Original Article

Effectiveness of vestibular exercise in acute vertigo

Noor Dina Hashim, Asma Abdullah, Mazita Ami, Roslenda Abdul Rahman

ORL Department, University Kebangsaan Malaysia Medical Centre, Kuala Lumpurand KPJ Healthcare University College, Negeri Sembilan, Malaysia.

Objective: To evaluate effectiveness of vestibular exercises in acute vertigo.

Methodology: 45 patients with acute vertigo were divided into 2 groups; 23 in Study Group (SG) and 22 in Control Group (CG). All patients were given tablet Betahistine 24mg twice daily as basic medical treatment and tablet Stemetil 5mg as a rescue. Those in SG also received vestibular exercise. Assessment was done using validated questionnaires, neuro-otology tests and individual diaries.

Results : Intragroup comparison of intensity of symptoms showed a significant improvement from baseline, 3-month and 6-month visit with $p<0.001$. While intergroup comparison showed reduction of scores in both groups and which was greater in SG at 6 months visit. An improvement of neuro-otology tests was seen in all five tests whereby the Romber test, Unterberger-Fukuda test and spontaneous nystagmus test showed earlier improvement in SG at 3-month visit than CG. The SG also recovered faster and used lesser medication. 30.4% patients in SG were asymptomatic as early as first to third week after intervention. The number of rescue medications required in each group lessened towards the end of study. By week 7, 56.3% of SG and 43.8% of CG needed no rescue medication.

Conclusion : The implementation of vestibular exercise is effective in improving symptoms of acute vertigo and the effect was maintained at longer period. (Rawal Med J 201;40: 65-70).

Keywords: Vertigo, vestibular, postural balance.

INTRODUCTION

Vertigois a very common symptom with a prevalence as high as 25% in the general population.[1]It associated with fear of fall, accidents and may cause embarrasement when carrying out daily activities. Balance compensation takes time and may not occur to every individual with vertigo. Underlying medical illness, permanent insult to organs or central or bilateral peripheral organs dysfunction may be one of many causes that delay compensation. Therefore, vertigo may become a debilitating symptom and general health and the quality of life of vestibular patients can be significantly impaired.Vertigo is generally classified into peripheral and central vertigo based on the location of equilibrium dysfunction.

Treatment is mainly symptomatic. A holistic management is required to minimize vertigo associated disability and improve the patient's quality of life. There is evidence to show that the use of vestibular sedatives (eg: bezodiaepines, anticholinergics) can delay the compensatory mechanism of brainstem and prolong the symptoms of vertigo.[2]Several reviews have called for evaluation of an exercise-based form of treatment known as vestibular exercise.[3,4]

Vestibular exercise is a program of graded exercises that consist of eye, head, and body movements designed to stimulate the vestibular system.[1] It is an effective tool for the treatment of vestibular hypofunction whereby its stimulation promotes central compensation, which is a neurologic adaptation to the altered input from the damaged labyrinth. To achieve vestibular compensation, exercises should be performed on a regular basis, under supervision of a skilled professional.Many previous studies have shown that the spectrum of vestibular rehabilitation application has broadened over the years.[5,7] Until recently, limited studies have demonstrated its use for patients with an acute onset vertigo.[8,9]Exercises started as early as 2 to 3 days had shown better postural stability and less disequilibrium.[10,11] There is no critical period when exercises should be initiated as vestibular exercises

are beneficial even for patients with chronic vertigo.[6] The objective of this study was to determine whether vestibular exercises are free from symptoms for a longer period of time as compared to the use of only conventional antivertiginous drug.

METHODOLOGY

45 patients who had history of at least one episode of clearly defined rotational vertigo in the past 5 days and free from any vestibular symptoms for the past 3 months were assessed using validated questionnaires, which include Vertigo Symptom Scale (VSS) and Visual Analog Score (VAS). The VSS has 15 items with two sub-scales: 8 items relating to vertigo-balance and 7 items relating to autonomic-anxiety symptoms.[12] The VSS-short form version has shown satisfactory internal consistency and moderate test-retest reliability.[12] A Malay version of VSS, which showed a high sensitivity and specificity values as an assessment tool in vertigo has been published.[13]

The patients were assigned to control group (CG) which is those with medication only and study group (SG) which is those with combination of medication and vestibular exercise. The patients were divided using systematic randomization whereby those with odd numbers were in CG and those in even numbers were in SG. Medication given to both groups were tablet Betahistine(betahistine dihydrochloride) 24mg twice daily and rescue medicine oral Stemetil(Prochlorperazine), as indicated. Patients were required to record the frequency and duration of acute attack of vertigo and the requirement of rescue medication in the diary given. Those in SG also were required to perform vestibular exercise which was carried out by a physiotherapist at initial stages, 30-40 minutes each session then subsequently, the steps were done individually at home after the patients had built confidence and comprehended the correct steps of exercise.

The exercise was done daily for a period of 12 weeks. Following completion of treatment at 3 months, vestibular exercise and medications were stopped in both groups and patients were assessed again using VSS and VAS at 3 months and again at 6 months to assess the long term recovery. During the visits at presentation and 3 months, neuro-otology tests which included Romberg test, Unterberger-Fukuda test, spontaneous nystagmus, post head shaking nystagmus (PHSN) and Head Thrust Test (HTT) or Halmagyi test were also conducted.

RESULTS

The mean age of patients was 55.3 years in CG and 56.3 years in SG. There were 8 (36.4%) and 9 (39.1%) male patients in CG and SG, respectively. The rest of the patients were female, with total of 14 (63.6%) and (60.9%) in each group. Intra group symptoms score using VSS and VAS at baseline visit (VSS1, VAS1), at 3months (VSS2, VAS2) and at 6 months (VSS3,VAS3) in both groups showed improvement in scores between each visit (Fig.1,2) which is statistically significant ($P<0.05$). The scores were vastly reduced at 3 months in both groups. There was further reduction of scores by end of study in both groups but little reduction was observed in CG as compared to SG.

Fig. 1. Mean VSS and VAS scores at baseline (VSS 1), 3 months (VSS 2) and 6 months (VSS 3) for Study Group.

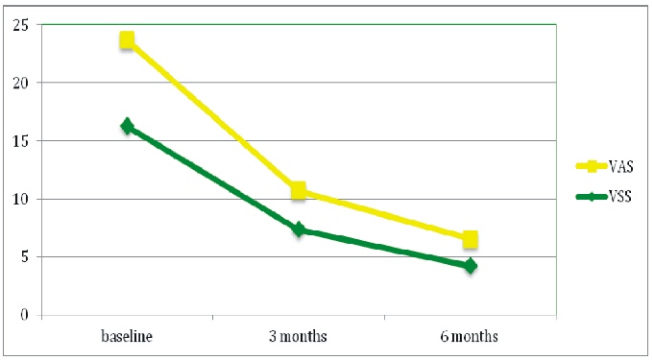
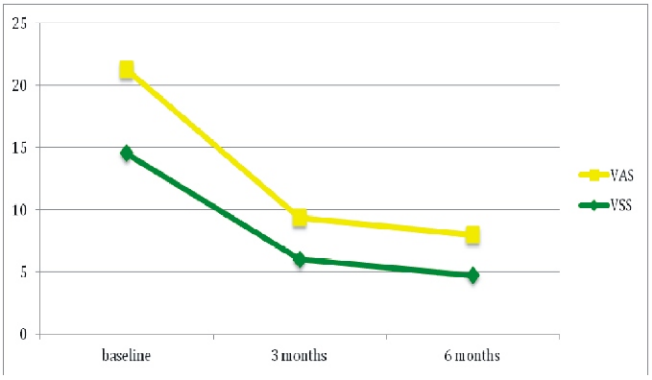
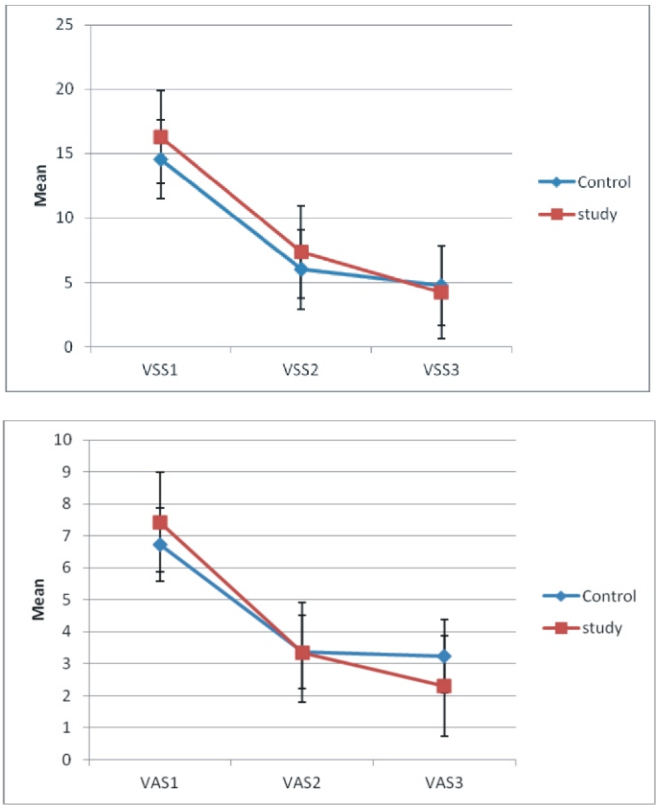


Fig. 2. Mean VSS and VAS scores at baseline (VSS 1), 3 months (VSS 2) and 6 months (VSS 3) for Control Group.



Comparisons between groups showed the mean scores for VSS and VAS in SG were slightly higher at baseline visit than CG. However, this did not affect the outcome of treatment seen as patients in SG did better. Generally, there was improvement of symptoms in both groups throughout the study which was observed more significantly in SG (Fig. 3).

Fig. 3. Comparison of symptoms score between groups using VSS and VAS.



The scores in CG by end of study was similar to second visit as compared to further reduction in SG. 60% patients in CG and 56.5% patients in SG showed abnormal Romberg's test during initial visit which reduced during next visits with SG showing smaller number of patient at 3 months (SG- 4.3%, CG- 9.0%). At final visit, none had positive test.Both groups have a number of patients with abnormal Untebeger-Fukuda test during initial visit (CG-63.6%, SG-39.1%) which reduced significantly in the next visits with SG showing no patient with abnormal test. In spontaneous nystagmus test, SG has higher number of patients during baseline visit (43.5%) while CG has only 36.3%.

Fig. 4. Numbers of medications required between groups.

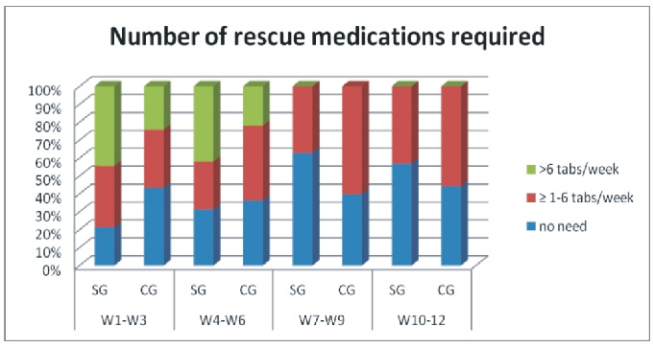
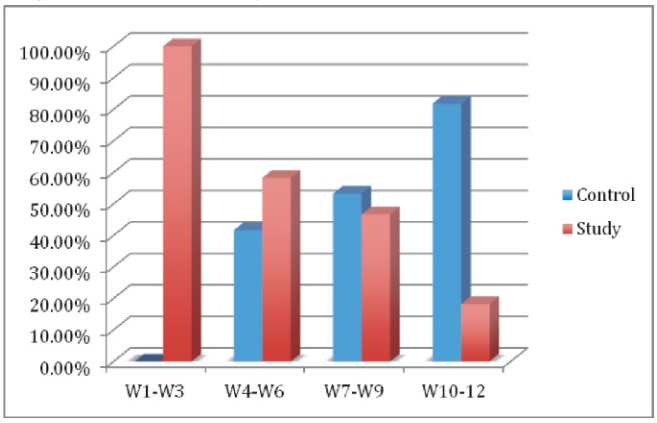


Fig. 5. Time to recovery.



However, the symptoms dissappeared during next visits in both groups.During baseline visit, CG has more patients with post head shaking nystagmus (50.0%) while 34.8% patients in SG with positive test. Numbers of symptomatic patients reduced significantly in next visits but there was a patient in SG who was still symptomatic during 3-month visit.Both groups had a number of patients with abnormal head thrust test during baseline visit (CG-45.5%, SG- 47.8%). The number reduced significantly during next visits with3.7% in SG with abnormal test at 3-month visit. There was however, none in final visit.

As in Figure 4, during the first half study period, both groups showed various requirement of rescue medication. There was a number of patients in both groups who took>6 tablets per week during initial visit. Subsequently, the number of medications required was equally reduced. More patients in SG

did not need rescue medications (50.3% at week7-9, 66.5% at week10-12) while CG (43.8% at week7-9, 47.5% at week10-12).

The time of recovery for SG was earlier than CG whereby a number of patients had dissappearance of symptoms as early as first 3 weeks of treatment (30.4%).None from CG recovered during this period of study. Majority of patients within in SG recovered earlier than CG in second and third quarter of the study. Meanwhile majority of CG had relief of symptoms in the last 3 weeks of study (40.9%)(Figure 5). This result is statistically significant ($P<0.01$) and did not relate to age, medical illness, or presenting illness.

DISCUSSION

The neuro-otology tests performed has shown a better result in SG compared to CG in most of the tests. In the Romberg test, the number of patients from SG which had positive results was lower during second visit more than CG. This result was similar to previous studies which had shown that those who practiced vestibular exercise had negative Romberg test thus.[9,10] At initial Unterberger-Fukuda test, a high number of patients presented with abnormal test in both groups. Those in SG who had abnormal test at initial visit, had negative Fukuda test as early as second visit. Should the reassessment been done during the first week of acute vertigo, a persistent abnormal test is expected as this test is sensitive to acute vestibular asymmetry.[14]

A spontaneous nystagmus was detected in most patients especially from the SG. The sign was observed at the initial visit and completely disappeared during the next 2 visits. Spontaneous nystagmus signifies an acute vestibular hypofunction and the ability to detect spontaneous nystagmus is useful both in support of a diagnosis of vestibular hypofunction especially vestibular neuritis and distinguishing it from stroke (central vertigo).[15]Although, there was a reduction in number of patients in both groups, there was still a patient in SG with abnormal test during second visit (4.3%). This may suggest an isolated case with delayed improvement of vestibular dysfunction or newly developed vertigo in SG. Guidetti G et aldocumented a small number of patients with abnormal PHSN tests at the initial phases after an acute vertigo attack.[16] This is possibly due to misinterpretation of PHSN as spontaneous nystagmus. This could be the case in this study. Assessment of nystagmus was done with Frenzel's lens which could be supported by the use of a video camera (video-nystagmography), as it can distinguish the PHSN and spontaneous nystgamus.[9] The video nystagmography was performed initially, however in view of local logistic problems including inadequate expert personnel and patients' incompliance to follow up, the procedure was then abandoned.

In head thrust test (HTT) or Hamalgyi test, almost half of the patients have abnormal results. During 3-month visit, there was still a patient with abnormal test (4.3%) in SG. This correlates with PHSN test, which may suggest that the patient still have an acute attack of vertigo despite vestibular therapy. HTT is useful in examining a patient several weeks after the diagnosis of acute vestibular dysfunction to determine whether recovery or central compensation has set in. A positive HTT in such patient is usually accompanied by other signs, such as positive Unterberger-Fukuda test or the presence of PHSN.[17] However, at 6 months, all patients had negative head thrust test. Similar as Unterberger-Fukuda test and PHSN test, HTT is an easily applicable bedside test for acute vestibular dysfunction.

During the first half of study period, both groups required equal amount of rescue medications. However, SG showed more tablets required per week in first two evaluations. This is expected, as the intensity of symptom for the SG during early follow up was higher than CG (Figure3). The other possibility is that the patients may need time to comprehend and practice the steps of vestibular exercise to ensure a good vestibular compensation. As the intensity of symptoms decreased, the number of medications required had equally decreased. The SG has reached the reduction of intensity of symptoms almost equal with CG even though upon presentation they have higher scores of severity of

symptoms. This may support the hypothesis that vestibular exercise was effective in managing acute vertigo with reduced dependency on medication. Our findings disagree with the study by Venosa et al who suggested that the comparable result between SG and CG is because the higher requirement of medications by CG.[9]

The time of recovery within 3 months study period was divided into 4 parts. The recovery from vertigo attack between SG and CG was variable. Interestingly, 30.4% patients from the SG recovered as early as the first part of study period (week1-3). None from CG recovered during this period of study. The majority of patients in both groups had resolved symptoms between week 4-6 and week 7-9. However, almost 40.9% of CG patients had disappearance of symptoms only by end of 3-month study period (week10-12). Our result is comparable to previous studies, that found that the improvement of symptoms was faster in those who practiced vestibular exercise.[10,11]

Throughout this study, we found a few limitations that can be improved to produce a better outcome. Firstly, the symptoms scoring using VAS and VSS are a subjective assessment. The interpretation of severity of vertigo attacks varies among patients. However, this weakness was reduced by adequate explanation and guidance from researcher. An additional limitation is that participants could not be blinded to treatment, therefore, will increase biases. As the effectiveness of vestibular rehabilitation relies on the willingness of patients to practice daily head movements that will initially make their symptoms worse, some patients especially the elderly and those who were not compliant did not complete the course of treatment and were categorized as dropouts. Dropouts were one of major limitation and in future studies, it is hoped that the community is aware of current successful alternative management of acute vertigo, which is safe and easily applicable, thus may increase compliance. Dropouts also lead to a small sample size which will not attain 80% power of study.

CONCLUSION

Vestibular exercises were effective in improving symptoms of acute vertigo and the effect was maintained at longer period.

Author Contributions:
Conception and design: Noor Dina Hashim, Mazita Ami
Collection and assembly of data:Noor Dina Hashim, Roslenda Abdul Rahman
Analysis and interpretation of the data: Noor Dina Hashim, Roslenda Abdul Rahman
Drafting of the article: Noor Dina Hashim, Mazita Ami
Critical revision of the article for important intellectual content: Asma Abdullah
Statistical expertise: Asma Abdullah
Final approval and guarantor of the article: Asma Abdullah
Corresponding author addess:dinahashim81@yahoo.com
Conflict of Interest: None declared
Rec. Date: Sep 11, 2014 Accept Date: Nov 29, 2014

REFERENCES

1. Yardley L, Donovan-Hall M, Smith HE, Mullee M, Bronstein AM, et al. Effectiveness of Primary care-based vestibular rehabilitation for chronic dizziness. Ann Intern Med 2004;141:598-605.
2. Hain TC, Yacovino D. Pharmacologic treatment of persons with dizziness. Neurologic Clin 2005;23:831-53.
3. Colledge NR, Barr-Hamilton RM, Lewis SJ, Sellar RJ, Wilson JA. Evaluation of investigations to diagnose the cause of dizziness in elderly people: A community based controlled study. BMJ 1996;313:788-92.
4. Hanley K, O'Down T. Symptoms of vertigo in general practice: a prospective study of diagnosis. Br J Gen Pract 2002;52:809-12.
5. Johansson M, Akerlund D, Larsen HC, Andersson G. Randomized controlled trial of vestibular rehabilitation combined with cognitive-behavioral therapy for dizziness in older people. Otolaryngol Head Neck Surg 2001;125:151-6.
6. Krebs DE, Gill-Body KM, Parker SW, Ramirez JV, Wernick-Robinson M. Vestibular rehabilitation: useful but not universally so. Otolaryngol Head Neck Surg 2003;128:240-50.
7. Cohen HS, Kimball KT. Increased independence and decreased vertigo after vestibular rehabilitation. Otolaryngol Head Neck Surg 2003;128:60-70.
8. Strupp M, Arbusow V, Maag KP, Gall C, Brandt T. Vestibular exercises improve central vestibulospinal compensation after vestibular neuritis. Neurology 1998;51:838-44.
9. Alessandra R. Venosa, Roseli S. Bittar. Vestibular Rehabilitation Exercises in Acute Vertigo. Am Laryngol Soc2007;117:1482-7.
10. Herdman SJ, Clendaniel RA, Mattox DE, Holliday MJ, Niparko JK. Vestibular adaptation exercises and recovery: acute stage after acoustic neuroma resection. Otolaryngol Head Neck Surg 1995;113:7787.
11. Enticott JC, O'leary SJ, Briggs RJ. Effects of vestibulo-ocular reflex exercises on vestibular compensation after

vestibular schwannoma surgery. Otol Neurotol 2005;26:265-9.
12. Yardley L, Burgneay J, Andersson G, Owen N, Nazareth I, Luxon L. Feasibility and effectiveness of providing vestibular rehabilitation for dizzy patients in the community. Clin Otolaryngol1998;23:442.
13. Zuraini Z., Mohd Normani Z. Dinsuhaimi S., Zalina I. Clinical use of Malay Version of Vertigo Symptom Scale in patients with Peripheral Vestibular Disorder (PVD). Med J Malaysia 2012;67;4;386-9.
14. Honaker, JA, Boismier TE, Shepard NP, Shepard NT. Fukuda Stepping Test: Sensitivity and Specificity. J Am Acad Audiol 2009;20:311.
15. Schubert MC, Tusa RJ, Grine LE, Herdman SJ. Optimizing the sensitivity of the head thrust test for identifying vestibular hypofunction. Phys Ther 2004; 84:151-8.
16. Guidetti G, Monzani D, Civiero N. Head-shaking nystagmus in the follow-up of patients with vestibular diseases. Clin Otolaryngol 2002;27:1248.
17. Kaplan DM, Slovik Y. The Head Thrust Test: Technique, Usefulness, and Limitations. Mediterr J Otol 2005;1:144-17.