

Benign Paroxysmal Positional Vertigo in Pregnancy: Our Experiences at a Tertiary Care Teaching Hospital of Eastern India

Santosh Kumar Swain, S. A. Vivek

Department of Otorhinolaryngology and Head and Neck Surgery, IMS and SUM Hospital, Siksha "O" Anusandhan University, Bhubaneswar, Odisha, India

Abstract

Background: Benign paroxysmal positional vertigo (BPPV) is a common clinical condition characterized by sudden, brief paroxysmal attacks of rotation vertigo occurred by changing the head position. BPPV is the most common peripheral vestibular pathology and is found frequently in females. There are very limited data on the association between BPPV and pregnancy. **Objective:** The objective of this study was to study the BPPV during pregnancy along with details of clinical manifestations and management. **Patients and Methods:** This is a cross-sectional study where pregnant women with BPPV were enrolled. The study was conducted between April 2020 and May 2022. Detailed neurological examinations were done at the vertigo clinic. **Results:** There were seven cases of BPPV associated with pregnancy in this study. The most common symptom was rotatory vertigo. All were diagnosed with the Dix–Hallpike test. All underwent Epley maneuver and symptoms resolved. Out of seven cases, two showed low 25-hydroxyvitamin D levels. **Conclusion:** Vertigo is a morbid symptom during pregnancy that affects both pregnant women and fetal status. To improve the quality of life during gestation, clinicians should consider this BPPV as an important clinical entity in their differential diagnosis of vertigo.

Keywords: Benign paroxysmal positional vertigo, gestation, pregnancy, vertigo

INTRODUCTION

Pregnancy is characterized by several changes which happen to a woman such as hormonal, anatomic, cardiovascular, and pulmonary such as pulmonary edema and weight gain which can affect the muscle-skeletal system, posture, and balance component of the body.^[1] The impact of the pregnancy on the labyrinthine function can manifest dizziness/vertigo. Benign paroxysmal positional vertigo (BPPV) is an important etiology for causing vertigo during the period of pregnancy. BPPV is a common cause of vertigo in routine clinical practice. It is characterized by brief, acute, paroxysmal attacks of rotational vertigo induced by changing the head position.^[2] It is the most common peripheral vestibular lesion and is found more commonly in females than males with a ratio of 2:1.^[3] It is often overlooked by clinicians and treated with anti-vertigo drugs. It has significant morbidity and psychosocial impact on the patient's life. In BPPV, there is degenerative debris dislocated from the utricle into the semicircular canals increasing the density of the cupula.^[4] This may happen either when the

deposits are abnormally attached to the cupula (cupulolithiasis) or when the dense particles freely move in the endolymphatic fluid in the semicircular canals (canalolithiasis).^[5] During the gestational period, BPPV causes an impact on the mother and fetus and hampers smooth pregnancy. There is very limited study on BPPV in pregnant women. Here, we study pregnant women with BPPV during their gestational periods.

PATIENTS AND METHODS

This cross-sectional study was conducted in a vertigo clinic, the department of otorhinolaryngology, and head and neck surgery

Address for correspondence: Prof. Santosh Kumar Swain, Department of Otorhinolaryngology and Head and Neck Surgery, IMS and SUM Hospital, Siksha "O" Anusandhan University, K8, Kalinga Nagar, Bhubaneswar - 751 003, Odisha, India. E-mail: santoshvoltage@yahoo.co.in

Submitted: 07-Jun-2022 Revised: 01-Sep-2022 Accepted: 02-Sep-2022 Published: 02-Jan-2023

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Swain SK, Vivek SA. Benign paroxysmal positional vertigo in pregnancy: Our experiences at a tertiary care teaching hospital of Eastern India. *Mustansiriya Med J* 2022;21:129-33.

Access this article online

Quick Response Code:



Website:
<http://www.mmjonweb.org>

DOI:
10.4103/mj.mj_16_22

of a tertiary care teaching hospital for the duration of 2 years from April 2020 to May 2022. This study was approved by the institutional ethical committee (IEC) with reference number IEC/IMS/SOA/18/March 22, 2020. Informed consent was obtained from the patients who participated in this study. The pregnant women who presented with vertigo were referred to the vertigo clinic. The inclusion criterion of this study was pregnant women presenting with transient vertigo with changing head position. The patients with a previous history of vertigo (before pregnancy) episodes were excluded from this study. Detailed physical examination, audiological evaluation, and neurological examination were performed. In all the participating patients, complete blood counts and plasma zinc levels were tested. The diagnosis of posterior semicircular canal BPPV is confirmed by a transient, up-beating, torsional nystagmus with eyes beating toward the underlying ear when the patient is rapidly positioned into the lateral head hanging position (Dix–Hallpike test). The diagnosed cases of BPPV were usually managed by canalith repositioning maneuvers such as the Epley maneuver. Labyrinthine sedatives were stopped 72 h before performing Dix–Hallpike test, if anyone was taking.

The details of the clinical profile of the pregnant women are given below.

Case 1

A 28-year-old pregnant woman for 32 weeks and 5 days attended the outpatient department of otorhinolaryngology with severe rotational vertigo and nausea. The vertigo was sudden in onset with no other complaints of hearing impairment, tinnitus, or aural fullness. Her neurological status was stable. The status of pregnancy was also within normal limits. There was no history of any peripheral or central pathologies for audiovestibular manifestations. A detailed physical examination of the patient was done and found normal except for horizontal rotatory nystagmus during the Dix–Hallpike test in the left head hanging position with a latency period of approximately 4–5 s and lasted for less than a minute. The diagnosis of the left posterior semicircular canal BPPV was done. Epley maneuver was performed as the canalith repositioning maneuver. The symptoms of the patients were relieved, and there was no evidence of recurrence 10 months later.

Case 2

A 35-year-old female pregnant for 34 weeks attended the vertigo clinic with rotational vertigo, nausea, and vomiting. The vertigo was aggravated by sudden head movements during the lying down position. The patient had no symptoms of ear fullness, hearing loss, and tinnitus. She had also no associated pregnancy-related problems. The patient had no comorbid diseases. She had no history of any similar audiovestibular complaints and had not been diagnosed with any peripheral vestibular pathologies. Dix–Hallpike test was performed, and right horizontal rotatory nystagmus with a 3–4 s latency lasting for around 30 s was observed. Epley maneuver was performed. During a follow-up of 24 months, she presented no further attacks.

Case 3

A 22-year-old pregnant female attended the vertigo clinic with a complaint of vertigo, especially when getting out of bed. She had no hearing loss, aural fullness, and ear pain. She was 14 weeks pregnant and had no comorbid pathologies. She had also no pregnancy-associated risk factors. The physical examination was within normal limits except for the Dix–Hallpike test where vertigo and left horizontal rotatory nystagmus was found after 5 s of latency and lasted for 20 s. Epley maneuver was performed. After a week, the patient was disease free. She was followed until the termination of labor, and further attacks of vertigo were seen. She developed a recurrence of symptoms 2 weeks before the delivery where the Epley maneuver was performed with no further symptoms.

Case 4

A 37-year-old woman pregnant for 22 weeks was referred to our vertigo clinic with complaints of vertigo and nausea. The symptoms started nearly 15 days back. The symptoms were aggravated with sudden head movements, especially when lying down position. The patient had no hearing loss, tinnitus, and aural fullness. She was a known case of hypothyroidism under treatment. Her pregnancy course was within normal limits. She had no history of any chronic diseases, trauma, infection, and allergy, but low 25-hydroxyvitamin D levels. The physical examination of the patient was within normal limits, except for right torsional low amplitude nystagmus, which started after 5 s of head hanging position and lasted for 45 s in the right ear. The right posterior semicircular canal BPPV was diagnosed, and the Epley maneuver was performed. Five days later, the patient was evaluated and the right Dix–Hallpike test was found to be positive again. Then Epley maneuver was repeated. She was disease-free after 1 week. The patient had no further BPPV attacks until the end of pregnancy.

Case 5

A 25-year-old pregnant woman for 36 weeks and 7 days attended the outpatient department of otorhinolaryngology with rotational vertigo, nausea, and vomiting. The vertigo was sudden in onset with no other complaints of hearing impairment, tinnitus, or aural fullness. The neurological examinations were within normal limits. The status of pregnancy was also normal. There was no history of any peripheral or central pathology for audiovestibular manifestations. A detailed physical examination of the patient was done and found normal except for horizontal rotatory nystagmus during the Dix–Hallpike test in the right head hanging position with a latency period of approximately 7 s and lasted for less than a minute. The diagnosis of the right posterior semicircular canal BPPV was done. Epley maneuver was performed as the canalith repositioning maneuver. The symptoms of the patients subsided and there was no evidence of recurrence 12 months later.

Case 6

A 36-year-old pregnant woman for 37 weeks attended the vertigo clinic with a history of rotatory vertigo and nausea for 2 days. The nature of vertigo was brief, sudden onset, and

induced by changing the head position to the right side. She had no complaints of hearing loss, tinnitus, ear discharge, and aural fullness. There were no similar attacks in the past. Dix–Hallpike test was performed which confirmed the right side BPPV. There was horizontal rotatory nystagmus during the Dix–Hallpike test. Epley maneuver was done, and the symptoms were disappeared and no evidence of recurrence 8 months later.

Case 7

A 42-year-old woman with 38 weeks of pregnancy attended the vertigo clinic with a classical history of giddiness/vertigo, nausea, and vomiting for 3 days. The vertigo was rotatory and more during changing the head position to the left side. She had no complaints of hearing impairment, tinnitus, and aural fullness. She was diagnosed previously with diabetes mellitus under treatment with controlled blood glucose. She had no history of trauma, allergy, or infection history, but reduced 25-hydroxyvitamin D levels. Dix–Hallpike test confirmed the BPPV to the left side. Epley maneuver was performed and after that no symptoms of giddiness.

RESULTS

There were seven pregnant women detected for BPPV from April 2020 to May 2022. The age of all patients in this study ranged from 22 to 42 years, with a mean age of 32.14 years. The gestation period ranged from 14 to 38 weeks among study participants. There was no history of trauma to the head in any participants. One of them was a known case of hypothyroidism (Case 4) and one was diabetes mellitus (Case 7). Pure-tone audiometry was performed in all study patients and found within normal limits. The blood pressure of each participant has checked in supine and standing positions and showed no evidence of postural hypotension. The most common symptom was rotator vertigo, followed by nausea and vomiting. All the patients showed rotator horizontal nystagmus during the performing of the Dix–Hallpike text. Out of seven cases, four (57.14%) were diagnosed with right side BPPV and three (42.85%) with left side BPPV [Table 1]. All of them were treated with the Epley maneuver. Two (28.57%) cases (Case 4 and 7) showed low 25-hydroxyvitamin D levels and were treated with supplementation of Vitamin D along with the Epley maneuver. One case (Case. 3) showed a recurrence of symptoms after the Epley maneuver. She was again repeated with the Epley maneuver and recovered from symptoms.

DISCUSSION

During pregnancy, otologic and neurotologic manifestations although temporary, have important repercussions on the quality of women.^[6] Vertigo affects the routine life involving family, social, and professional environment thus resulting in a deterioration of physical and psychological well-being with the onset of frustration, depression, lack of self-confidence, and failure of concentration at the workplace.^[7] Vertigo and dizziness are commonly reported symptoms in the general

population and pregnant women.^[8] It accounts for 20%–40% of all cases, with a reported incidence of 0.6%/year/100,000 population and a lifetime prevalence of 2.4%.^[9] BPPV is characterized by a brief and violent attack of paroxysmal vertigo aggravated by certain positions of the head.^[7] BPPV is the most common etiology for vertigo, resulting from the migration of otoconia particles into the semicircular canals.^[9] BPPV is most commonly found between the 5th and 7th decades of life.^[10] The etiology of BPPV may be idiopathic (50%–70% of all cases) or secondary to infections, migraine, Meniere’s disease, prolonged bed rest, trauma, otologic/neurotologic surgery, vascular, metabolic pathologies, and following magnetic resonance imaging.^[11] One study reported ten cases of BPPV secondary to oral contraceptive use.^[12] They concluded that hormonal disorders in females may trigger BPPV and the raised prevalence in females compared with males could be associated with these hormonal changes.^[13] The hormonal changes which occur during the menstrual cycle, gestation, and menopause can lead to alterations in the homeostasis of labyrinthine fluids, as they have a direct impact on the enzymatic process and the action of neurotransmitters. The compromise of inner ear fluids and interference with the sensitivity of enzymatic receptors influences the basal metabolism of the labyrinth, which justify the otological manifestations in female.^[14] These changes can be asymptomatic or clinically called vertigo, tinnitus, aural fullness, hypacusis, and algiacusis.^[15] The exact pathophysiology of the BPPV during pregnancy is still debated. Trauma to the head contributes to the etiology of about half of the patients with BPPV.^[16] Prolonged bed rest is also thought of as the etiology of BPPV.^[17] In this study, no participants had a history of head injuries or prolonged bed rest. Recently, there are reports that calcium and Vitamin D metabolism disorders act as risk factors for BPPV. Calcium and Vitamin D metabolism is often affected in pregnancy, particularly in the late trimesters because of the rapid growth of the fetus. This may be an important risk factor for pregnant females suffering from BPPV.^[18]

Otoconia are formed due to ordered deposition of inorganic calcium carbonate crystallites onto a framework of the organic matrix of glycoproteins, mainly otoconin 90.^[18] The study shows the importance of Vitamin D for the maintenance and development of normal otoconia and subsequently normal function of the otolith.^[19] The normal serum concentration of Vitamin D is required for the development of normal otoconia by keeping the calcium concentration in the vestibular endolymph at a normal critical level, as either high or low calcium would lead to abnormal otoconia. This is achieved by the epithelial calcium channel transport system found in the labyrinth, which is maintained by Vitamin D receptors.^[20] Vitamin D deficiency leads to the production of abnormal otoconia, which results in otolith dysfunction. In this study, two pregnant women with BPPV presented with reduced Vitamin D.^[21] In this study, two cases (28.57%) were presented with Vitamin D deficiency.

Hormonal changes during the menstrual cycle, gestation, and menopausal period induce different homeostatic and metabolic

Table 1: Detail clinical profile of pregnant women with benign paroxysmal positional vertigo

Age	Gestational period	Clinical profile	Diagnosis	Treatment
28	32 weeks 5 days	Rotatory vertigo, nausea, rotatory nystagmus	Left BPPV	Epley maneuver
35	34 weeks	Rotatory nystagmus	Right BPPV	Epley maneuver
22	14 weeks	Vertigo and left horizontal nystagmus	Left BPPV	Epley maneuver
37	22 weeks	Vertigo, nausea, right torsional low amplitude nystagmus	Right posterior semicircular canal BPPV	Epley maneuver
25	36 weeks 7 days	Rotational vertigo, nausea and vomiting, horizontal rotatory nystagmus	Right posterior semicircular canal BPPV	Epley maneuver
36	37 weeks	Rotatory vertigo and nausea, horizontal rotatory nystagmus	Right posterior semicircular canal BPPV	Epley maneuver
42	38 weeks	Vertigo, nausea, and vomiting	Left posterior semicircular canal BPPV	Epley maneuver

BPPV: Benign paroxysmal positional vertigo

effects. There are different theories regarding estrogen effects proposed. Estrogen receptors were detected in the inner ears of normal mice.^[22,23] These receptors are detected especially in the spiral ganglion and stria vascularis. Estrogen alteration is thought to impair endolymphatic fluid electrolytes concentration, resulting in degeneration of otoconial fibers, or induce endolymphatic pH liabilities, causing degeneration of otoconia.^[12] Estrogen is thought to affect endolymphatic ionic and anionic homeostasis by regulating ion and anion channels.^[24] Furthermore, it is assumed that estrogen triggers vascular supply to the macula and otoconia because of varied glucose and lipid metabolism.^[12] Variations of estrogen and progesterone levels occur during the course of pregnancy. The hormonal effects on the physiology of the inner ear in each trimester of the gestation cycle remain unclear. The increased prevalence of BPPV with age has previously been documented and this is higher in females than in males. Low and fluctuating estrogen levels may lead to otoconial degeneration.^[25]

Change of head position provokes episodes of vertigo in BPPV. Vertigo attacks occur when the patient rolls over onto the affected side or tilts the head back while looking in an upward direction. There may be associated symptoms such as nausea and vomiting. The Dix–Hallpike test is usually positive when anticlockwise rotatory nystagmus occurs toward the undermost ear. In this study, all seven cases showed positive to Dix–Hallpike test. Out of seven cases, four were right side BPPV and three were left side BPPV. Pregnancy is an important physiological period where any clinical manifestations and treatment of disease should be carefully reasoned to stop possible consequences to the fetus. Treatment of BPPV is usually done by the Epley maneuver and Semont's maneuver. The majority of patients with BPPV are self-limiting.^[26] The canal repositioning procedure is considered an efficient and long-standing noninvasive treatment option for BPPV.^[27] However, there some controversy still exists as to whether these maneuvers are effective other than central habituation. Some resistant cases of BPPV and variants of the disease may create a significant problem.^[28]

CONCLUSION

Although the relationship between pregnancy and BPPV is not defined, there is limited data in English literature. Obstetricians

and gynecologists and otolaryngologists should be aware of pregnant women with vertigo due to BPPV. To improve the quality of life during gestation, clinicians should consider this clinical entity in their differential diagnosis, which will help to avoid vertigo-related morbidity which compromises both maternal and fetal status. This study will increase the attempts for further study about BPPV in pregnant women.

Study limitation

This study has a small sample size and may limit the outcome of the above interpretation. However, the results of this study will surely encourage future research work in BPPV during pregnancy.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understand that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Ireland ML, Ott SM. The effects of pregnancy on the musculoskeletal system. *Clinical Orthopaedics and Related Research* 2000;372:169-79.
- Instrum RS, Parnes LS. Benign paroxysmal positional vertigo. *Adv Otorhinolaryngol* 2019;82:67-76.
- Kim HJ, Park J, Kim JS. Update on benign paroxysmal positional vertigo. *J Neurol* 2021;268:1995-2000.
- Swain SK, Behera IC, Sahu MC. Prevalence of benign paroxysmal positional vertigo: Our experiences at a tertiary care hospital of India. *Egypt J Ear Nose Throat Allied Sci* 2018;19:87-92.
- Aydin E, Akman K, Yerli H, Ozluoglu LN. Benign paroxysmal positional vertigo after radiologic scanning: A case series. *J Med Case Rep* 2008;2:92.
- Swain SK, Pattnaik T, Mohanty JN. Otolological and rhinological manifestations in pregnancy: Our experiences at a tertiary care teaching hospital of East India. *Int J Health Allied Sci* 2020;9:159-63.
- Hawke LJ, Barr CJ, McLoughlin JV. The frequency and impact of undiagnosed benign paroxysmal positional vertigo in outpatients with high falls risk. *Age Ageing* 2021;50:2025-30.
- Feazadeh A, Carmeli E. Rehabilitation exercise for treatment of

- vestibular disorder: A case study. *ScientificWorldJournal* 2006;6:291-4.
9. Kim JS, Zee DS. Clinical practice. Benign paroxysmal positional vertigo. *N Engl J Med* 2014;370:1138-47.
 10. You P, Instrum R, Parnes L. Benign paroxysmal positional vertigo. *Laryngoscope Investig Otolaryngol* 2019;4:116-23.
 11. Kansu L, Avci S, Yilmaz I, Ozluoglu LN. Long-term follow-up of patients with posterior canal benign paroxysmal positional vertigo. *Acta Otolaryngol* 2010;130:1009-12.
 12. Giacomini PG, Napolitano B, Alessandrini M, Di Girolamo S, Magrini A. Recurrent paroxysmal positional vertigo related to oral contraceptive treatment. *Gynecol Endocrinol* 2006;22:5-8.
 13. Swain SK, Pattnaik T. Otorhinolaryngological manifestations in pregnant women. *Med J DY Patil Vidyapeeth* 2021;14:374.
 14. Swain SK, Pati BK, Mohanty JN. Otological manifestations in pregnant women – A study at a tertiary care hospital of eastern India. *J Otol* 2020;15:103-6.
 15. Bittar RS. As síndromes de equilíbriomulher. In: Formigoni LG, Gobbi AF, *et al.* *Otoneurologia: Fatos e Experiênciaspráticas*. São Paulo: EditoraSarvier; 1999. p. 01-7.
 16. Motin M, Keren O, Groswasser Z, Gordon CR. Benign paroxysmal positional vertigo as the cause of dizziness in patients after severe traumatic brain injury: Diagnosis and treatment. *Brain Inj* 2005;19:693-7.
 17. Balatsouras DG, Koukoutsis G, Fassolis A, Moukos A, Apris A. Benign paroxysmal positional vertigo in the elderly: Current insights. *Clin Interv Aging* 2018;13:2251-66.
 18. Talaat HS, Abuhadied G, Talaat AS, Abdelaal MS. Low bone mineral density and vitamin D deficiency in patients with benign positional paroxysmal vertigo. *Eur Arch Otorhinolaryngol* 2015;272:2249-53.
 19. Sanyelbhaa H, Sanyelbhaa A. Vestibular-evoked myogenic potentials and subjective visual vertical testing in patients with vitamin D deficiency/insufficiency. *Eur Arch Otorhinolaryngol* 2015;272:3233-9.
 20. Jeong SH, Kim JS, Shin JW, Kim S, Lee H, Lee AY, *et al.* Decreased serum vitamin D in idiopathic benign paroxysmal positional vertigo. *J Neurol* 2013;260:832-8.
 21. Swain SK, Samal S, Sahu MC, Debta P. Biomarker for evaluating peripheral vertigo-a study at a tertiary care teaching hospital of Eastern India. *Indian J Public Health Res Dev* 2018;9:2352-56.
 22. Roberts RA, Gans RE, DeBoodt JL, Lister JJ. Treatment of benign paroxysmal positional vertigo: Necessity of postmaneuver patient restrictions. *J Am Acad Audiol* 2005;16:357-66.
 23. Stenberg AE, Wang H, Sahlin L, Stierna P, Enmark E, Hultcrantz M. Estrogen receptors alpha and beta in the inner ear of the 'Turner mouse' and an estrogen receptor beta knockout mouse. *Hear Res* 2002;166:1-8.
 24. Chen J, Nathans J. Estrogen-related receptor beta/NR3B2 controls epithelial cell fate and endolymph production by the stria vascularis. *Dev Cell* 2007;13:325-37.
 25. Ogun OA, Büki B, Cohn ES, Janky KL, Lundberg YW. Menopause and benign paroxysmal positional vertigo. *Menopause* 2014;21:886-9.
 26. Mujeeb M, Khan N. Epley's manoeuvre: Treatment of choice for benign paroxysmal positional vertigo. *J Laryngol Otol* 2000;114:844-7.
 27. Prokopakis EP, Chimona T, Tsagournisakis M, Christodoulou P, Hirsch BE, Lachanas VA, *et al.* Benign paroxysmal positional vertigo: 10-year experience in treating 592 patients with canalith repositioning procedure. *Laryngoscope* 2005;115:1667-71.
 28. Nakayama M, Epley JM. BPPV and variants: Improved treatment results with automated, nystagmus-based repositioning. *Otolaryngol Head Neck Surg* 2005;133:107-12.