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Research Article

RESOLUTION TIME OF VERTIGO IN EACH STAGE OF EPLEY'S MANEUVRE – A RANDOMIZED CONTROLLED TRIAL

Naziya Jabeen, Naveen Kumar Balne and Laxmana Prasad Gadde

Department of Physiotherapy, Nizam's Institute of Medical Sciences, Hyderabad - TS.500082

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A B S T R A C T

Back ground: Epley's maneuvreis a proven treatment for posterior canal vertigo. This study is aimed to find the average time required for the resolution of vertigo symptoms while performing each stage of Epley's maneuvre and its relation to recurrence of symptoms.

Methods: After ethical clearance and informed consent, 297subjects screened and 50 who met inclusion criteria were randomised to control or experimental groups. Group 1: subjects of controlled group (n=25**)** received Epley's manoeuvre with 30 sec for each position. Group 2: subjects of Experimental group (n=25) received Epley's manoeuvre each stage duration extended until the symptoms resolved and time was noted. Outcome measures of this study includes: duration in each step and total time of Epley's, Visual analogue scale, and Dizziness handicap inventory score and recurrence rate.

Results: Total duration of manoeuvre in control group was 90 seconds, in experimental group it was184.56±68.38 seconds. The recurrence in control was 52% and 12% in experimental group within 6 months.

Conclusion: This study shows reduced recurrence of vertigo and increase in duration of each stage in group 2. This is preliminary evidence to investigate further on Epley's maneuvre.

INTRODUCTION

Vertigo is the sense of spinning where an illusion of movement is seen due to asymmetry in the tonic firing rate of two vestibular systems (O Sullivan SB, 2013)**.** PC-BPPV (posterior canal BPPV) was initially described by Barany in 1921, followed by Dix and Hall. The most common form of BPPV occurs when otoliths from the macula of the utricle fall into the lumen of posterior semi-circular canals responding to the effect of gravity.

Overall BPPV casesaccounts for 22% of all dizziness cases (3%) Prevalence of idiopathic BPPV ratio in female and male is 2:1. Dix hall pike test is used to diagnose BPPV most commonly(Chauhan A, 2015)**.** Patients complain of BPPV especially when they change their head position in respect to gravity, like getting off the bed, tilting the head back and rolling over the bed, or forward bending may cause light headedness, nausea, vomiting, dizziness, and postural instability. The symptoms are intermittent, usually resolving within 30 seconds (Chauhan A, 2015).

The recurrence rate of PC-BPPV is 26% and PC BPPV is much more common to be affected due to its inferior positioning and gravitational forces tend to settles the particles in there, especially when the subject is in supine position (Zhang YX, 2016). Epley's maneuvre is an effective treatment for PC BPPV, it is also considered safe with a confirmed level of evidence (Chauhan A, 2015)**.** Many authors suggest vestibular exercises for the improvement of balance and vestibular compensations (Korn GP, 2007).

In our regular practice there is a confusion, how much time we need to keep the head in each position. some cases showed good results and less recurrence if we keep them more than 30 seconds or till they get relief of symptom in each stage of Epley's maneuvre. Hence present study was aimed to find the total time required for whole procedure and its relation to recurrence.

The objective*:* 1. To evaluate the time required for resolution of vertigo symptoms during each step of Epley's maneuvre. 2. To compare the recurrence between control and experimental group.

METHODOLOGY

Study design: Randomized controlled trial

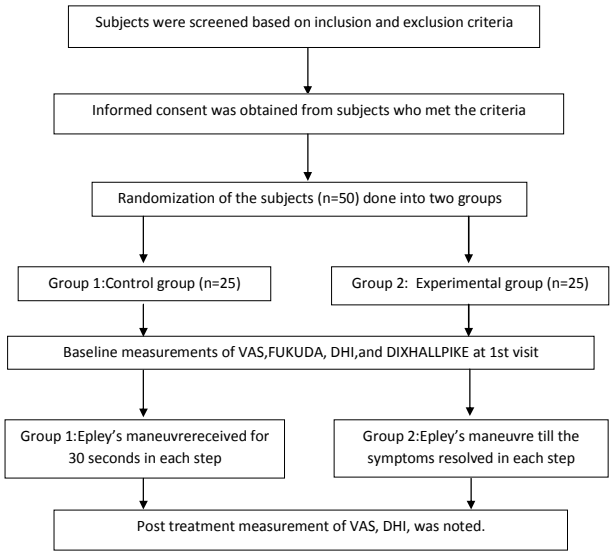
Study Participants: All the subjects were informed about the nature of the study and written informed consent was obtained. The study was approved by the ethical committee of Nizam's Institute of Medical Sciences. Subjects with BPPV with involvement posterior canal, symptoms persisting less than

Corresponding author:* **Naziya Jabeen
Department of Physiotherapy, Nizam's Institute of Medical Sciences, Hyderabad - TS.500082

60secs.Subjects with positive Dix hall pike test with /without nystagmus were included in this study.
Subjects complaining of pain in cervical and spinal mobility where patients experience discomfort in performing repositioning manoeuvre. Vertigo with cervical origin: cervicogenic headache, cervical radiculopathy and myelopathy. Vertigo with central origin, schwannomas, vestibular neuromas. Central vestibular nuclei lesion, post head trauma vertigo. Labyrinthine artery dysfunction. Drug induced vertigo, otitis media/chronic suppurative otitis media, inner ear infection and peripheral vestibular nerve lesion .(8th cranial nerve), were excluded from the study.

Study procedure: Subjects diagnosed with benign paroxysmal positional vertigo by clinician and meeting the inclusion criteria were included in this study. Primary investigator will confirm Posterior canal involvement by detailed history and Hall Pike Dix. Out of 297screened subjects, 50 subjects who met inclusion criteria were included in the study. They were randomised to control or experimental group via the random chit method. Group 1: subjects of controlled group (n=25) received Epley's maneuvre with 30 sec for each position. Group 2: subjects of Experimental group (n=25) received Epley's maneuvre until the symptoms resolve and time was noted. Subjects were screened again in the next visit when the symptoms provoked.

Flow chart



Epley's Manoeuvre: Epley's manoeuvre was developed by Dr. John Epley and first described in 1980, Patient is kept in different positions to allow crystals to move towards utricle in semi-circular canals, approximately 30s in each step (Hain, 2002).

Stage 1: (Figure: 1), BPPV is diagnosed by placing the patient's head in the Dix-hall pike position, which elicits the nystagmus and vertigo (The affected side posterior canal is in the earth-vertical plane).let the initial nystagmus settle.

Stage 2: Now the head is turned 180 degrees (Then wait for nystagmus to settle)-till the offending ear is up.

Stage 3: Patient is brought to upright sitting position .let the nystagmus settle (Jacob CE, 2017).

RESULTS AND DISCUSSION

Descriptive statics were taken to have averages and their standard deviation. Non parametric test Wilcoxon signed ranks test was used to compare the scores of VAS and DHI pre and post Epley's maneuvre within groups. Mann Whitney test was done to compare the results between groups.

Total of 297 screened for study and 50 subjects met inclusion criteria (32 females, 18 males) aged between 33 to 73 years ((mean±SD) 53.4 ± 12.1 control and 49.7 ± 13.4 experimental years). This gender distribution correlates with the study published by S Yetiser and D Ince in 2015 indicating female predominance. Though studies quoted common age of onset as 50-70 years(S.Ytiser, 2015)(Hornibrook, 2011) current study population age range was 33 to 70.

Average sensation of spinning on VAS were 5.84±1.37 in control and 5.84±1.95 prior to Epley's manoeuvre and changed to 1.28±0.54 in controls and 0.04±0.2 in experimental group (z -4.4, p=highly significant and z -4.38,p=highly significant for control and experimental groups on Wilcoxon signed rank test). In control group each step time was fixed to 30 seconds thereby total time of Epley's duration was 90 seconds.

Table 1 Results of study parameters

Category		Control	Experimental
Total sample	50 (32F,18M)	25	25
Age		33-73 years	
Epley's steps duration in seconds	ES1	30	56.52±30.87
	ES2	30	80.20±30.46
	ES3	30	49.04±22.80
	ETT	90	184.56±68.38
Recurrence	Number & Percentage	13 (52%)	3(12%)

	Control		Experimental	
	Pre	Post	Pre	Post
VAS score	5.84±1.37	1.28±0.54	5.84±1.95	0.04±0.20
DHI score	16.48±4.48	3.52±1.32	14.0±5.62	0.32±1.24

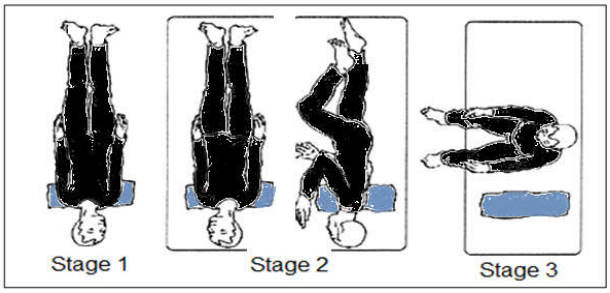


Figure 1 Epley's Maneuvre: Stages

In experimental group the time for each step was adjusted till symptom recovery. The average time spent in each step for resolution of symptoms in experimental group was as follows 56.5±30.8 (S.E 6.17), 80.2±30.46 (S.E 6.09) and 49.04±22.80 (S.E 4.56) and 184.56±68.38 (S.E 13.67) seconds in ES1, Es2, Es3 and ETT respectively and the results are highly significant. Since there is variation in endolymph density in semi-circular canals hair cells and change in vestibular output to higher systems, movement of canaliths or otoconia are gravity dependent, each stage help them to move in viscous endolymph towards utricle, Epley's Manoeuvre helps in relocating canaliths or otoconia into utricle for absorption by dark cells. It was assumed that viscosity of fluid will have influence on movement of crystals in semi-circular canals. Extension of each step duration till symptom resolution might

have allowed crystals to fall in to the utricle and correlated with symptom resolution and provided better results in experimental group.

Pre and post Average scores of DHI in control group were 16.48±4.48, 3.52±1.32. In experimental group 14±5.62, 0.32±1.24 respectively. The significance of pre and post results of control and experimental groups on Wilcoxon signed rank test were (z -4.39, p=highly significant and z -4.38,p=highly significant).All subjects had relief from perception of vertigo symptoms and DHI scores after the manoeuvre. But in experimental group (extended manoeuvre group) reduction was more than control. Similar finding was shown by Camila Nicácio da Silva in 2016(Silva CN, 2016).

Another important finding in current study is rate of recurrence in 6 months. Outof 25 only 13 (52%)subjects had at least once recurrence in control group, but in experimental group only 3(12%) subjects had at least once recurrence. It may be because of provision of sufficient time for relocation of canaliths or otoconia towards utricle.

This study provides preliminary evidence to look for adjustment of each step duration of Epley's manoeuvre till their symptom resolution in each session for better outcome and prevention of early recurrence.

Limitations

This study was focussed mainly on symptom resolution time during the manoeuvre. Since the reasons for recurrence are many, it helps in planning future studies. Study sample was taken only from one institute and limited to those who are able to attend department of physiotherapy, NIMS. This study could not find out if the treated patients had a recurrence of symptoms beyond 6 months as this study was limited to 6 months period.

Scope of further Study: With the inclusion of objective diagnostic tools, this study can be extended to find the endolymph densities and its relation to movement of otoconia or canaliths in semi-circular canals. A multicentre and cohort study to generalise to whole population.

CONCLUSION

Control group manoeuvre time was 90 seconds and experimental group needed 184.56±68.38 seconds time for complete resolution of symptom in a session (26 to 86 seconds in step1, 50-120 seconds in step 2 and 27 to 71 seconds in step3). The recurrence of symptoms in 6moths was less in experimental group. 13subjects of control group (n=25) had at least once, but only 3 subjects of experimental group(n=25) had at least once recurrence. This study showed preliminary evidence towards extension of duration of each stage of Epley's manoeuvre till the symptom resolution.

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