

Recurrence Rate of Benign Paroxysmal Positional Vertigo – A Multicenter Survey

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Benign paroxysmal positional vertigo (BPPV) is a common peripheral vestibular disease. However, the data on the recurrence rate of this condition is lacking. The objectives of this study were to estimate the recurrence rate and factors for the recurrence of BPPV. Methods: This multicenter survey was conducted at the Otorhinolaryngology Clinic, Mahasarakham Hospital, and Srinagarind Hospital, Khon Kaen University in Thailand. From 2016 to 2021, patients with evidence of remission indicated by no nystagmus during an otolaryngologist examination at the last outpatient visit were recruited. The survey was conducted to assess the recurrence, severity, and risk factors of the recurrence. Results: 84 patients participated in this study. All of the patients were followed up after the resolution of the disease to evaluate for the recurrence rate of BPPV. The recurrence rate of BPPV was 27.38%. The mean time to the first recurrence event was 4.47 months. The dizziness handicap index score and visual analog scale score were significantly decreased between baseline and the first recurrence event ($p < 0.05$). Factors such as age, gender, and comorbidities including diabetes mellitus, hypertension, and hyperlipidemia were not significantly different between the recurrence group and control group ($p = 0.248, 0.128, 0.369, 0.651, 0.537$). Conclusions: Around 1 in 3 BPPV patients can suffer from a relapse. There was no significant risk factor for the recurrence of BPPV in this study.

Keywords: BPPV; Benign paroxysmal positional vertigo; Dizziness handicap inventory scores; Recurrence; Severity.

The most common vertigo or dizziness etiology in the outpatient setting is Benign Paroxysmal Positional Vertigo (BPPV).^{1, 2} The proportion of BPPV in patients who reported a feeling of dizziness at an outpatient clinic is up to 40%.³ Treatment for BPPV included a canalith repositioning procedure that removed the canalith debris from the semicircular canal.⁴

There are two pathophysiological hypotheses. The aggregation of small debris on the cupula in the semicircular canal was known as the cupulolithiasis hypothesis,⁵ whereas the

canalithiasis hypothesis suggested that the nystagmus was attributed to the movement of the debris in the semicircular canal, which would explain the latency of nystagmus since it takes time for gravity to start moving the material inside the posterior canal.⁶

Up to 70% of BPPV cases are idiopathic. The most common cause of BPPV is head trauma, which accounts for 17%. Other factors that contribute to secondary BPPV include vestibular neuronitis, Meniere's disease, migraines, otolaryngology surgery, and prolonged bed rest.⁷

The posterior semicircular canal is the most commonly affected part of the body for BPPV, followed by the horizontal semicircular canal and anterior semicircular canal.^{4, 8} The physical examination that is specific to the BPPV is Dix-Hallpike or log roll test. The diagnosis of BPPV is usually made when the patient has a history of vertigo during head movements and a positive Dix-Hallpike or log roll test.⁴

First-line therapy for BPPV is a canalith repositioning procedure including the Epley maneuver for the treatment of posterior canal BPPV, 360-degree rotation for the treatment of horizontal canal BPPV, and the deep head hanging maneuver for the treatment of anterior canal BPPV.⁹

Recurrence of BPPV was defined as the return of symptoms after at least one month of the symptom-free period.¹⁰ A recent study found that BPPV can be associated with various comorbidities, such as hypertension, diabetes, thyroid disease, hyperlipidemia, and osteoporosis.¹¹

Recurrence BPPV is a chronic disease. This disease's quality of life has received little attention. Dizziness Handicap Inventory (DHI) is a specific health questionnaire that can evaluate the health status of the patient and the effectiveness of treatment.¹² A cross-sectional study found that an elderly with dizziness or vertigo who has a DHI score of 50 or higher is expected to have BPPV.¹³

One survey found that 22.1% of patients with BPPV had at least one recurrence within 5 years.¹⁴ However, a retrospective review of horizontal canal BPPV found the recurrence rate to be 46%¹⁵ and a retrospective review in a single high-volume otology practice concluded that the recurrence rate was 37%.¹⁶

As the discrepancy was high, there was a need for more evidence on the recurrence rate of BPPV. The objectives of this study were to assess the recurrence rate, severity, and potential factors for the recurrence of BPPV using a telephone survey.

METHODS

Study Design and Setting

This study was conducted at the ENT clinic, Mahasarakham Hospital, Mahasarakham, and Srinagarind Hospital, Khon Kaen University, Thailand from 2016 to 2021.

Participants

The BPPV patient, as defined according to the recommendations of the American Academy of Otorhinolaryngology - Head and Neck Surgery,³ who was older than 18 years old and had remission from BPPV as indicated by no nystagmus during the physical examination by an otolaryngologist at the last outpatient visit was recruited.

Study Protocol

Each patient had been treated for BPPV by the office-based canalith repositioning procedure and followed up to check that they had a free symptom of positional vertigo and a negative result from the diagnostic maneuver.

After remission for at least 1 month, we conduct a telephone follow-up to check for recurrence and assess the severity of the disease using the dizziness handicap inventory (DHI) score and the visual analog scale (VAS) score. The onset and episodes of recurrence were recorded. A variety of risk factors were noted, including age, gender, and comorbidities such as diabetes mellitus, hypertension, and hyperlipidemia. The recurrence was defined as the patient having similar symptoms as the previous BPPV episode.

Statistical Analysis

Statistical analyses were performed using SPSS Statistics 22. We used the chi-square test for categorical data such as gender, site of BPPV, comorbidities, and the onset and duration of the vertigo episodes. We used paired t-tests for continuous data such as DHI and age. If the p-value was less than 0.05, we considered the difference to be statistically significant.

Ethical Considerations

This study was approved by the Mahasarakham Hospital Ethics Committee in Human Research (MSKH_REC 65-01-043).

RESULTS

Eighty-four patients participated in this study. The baseline characteristics of these patients were shown in Table 1. The patients are commonly in middle age. Most of them were female (70.2%). The posterior canal (80.9%) was the most affected part. The common underlying disease was hypertension (29.8%). The onset of the first vertigo episode was usually less than a week before presenting to the hospital (65.48%). There

was a brief vertigo symptom in more than half of the patients (54.76%). The mean DHI score and visual analog scale (VAS) score before treatment were 51.57 and 7.94, respectively.

The mean follow-up time was 30.83 months. The recurrence rate of BPPV was 27.38%. The mean time to the first recurrence event was 4.47 months. The dizziness handicap index score and visual analog scale score were significantly decreased between baseline and the first recurrence event ($p < 0.05$). (Table 2)

The risk factors were compared between the patients with recurrence and non-recurrence BPPV. However, there was no statistically significant risk factor identified in this study. (Table 3)

DISCUSSION

The recurrence rate of BPPV in the literature ranged from 20 to 40 percent.^{14,16} As the

Table 1. Demographic data

	Posterior BPPV (n = 68)	Lateral BPPV (n = 16)	Total (n = 84)
Age	56.6 ± 10.95	60.81 ± 7.8	56.96 ± 10.57
Gender, number (%)			
Male	19 (27.9)	6 (37.5)	25 (29.8)
Female	49 (72.1)	10 (62.5)	59 (70.2)
Comorbidity, number (%)			
Diabetes mellitus	9 (13.2)	3 (18.8)	12 (14.3)
Hypertension	23 (33.8)	2 (12.5)	25 (29.8)
Hyperlipidemia	20 (29.41)	4 (25.0)	24 (28.57)
Duration of vertigo episode			
Less than 1 minute	40 (58.82)	6 (37.50)	46 (54.76)
1 minute to 1 hour	26 (38.24)	8 (50.00)	34 (40.48)
More than 1 hour	2 (2.94)	2 (12.50)	4 (4.76)
Onset of first vertigo episode			
Less than 1 week	43 (63.24)	12 (75.00)	55 (65.48)
1–2 weeks	13 (19.12)	2 (12.50)	15 (17.86)
2–4 weeks	5 (7.35)	1 (6.25)	6 (7.14)
4–12 weeks	4 (5.88)	1 (6.25)	5 (6.0)
More than 12 weeks	3 (4.41)	0	3 (3.57)
DHI baseline (mean ± SD)	50.35 ± 23.64	56.75 ± 18.37	51.57 ± 22.77
VAS baseline (mean ± SD)	7.90 ± 1.94	8.13 ± 1.93	7.94 ± 1.93

Table 2. DHI and VAS score in the patients with recurrent episodes

	Mean ± SD	Mean difference from baseline (paired)	p-value ^a
DHI			
- First recurrence (n = 14)	28.29 ± 18.73	13.71 ± 22.28	0.038*
- Second recurrence (n = 5)	36.00 ± 22.27	-1.60 ± 20.56	0.870
- Third recurrence (n = 3)	16.00 ± 5.66	7.00 ± 1.41	0.090
VAS			
- First recurrence (n = 14)	5.63 ± 2.17	2.86 ± 3.13	0.005*
- Second recurrence (n = 5)	4.40 ± 1.82	2.80 ± 3.70	0.166
- Third recurrence (n = 3)	3.50 ± 3.54	5.50 ± 4.95	0.361

a - paired t-test, * - statistically significant difference

Table 3. Risk factors for the recurrence of BPPV

	Non-recurrence	Recurrence	p-value
Age	57.79 ± 10.91	54.78 ± 9.51	0.248 ^a
Gender, number (%)			
Male	21 (34.4)	4 (17.4)	0.128 ^b
Female	40 (65.6)	19 (82.6)	
Comorbidity, number (%)			
Diabetes mellitus	10 (16.4)	2 (8.7)	0.369 ^b
Hypertension	19 (31.1)	6 (26.1)	0.651 ^b
Hyperlipidemia	17 (27.9)	8 (34.8)	0.537 ^b

a – independent t-test, b - Chi-square test

discrepancy was high, there was a need for more evidence on the recurrence rate of BPPV.

In this study, we assessed the recurrence rate, severity, and potential risk factors for the recurrence of BPPV in the patients using a telephone survey. We found that the recurrence rate in our population was 27.38%. The dizziness handicap index score and visual analog scale score were significantly decreased between baseline and the first recurrence event ($p < 0.05$). There was no statistically significant risk factor identified in this study ($p > 0.05$).

The recurrence rate from this study was comparable to the telephone survey conducted by Kong et al. which found a recurrence rate of 22.1 percent when they followed up every 6 months.¹⁴

There was a discrepancy between the data from the telephone survey and the retrospective chart review. The retrospective chart review reported a higher recurrence rate. This may be due to the chart review having no details on the BPPV patient who was resolved and not coming to the hospital.¹⁶

The strength of this study is that we can contact and recruit all the patients (100%) who have remitted from BPPV during the time period. This included the patients who had no recurrence and the patients who did not come to the hospital in the case of recurrence. The limitation of this study is that telephone surveys of past events involving vertigo symptoms may be affected by recall bias.

Although there was no significant risk factor identified in this study, we did not collect other factors such as diseases of other organs,

electromagnetic radiation, nutritional deficiency, and vaccination status. We suggest that future studies should address this problem.

As the recurrence rate was quite high, we suggest that future studies should focus on the prevention of the recurrence of BPPV and the follow-up strategy for this group of patients.

CONCLUSIONS

The recurrence rate of BPPV was 27.38 percent in this study population. There was no significant risk factor for the recurrence of BPPV in this study.

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Conflict of Interest

The authors declare no competing interests.

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