





patients had migraine (31/263; 11.8%). Nineteen patients had an evident story of trauma (19/263; 7.2%). Ten patients had vestibular neuritis prior to BPPV, 5 patients had Meniere's disease and 3 patients had otosclerosis (18/263; 6.8%). Goiter, hypertension, high cholesterol, diabetes, gastric ulcer, osteoarthritis, cancer (lymphoma, thyroid and breast cancers etc), chronic coronary and lung diseases were the other miscellaneous problems (50/263; 19.1%) [Table 3]. One hundred and ninety-one patients had symptoms <2 months (191/263; 72.6%). Sixty-two patients (62/263; 23.6%) had intensive nystagmus lasting more than a minute regardless of canal involvement. Eighty-seven patients (87/263; 33%) required two or more maneuvers for the relief of symptoms.

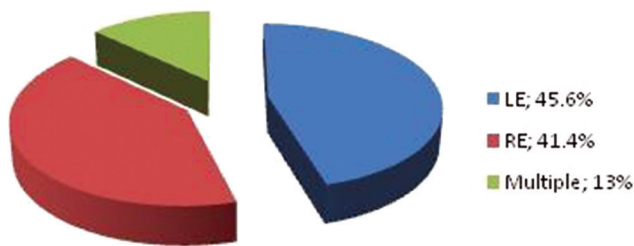
### Discussion

Causative factors that can be related with BPPV are still not quite clear. The role of aging as an etiological factor has been proposed. Ischemia and vascular damage, the incidence of which increases progressively with age, have been claimed although this disorder can affect eventually all age groups. Faralli *et al.* have investigated hypertension, hyperglycemia, and hyperlipidemia in 566 patients with BPPV and have found no difference between those under 50 and those over 50 years of age.<sup>[5]</sup> BPPV is known to be a disease of the elderly population. But more recently, it occurs across all age groups.<sup>[6]</sup> We have found an increased incidence of BPPV at middle age groups. This might be due to growing awareness of the problem and widespread use of diagnostic maneuvers. Associated problems were evident in 22.6% of patients and inner ear problems were found to be in 6.8% of

patients in this series. Co-existence of Meniere's disease and BPPV has been reported to be 5.5-10%.<sup>[6]</sup> It is important to explore the problems associated with BPPV since it has been reported that especially those with inner ear disease have long treatment duration and higher recurrence when compared to those defined as idiopathic.<sup>[6-8]</sup>

Females were found to be affected more frequently. This is a common finding in several studies and females have more psychiatric disorders associated with BPPV like depression, demoralization, phobia and anxiety.<sup>[9]</sup> No predilection of side was observed in this series. On the other hand, Von Brevern *et al.* have found that BPPV affects predominantly the right labyrinth. They have reported that most patients had the habit of sleeping on their right side.<sup>[10]</sup> Most recently, a significant correlation has been found between head position during sleep and the side affected by BPPV.<sup>[11,12]</sup> Co-existence of BPPV with long-standing ipsilateral severe hearing loss might also be due to sleeping habit of the patients since most people desire to sleep on the side with hearing loss to keep the hearing side in the open environment. Trauma was evident in 7.2% of patients. Presence of trauma, as a factor, is probably under-estimated since most patients describe important events only. However, it has been reported that minor head trauma during daily life such as mountain biking; long journey by bus or airplane, roller-skating in amusement park, intense physical activity and dental treatment may provoke BPPV.<sup>[13-15]</sup> One of the interesting finding in our series is the co-existence of migraine and BPPV in 11.4% of patients which has to be investigated in detail in further studies.

**Table 2: Comparison of side of involvement in patients with BPPV**



BPPV: Benign paroxysmal positional vertigo

**Table 3: Associated problems in patients with BPPV**



BPPV: Benign paroxysmal positional vertigo

Posterior canal-BPPV was the most common type, followed by other two versions of the LC-BPPV in which the crystalloid debris are in the anterior arm or in cupula in apogeotropic form and in the posterior arm in the geotropic form. The incidence of SC-BPPV was very low. Diagnosis of PC-BPPV is quite straightforward with ipsilateral head-hanging maneuver. However, the test could be positive on both sides, that may be due to pseudo effect on counter LC. Therefore, it is important to treat the more intensive side first, which will result in complete relief of symptoms. On the other hand, diagnosis of the affected side in patients with LC-BPPV could be difficult if the provoked nystagmus has equal intensity on both sides or is too weak to justify. The "head bow and lean test" is helpful to decide for the affected side.<sup>[16]</sup> Multiple canal involvement, which can be detected on both head-hanging and roll-on tests, is usually more common in those who had a history of trauma and presents a challenge for the treatment. Eighty-seven patients (33%) required two or more attempts of therapeutic maneuvers for the relief of symptoms in this series. This is an important finding in terms of public health since almost one-third of BPPV patients will have a recurrence of symptoms.

Diagnosis of patients with BPPV is easy and quick after head-roll and head-hanging diagnostic maneuvers. Intense,

paroxysmal positional nystagmus is characteristic. Provoked vertigo is rarely distressing and long-lasting. Treatment is simple, safe and highly effective. However, it should be kept in mind that the symptoms are prone to recur in those with traumatic origin, in those with associated inner ear problems and in those with systemic disorders.<sup>[17-19]</sup> In conclusion, demographic and prognostic studies will enlighten all aspects of this common vestibular problem and will give new insights for proper cure and preventive measures like changing sleeping habit or searching of BPPV in every patient with balance problem following even mild trauma.

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