

Can yoga cause benign paroxysmal positional vertigo?

Yoga benign paroksizmal pozisyonel vertigoya neden olabilir mi?

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ABSTRACT

Objectives: This study aims to investigate any correlation between benign paroxysmal positional vertigo (BPPV) and yoga.

Patients and Methods: Two groups were compared in the study: group 1 consisting of volunteers who performed yoga at regular intervals (38 females, 16 males; mean age 32.3 years; range 23 to 50 years) and group 2 as the control group (29 females, 25 males; mean age 34.6 years; range 21 to 46 years). All participants have undergone complete audio-vestibular tests and received Dix-Hallpike maneuver for the diagnosis of posterior semicircular canal BPPV and Roll maneuver for the diagnosis of lateral semicircular canal BPPV. The participants with the definitive diagnosis of BPPV were treated with Epley or Lempert maneuver, according to the affected semicircular canal.

Results: Benign paroxysmal positional vertigo was diagnosed in one participant in the control group (1.9%) while it was seen in eight participants in the yoga group (14.8%). We observed the posterior canal to be affected in seven out of eight BPPV patients and lateral semicircular canal was affected in the remaining one patient. We found the prevalence of BPPV to be significantly higher in the yoga group compared to the control group ($p=0.031$). Although there is no correlation observed between the years of yoga performance and development of BPPV ($p>0.05$), a positive correlation is found between weekly practice hours of yoga and development of BPPV ($p=0.009$).

Conclusion: There is a statistically significant correlation between BPPV and yoga. Therefore, performing yoga might be a risk factor for BPPV.

Keywords: Benign paroxysmal positional vertigo; Dix-Hallpike; vertigo; yoga.

ÖZ

Amaç: Bu çalışmada benign paroksizmal pozisyonel vertigo (BPPV) ile yoga arasındaki ilişki araştırıldı.

Hastalar ve Yöntemler: Bu çalışmada iki grup karşılaştırıldı; grup 1 düzenli aralıklarla yoga yapan gönüllü grubu (38 kadın, 16 erkek; ort. yaş 32.3 yıl; dağılım 23-50 yıl) ve grup 2 gönüllü kontrol grubu (29 kadın, 25 erkek; ort. yaş 34.6 yıl; dağılım 21-46 yıl). Tüm katılımcılara posterior semisirküler kanal BPPV tanısı için komple odyovestibüler testlerle birlikte Dix-Hallpike manevrası ve lateral semisirküler kanal BPPV tanısı için Roll manevrası yapıldı. Benign paroksizmal pozisyonel vertigo tanısı konulan katılımcılar, etkilenen semisirküler kanala göre Epley veya Lempert manevrası ile tedavi edildi.

Bulgular: Benign paroksizmal pozisyonel vertigo kontrol grubunda bir katılımcıda (%1.9) saptanırken, yoga grubunda sekiz katılımcıda (%14.8) saptandı. Bu sekiz BPPV hastasının yedisinde posterior kanal tutulumu, birinde ise lateral semisirküler kanal tutulumu izlendi. Yoga yapan grupta BPPV görülme olasılığı kontrol grubuna kıyasla anlamlı olarak yüksek bulundu ($p=0.031$). Yoga yapma yılı ile BPPV gelişme riski arasında ilişki yokken ($p>0.05$), haftalık yoga yapma süresi ile BPPV gelişme riski arasında doğru orantılı ilişki saptandı ($p=0.009$).

Sonuç: Yoga ile BPPV arasında istatistiksel olarak anlamlı bir ilişki saptandı. Dolayısıyla yoga yapmak BPPV için bir risk faktörü olabilir.

Anahtar Sözcükler: Benign paroksizmal pozisyonel vertigo; Dix-Hallpike; vertigo; yoga.



Benign paroxysmal positional vertigo (BPPV) is one of the leading causes of vertigo. Benign paroxysmal positional vertigo is characterized by brief and intense episodes of vertigo, which usually last seconds and are accompanied with episodes of horizontal rotatory nystagmus. Vertigo is specifically induced by sudden changes in the position of the head, such as rolling over in bed, bending over, or looking up. The incidence increases with age and remains twice more in females than in males.^[1] Benign paroxysmal positional vertigo leads to significant morbidity, depression, rising medical costs and decline in the quality of life.^[2]

The commonly accepted mechanisms in pathophysiology of BPPV are canalithiasis, which is defined as the displacement of otoliths from utricle to semicircular canals and cupulolithiasis. This explains the attachment of otoliths to the cupula of the semicircular canal. Benign paroxysmal positional vertigo most commonly affects the posterior semicircular canal and is detected with the Dix-Hallpike maneuver.^[3] Horizontal semicircular canal involvement is relatively rare. It has mostly idiopathic causes but the other possible etiologies are head trauma, viral infections, rhinosurgery, ear surgery, dental surgery, sports activities and swimming.^[4-8] Non-idiopathic BPPVs are more difficult to treat and tend to recur frequently.^[9]

Yoga is an increasingly popular and accessible activity that can serve as meditation, wellness and physical fitness. Practitioners perform different postures of sitting, twists, inversions, forward and breathing exercises to relieve stress, boost motivation and increase flexibility. There is recent evidence about the benefits of yoga in improving depression and sleep disorders in pregnancy,^[10] arrhythmias in atrial fibrillation,^[11] and chronic neck pain.^[12] However, unusual and risky positions obtained during various yoga exercises predispose to unpleasant consequences and even muscle and joint injuries.^[13] For instance, head-down position of the body rapidly increases the intraocular pressure and can create severe problems for glaucoma patients.^[14]

Recent research studies focus on the relationship between BPPV and sports activities.^[7,8,15] We designed this study after diagnosing BPPV in two inconsecutive patients who were both performing yoga and presented

with brief episodes of vertigo in our ENT outpatient clinic. We aim to observe whether any correlation between BPPV and yoga practice exists.

PATIENTS AND METHODS

The Institutional Review Board approval was received and written informed consent form of each volunteer was collected before the initiation of the study. This prospective cross sectional study recruits 108 healthy volunteers divided into group 1 (yoga) as yoga practitioners (38 females, 16 males; mean age 32.3 years; range 23 to 50 years) and group 2 (control) as the control group (29 females, 25 males; mean age 34.6 years; range 21 to 46 years). The exclusion criteria are preexisting central nervous system pathology; history of rhinosurgery, ear surgery or dental surgery; migraine; head trauma; swimmers and performance of sports activities other than yoga. All participants received complete ear-nose-throat examination and complete audiometric tests. The volunteers experiencing signs and symptoms of Meniere's disease were excluded from the study group. All participants were examined with videonystagmography (VNG) (Interacoustics A/S, Middelfart, Denmark) for complete vestibular evaluation. They all received Dix-Hallpike maneuver for the diagnosis of posterior semicircular canal BPPV and Roll maneuver for the diagnosis of lateral semicircular canal BPPV. Nystagmus was evaluated with Frenzel goggles. The diagnostic criteria of BPPV are designated by The American Academy of Otolaryngology-Head and Neck Surgery.^[16] The study was conducted in accordance with the principles of the Declaration of Helsinki.

The newly diagnosed BPPV patients were treated with Epley^[16] or Lempert and Tiel-Wilck^[17] maneuver according to the affected semicircular canal.

Statistical analysis

All statistical analyses were performed using the IBM SPSS version 23.0 (IBM Corp., Armonk NY, USA) software program. Data normality was checked using the Kolmogorov-Smirnov test. Independent t-test was used for between-group evaluation of quantity data. To compare qualitative data, Fisher exact chi square test was utilized. Risk of BPPV in each group is given with odds ratio (OR) with 95% confidence interval (CI).

Table 1. Demographic features of the groups

	Group 1 (yoga)		Group 2 (control)		<i>p</i>
	n	Mean±SD	n	Mean±SD	
Age (year)		32.3±7		34.6±7.3	>0.05
Gender					>0.05
Female	38		29		
Male	16		25		

SD: Standard deviation.

Data is expressed as mean ± standard deviation. A *p* value of less than 0.05 is accepted as statistically significant.

RESULTS

There is no statistically significant difference in age and gender between the two groups ($p>0.05$; Table 1). The volunteers in yoga group have been performing yoga with an average of three hours per week (mean=3.3 hours; range=2-5 hours) for an average of 2.5 years (mean=31.9±22.4 months; range=6-96 months).

Benign paroxysmal positional vertigo was diagnosed in one participant in the control group with posterior semicircular canal involvement (1.9%) while it was seen in eight participants in the yoga group (14.8%). Seven out of eight BPPV patients in the yoga group had posterior semicircular canal involvement with five of them on the right and two of them on the left side while the remaining one patient had left lateral semicircular canal affected. The prevalence of BPPV is found to be significantly higher in the yoga group compared to the control group ($p=0.031$; Table 2). The possibility of diagnosing BPPV in yoga practitioners is shown to increase by 9.2 times compared to that of control group

Table 2. The distribution of benign paroxysmal positional vertigo within the groups

	BPPV (+)		BPPV (-)		<i>p</i>
	n	%	n	%	
Group 1 (yoga)	8	14.8	46	85.2	0.031
Group 2 (control)	1	1.9	53	98.1	
Odds ratio	9.2				
95% CI of OR	1.1-76.4				
<i>p</i> value	0.039				

BPPV: Benign paroxysmal positional vertigo; CI: Confidence interval; OR: Odds ratio.

(OR: 9.2; 95% CI: 1.1-76.4; $p=0.039$). Although there is no correlation observed between the years of yoga performance and development of BPPV ($p>0.05$), a positive correlation is found between weekly practice hours of yoga and development of BPPV ($p=0.009$; Table 3). The risk of BPPV is significantly increased if yoga is practiced for four hours or more per week ($p=0.04$, Table 3). The other audiometric and vestibular tests were normal in all 108 participants.

DISCUSSION

Benign paroxysmal positional vertigo as one of the leading causes of vertigo has remarkably negative impact on activities of daily life and quality of life. In spite of the enlightened pathophysiologic mechanisms underlying BPPV, the etiology is still unknown in approximately half of the cases.^[18] The currently accepted theory in pathophysiology of BPPV is the canalolithiasis theory proposed by Hall et al.^[19] Otoliths from the utricle freely float in the semicircular canal and generate the symptoms of BPPV.

Table 3. Yoga period in practitioners with and without benign paroxysmal positional vertigo

	Yoga period			
	Weekly (hours)	Years (months)	≥4 hours (weekly)	<4 hours (weekly)
	Mean±SD	Mean±SD	n	n
Yoga practitioners without BPPV	3.2±0.9	29.9±21.2	15	31
Yoga practitioners with BPPV	4.1±0.8	43.5±27.1	6	2
<i>p</i> value	0.009*	0.11‡	0.04†	

SD: Standard deviation; BPPV: Benign paroxysmal positional vertigo; * $p<0.05$; comparison of weekly Yoga hours in Yoga practitioners with BPPV and without BPPV; ‡ $p>0.05$; comparison of Yoga years in Yoga practitioners with BPPV and without BPPV; † $p<0.05$ comparison of those who did Yoga four hours and more with those who did yoga less than four hours a week in terms of BPPV.



Figure 1. Illustration of yoga positions that can cause benign paroxysmal positional vertigo.

The relationship between BPPV and sports activities such as swimming and motocross racing is being investigated, but the etiological relationship between BPPV and yoga has not been reported yet. Entrance of otoconia to the semicircular canal upon sudden head turns in swimming is thought to provoke the symptoms of BPPV.^[8] Motocross racing is thought to trigger BPPV due to displacement of otoconia during sudden vertical acceleration and deceleration of the head.^[20]

Yoga has its origins in ancient India and integrates physical, mental, emotional, and spiritual dimensions to improve the holistic health. The benefits of yoga include increased muscle strength and endurance, muscle power, flexibility, balance, coordination, and pain attenuation.^[21] There are studies showing the improvement of depression, sleep disorders, arrhythmias, and chronic neck pain after regular practice of yoga.^[10-12] However, yoga may cause some health problems. Yoga postures are comprised of basic elements such as standing, sitting, forward and backbends, twists, inversions and lying. The aforementioned movements can put the body in risky positions and cause injuries in the muscles and joints.^[13] It is reported that head-down position of the body can accelerate the progression of glaucoma by rapidly increasing the intraocular pressure.^[14]

In this study, our main objective is to detect any correlation between BPPV and yoga. Dix-Hallpike and Roll maneuvers are applied, as the gold standard for BPPV diagnosis. We report that yoga practitioners received BPPV diagnosis significantly more often than the control group did. Also, some patients complained of acute onset positional rotatory vertigo and nausea arising particularly during upward bow and other upward-facing positions. The results from

this study indicated the incidence of BPPV in yoga practitioners was high and remarkable. Fortunately, the treatment efficacy was also high and BPPV could be treated in minutes without any complications. Our effective treatment results with Epley and Lempert canalith repositioning maneuvers support the current evidence in the literature.^[16-18,22]

Previous studies demonstrated that BPPV symptoms occur after surgeries performed with the patients' face up with head hyperextended positions, which may displace otoliths to the posterior semicircular canal.^[23,24] It is also shown that sports activities that require upright position of the head induce migration of detached otoliths to the posterior semicircular canal.^[25] We claim that especially upward (inverted) bow positions and other upward-facing movements displace otoliths from the utricle to posterior, horizontal or both of the semicircular canals and hence, play a role in the etiology of BPPV by creating vertiginous symptoms (Figure 1).

The most significant finding of this study is the designation of yoga as an etiologic factor in BPPV. Although most cases of BPPV are idiopathic, we assume that many other factors in the development of BPPV are not detected yet. The numbers of idiopathic BPPV cases are presumed to decline if detailed history is obtained from BPPV patients in a systematic manner and circumstances relevant to BPPV are investigated.

Potential limitations of our study should be mentioned. First, the sample size is small and it is necessary to validate these findings in larger cohorts. Second, this is a cross-sectional study, so the potential causal relationship between BPPV and yoga cannot be concluded. Despite this feature, the results provide a baseline of BPPV in yoga practitioners upon which further research can be conducted.

In conclusion, this study is the first clinical study that demonstrates the correlation between yoga and BPPV. We suggest that yoga may potentially cause BPPV. It appears that inverted positions of the head cause otoconia to enter the semicircular canal following their dislodging from the macula of the utricle. Benign paroxysmal positional vertigo should be strongly considered as a diagnosis in yoga practitioners who suffer from vertigo. Further large-scale studies are necessary to clarify the relationship.

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