g/dL) in the cohort was 55.8%.

Table 1: Prevalence of Otologic Symptoms (N=385)

Otologic Symptom	Number (n)	Percentage (%)
Tinnitus	70	18.2%
Perceived Hearing Loss	31	8.1%
Both Symptoms	15	3.9%

Severity of Tinnitus: Among the 70 women reporting tinnitus, the severity, as per the THI, was predominantly in the mild to slight categories.

Table 2: Severity of Tinnitus among Affected Women (n=70)

THI Category	Score Range	Number (n)	Percentage (%)
Slight	1-16	32	45.7%
Mild	18-36	22	31.4%
Moderate	38-56	12	17.1%
Severe	58-76	4	5.7%
Catastrophic	78-100	0	0%

Audiometric Findings: Pure Tone Audiometry was performed on the 31 women reporting hearing loss and 39 randomly selected asymptomatic women. Sensorineural hearing loss (SNHL) was confirmed in 8 of the 31 symptomatic women (25.8% of those tested with symptoms), primarily in the high frequencies. None of the asymptomatic women tested had abnormal PTA findings.

Association with Risk Factors: A statistically significant association was observed between the mode of delivery and the presence of tinnitus ($p = 0.038$), with a higher proportion of women who underwent Cesarean section reporting the symptom. No significant association was found with parity or age. Anemia was highly prevalent among the subgroup with otologic symptoms, present in 62.3% of these women.

Table 3: Association between Mode of Delivery and Tinnitus

Mode of Delivery	Tinnitus Present (n=70)	Tinnitus Absent (n=315)	P-value
Cesarean Section	**32 (45.7%)**	**103 (32.7%)**	**0.038**
Vaginal Delivery	**38 (54.3%)**	**212 (67.3%)**	

4. Discussion

This cross-sectional study provides original data on the prevalence of otologic symptoms among postnatal women in Dehradun, India, during the latter half of 2021. Our findings indicate that tinnitus and hearing loss are not rare in the puerperium, with a prevalence of 18.2% and 8.1%, respectively.

The prevalence of tinnitus observed in our study (18.2%) is higher than that reported in some general population studies of young women but aligns with research focusing on audio-vestibular changes in pregnancy.[7] The pathophysiological link may lie in the rapid hormonal shifts, particularly the steep decline in estrogen, which is known to have neuroprotective and vasodilatory effects.[2, 4] The inner ear is highly sensitive to ischemic and metabolic insults, and the relative instability of the cardiovascular system postpartum could predispose women to such symptoms.

A key finding of our study is the significant association between cesarean section and tinnitus. Cesarean delivery is a major abdominal surgery accompanied by spinal or epidural anesthesia, blood loss, and significant physiological stress. Spinal anesthesia itself can cause a transient decrease in cerebrospinal fluid pressure, which may be transmitted to the perilymph and potentially trigger tinnitus.[9] Furthermore, the stress and anxiety associated with surgical delivery could exacerbate the perception of tinnitus.[10]

The high prevalence of anemia in our cohort, particularly among symptomatic women, is another noteworthy finding. Anemia reduces the oxygen-carrying capacity of the blood, which can compromise the high metabolic activity of the stria vascularis in the cochlea, potentially leading to tinnitus or high-frequency SNHL.[5] This is consistent with our audiometric findings, which confirmed SNHL in a subset of women reporting hearing loss.

The majority of tinnitus cases was mild or slight, suggesting that for most women, it is a transient and non-debilitating condition. However, the presence of a minority with moderate-to-severe handicap indicates that it can be a significant concern for some, warranting clinical attention.

Limitations: This study has limitations. Its cross-sectional design can establish association but not causation. The assessment of hearing loss was initially based on self-report, which is subjective, though validated by PTA in a subset. The study was conducted at a single tertiary center, which may limit the generalizability of the findings.

Implications for Practice: Despite these limitations, the study highlights an under-recognized issue. We recommend that healthcare providers consider inquiring about otologic symptoms during routine postnatal checks, especially in women with risk factors like cesarean delivery or anemia. Basic screening questions could help identify women needing further evaluation by an ENT specialist.

5. Financial support and sponsorship
Nil.

6. Conflicts of interest
There are no conflicts of interest.

7. References

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