CHAPTER 6

SUMMARY AND CONCLUSION

Benign Paroxysmal positional Vertigo is one of the most common peripheral vestibular disorder causing positional vertigo. Persons who report of BPPV without a prior history of otologic pathology have been described as having primary BPPV or idiopathic BPPV while persons with BPPV with a definite history of prior otological pathology are said to have secondary BPPV. Secondary BPPV can occur due to many inner ear disorder such as vestibular neuritis, labrynthitis, or Meniere's disease (Karlberg et al., 2000). Traditionally BPPV is diagnosed based on the results of Dix-Hallpike test and clinical case history. However recent studies have shown that persons with BPPV may show abnormality on other audiovestibular tests also (Imai, Ito, Takeda, 2005).

Audiovestibular profile of persons with BPPV have been investigated by many researchers. A few investigators report no significant difference in hearing sensitivity between individuals with BPPV and healthy control group (Moreno, 2009) while others report hearing loss among persons with BPPV (Wu et al, 2006). Apart from hearing sensitivity, there has been studies in the literature documenting the findings on vestibular tests such as spontaneous nystagmus, gaze evoked nystagmus, positional nystagmus, caloric test and cVEMP in persons with BPPV. However large variations in terms of occurrence of abnormal test findings have been reported in persons with BPPV. Reported prevalence rate of abnormal caloric responses vary from 0 % to 50% among individuals with BPPV across the different studies. Similarly, rate of abnormal cVEMP responses has been found to vary from 5% to 60% by numerous

investigators. Thus, there is no consensus among the researchers documenting the percentage of abnormal test findings in individuals with BPPV.

Positional vertigo caused by BPPV can lead to significant handicap in day to day life. The self perceived handicap has been studied using disease specific questionnaires specifically designed for individuals with dizziness. One such questionnaire is the Dizziness Handicap Inventory (DHI) developed by Jacobson & Newman (1990). Researchers have also investigated the impact of disease on general quality of life using generic questionnaires such as SF-36, WHOQOL-BREF. Some of the researchers have used both generic as well disease specific questionnaires to assess the QOL. A review of literature shows that there is contradictory findings with regard to the domains of these questionnaires that are most affected among the persons with BPPV, primary as well secondary.

Self-perceived handicap and general quality of life can be affected by many factors such as underlying vestibular pathology, frequency and duration of dizziness, associated hearing loss and also non pathologic factors such as age and gender. Effect of these factors have not been studied specifically in persons with BPPV.

Aims and objectives of the study

Aim of the present study was to investigate audiovestibular profile in persons with BPPV and to study the QOL in persons with BPPV. The specific objectives of the study included studying the hearing sensitivity, functioning of the vestibular system using subtests of VNG (Spontaneous Nystagmus, Positional Nystagmus, Gaze evoked Nystagmus, caloric Nystagmus) and cVEMP in persons with BPPV, both primary and secondary; investigating the self-perceived handicap using DHI and

quality of life (QOL) using WHOQOL-BREF in individuals with BPPV, both primary and secondary BPPV; and investigating the effect of age, gender, associated hearing loss as well as frequency and duration of dizziness on QOL of persons with BPPV.

Data were collected from two groups of participants, in the age range of 40 to 70 years. Group I consisted of 40 healthy participants and Group II included 92 participants with BPPV. Procedure included administration of case history specifically designed for persons with dizziness and Dix-Hallpike test or Roll Maneuver to diagnose the BPPV. Detailed audiovestibular assessment was carried out for all the participants (both Group I and Group II). The audiovestibular test battery included pure tone audiometry, immittance evaluation, Spontaneous nystagmus test, Gaze nystagmus test, Positional nystagmus test, Caloric test and recording of cervical Vestibular Evoked Myogenic Potential (cVEMP). Marathi version of DHI and WHOQOL-BREF was administered in a interview format for both the groups to measure self perceived handicap and QOL.

Audiovestibular Profile of persons with BPPV

Results revealed that out of the total 92 participants with BPPV (51 males and 41 females) 30 participants had primary BPPV, 15 participants had BPPV secondary to vestibular neuritis (VN), 10 individuals had BPPV secondary to Meniere's disease (MD) and 37 had BPPV secondary to unknown peripheral vestibular pathology (UVP).

Results of pure tone audiometry revealed a significant difference between PTA of ears with BPPV and ears of healthy control group. Further analysis revealed that persons with BPPV secondary to MD and UVP showed associated hearing loss but hearing sensitivity of persons with primary BPPV and those with VN did not

differ significantly from normal group. This could be due to the specific nature of VN affecting vestibular nerve without affecting the cochlear physiology. This is in consensus with earlier investigators who have also reported no hearing loss in persons with BPPV secondary to vestibular neuritis (Karlberg, 2000; Caldas et al., 2009).

Vestibular testing revealed that among Group II which involved individuals with both primary as well as secondary BPPV, 8 participants showed spontaneous nystagmus, 6 participants demonstrated gaze evoked nystagmus and 16 had positional nystagmus at least in one of the position. Further analysis revealed the presence of nystagmus in more number participants with BPPV secondary to VN followed by those secondary to MD and UVP. There was no spontaneous and gaze nystagmus observed among the participants with primary BPPV. Present findings are in accordance with the previous investigators who reported that secondary BPPV has specific clinical characteristics that differ from those of idiopathic BPPV resulting into more occurrence of nystagmus on various vestibular tests. (Baloh, Honubria, Jacobson, 1987; Korres, Balatsouras & Ferekidis, 2004).

Results on air caloric tests revealed significantly lower SPV values across all the four irrigations in persons with BPPV when compared to normal group. Further, it was found that SPV values of participants with idiopathic BPPV as well as those with BPPV secondary to MD were comparable with normal healthy group. However, SPV values of participants with BPPV secondary to VN and UVP were significantly lower than healthy control group. These results of lower SPV values among the individuals with BPPV secondary to VN and UVP has been explained based on the affected superior vestibular nerve in most of client with VN and UVP, (Balatsouras et al, 2013) whereas individuals with BPPV secondary MD may or may not results into hypoactive responses on caloric tests (Goss et al, 2000; Zhou et al, 2015).

Results on cVEMP showed that there was a significant difference for the response rate of cVEMP and peak to peak amplitude of P13-N23 between the ears of Group II and Group I. Furthermore, comparison of various subgroups with BPPV was done with healthy control group. Participants with BPPV secondary to VN and UVP had significantly longer latencies of N23 peak compared to participants with primary BPPV. Unlike the latency parameter, significant difference was observed for the amplitude parameter of cVEMP between ears with primary BPPV and ears with BPPV secondary to MD, UVP and VN. Significant difference for the latency parameter of cVEMP between ears with BPPV secondary VN and ears with primary BPPV has been illustrated based on the neural pathology involved in these participants (Viciana, Lopez-Escamez (2014). Moreover, amplitude parameter has been consistently found to be more affected in persons with Group II than Group I and this can be attributed to an affected saccular structure in all types of BPPV.

Self-perceived handicap and quality of life in persons with BPPV

It was observed that self-perceived handicap was highest among the participants with BPPV secondary to VN followed by individuals with BPPV secondary to MD and UVP. Self-perceived handicap was found to be least among the participants with primary BPPV. There was a significant difference between self-perceived handicap of participants with primary BPPV and those with secondary BPPV. Domain wise analysis of DHI in participants with primary BPPV showed that physical domain was maximally affected followed by functional and emotional domain. In participants with secondary BPPV, functional domain was more affected than physical and emotional. This could be due to the severe dizziness, spontaneous

nystagmus and imbalance associated with unilaterally affected vestibular afferents either shown on cVEMP or caloric test resulting into severely affected quality of life.

Analyses of scores of WHOQOL-BREF showed that general QOL was maximally affected among the participants with BPPV secondary VN followed by participants with BPPV secondary to MD and UVP. The QOL of participants with primary BPPV was least affected. However, the difference in scores was not statistically significant. Among the four domains of WHOQOL-BREF, physical domain was found to be maximally affected followed by social relationship, psychological and environmental.

Self-perceived handicap and general QOL was also compared among subgroups classified based on the abnormality observed on vestibular tests. Group IIa included participants with abnormal results on Dix-Hallpike but normal results on caloric and cVEMP test, Group IIb included persons with abnormal results on Dix-Hallpike and on cVEMP only but normal results on caloric test. Group IIc had participants with abnormal results on Dix-Hallpike, cVEMP and caloric tests. Statistical analysis revealed a significant effect of group on self-perceived handicap and general QOL. This shows that extent/pattern of abnormality also has a significant effect on the general QOL in persons with BPPV. Present findings are in consensus with the earlier investigators (Lee, Park & Lee, 2012; Jacobson et al., 2012). Pairwise comparison showed that only Group II and IIb did not show a significant difference on WHOQOL-BREF.

Factors affecting self-perceived handicap and QOL of persons with BPPV

Results revealed no significant effect of age and gender on self-perceived handicap as well as general quality of life except for social relationship and

psychological domain of WHOQOL-BREF which showed significantly poorer QOL for females when compared to males. . The frequency of dizziness was observed to have moderate to strong correlation with self-perceived handicap and poor yet significant with general QOL. Duration of dizziness showed only low yet significant association with self-perceived handicap and no relationship with general QOL. Significant mild to moderate correlation was found between general quality of life and associated hearing loss among participants with BPPV. However there was no significant association observed between self-perceived handicap assessed using DHI and associated hearing loss.

CONCLUSIONs

Present study has highlighted the importance of detailed audiovestibular investigation in individuals with BPPV. A detailed evaluation will uncover many latent inner ear disorders associated with BPPV. The audiovestibular profile varies depending on the type and etiology of BPPV. The results of the present study indicate that self-perceived handicap as well as QOL is affected in persons with BPPV. The self-perceived handicap and the QOL of persons with BPPV varied depending on the associated vestibular pathology. The self-perceived handicap and QOL also varied depending on the abnormalities seen on vestibular tests. However, trends found in subgroups of BPPV for self-perceived handicap assessed using DHI and for general QOL assessed using WHOQOL-BREF were not always same. This reiterates the fact that both the questionnaires do not provide same information and administering both of them gives better understanding of quality of life in individuals with BPPV.

Future Directions for Research

Present study has been able to uncover many additional associated vestibular pathologies in persons with BPPV. Further studies can be carried out to evaluate functioning of vestibular system through additional tests such as oVEMP, head impulse test, posturography and rotational chair test which assesses different parts of balance system. Future research can focus on studying self-perceived handicap and QOL among the participants with BPPV categorized based on the results of these tests.

In the current study, there was large variation observed in the self-perceived handicap among the participants with secondary. This could be due to various stages of associated disorders as observed in client with MD as well as variants' of disorder such as superior versus inferior type of VN. Future study should focus studying QOL considering such variations in account. Studies should also be carried out to investigate the other factors such as associated tinnitus, effect of personality and coping strategies, associated imbalance on self-perceived handicap and QOL.