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Evaluation Of Clinical Profile Of Vertigo Patients Using Video Nystagmography

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ABSTRACT

INTRODUCTION:

Benign positional paroxysmal vertigo is the most frequent vestibular disorder displaying a 10% incidence rate in general population.Posterior canal BPPV accounts for 80-90% of cases with lateral canal BPPV occurs in 10-20% of cases.Anterior canal BPPV is very rare (1-2%).Posterior canal BPPV and lateral canal BPPV are well defined entities and their diagnosis is based on direction of nystagmus.

OBJECTIVE:

To test efficency, efficacy and accuracy of VNG compared to CONVENTIONAL method ie Dix Hallpike in diagnosis and differentiating Vestibular disorders.

Materials and Methods :

A total of 150 symptomatically positive patients of vertigo visiting the ENT OPD were examined prospectively and the findings of Conventional method ie Dix Hallpike was compared with VNG in diagnosis and differentiation of peripheral and central vertigo .

Results :BPPV was found to the most common cause of peripheral vertigo followed by Menieres disease. While Ishaemic event was the commonest cause of Central vertigo followed by Migraine and Multiple sclerosis. VNG was also able to differentiate bilateral from unilateral vestibulopathy.It was a major help in finding of the usefulness of Epleys or canalolith repositioning manuvere in cure of BPPV patients. MRI had a specificity of 100% in diagosis of Central vestiular disorders. It increased the accuracy and specificity of diagnosis of Central disorders.

CONCLUSION:

The VNG was compartively more effective, accurate and efficent in differentiating various vestibular disorders even the pereipheral ones as compared to the Conventional Dix Hallpike manuvere.VNG was very helpful in differentiating bilateral vestibulopathy from unilateral vestibulopathy, VNG was the gold standard investigation in checking the effectiveness of canalolith repositioning manuvere.A total of 150 patients were examined in our study.This is a hospital based prospective study .Age group 30-50 years were more commonly involved.Females were involved more tha male abut 65 females were involved and only 35 males were involved.Peripheral vertigo was seen in 75% of patients and central in only 25% of patients.Antivertigo medications and vertigo excercises improved the treatment outcome in all patients of peripheral vertigo.Posterior canal was involved in 70 patients followed by Anterior and then horizontal canals.Among the peripheral causes of vertigo BPPV was present in 35% 0f patients followed by Menieres disease in 18% of patients.Among the central cause Stroke or an ischaemic focus was present in majority of patients presenting with central vertigo followed by multiple sclerosis .VNG was able to diagnose ,differentiate most of the cases of vertigo with 98% accuracy as compared to the coinventional methods ie Dix Hallpike. Dix hallpike diagnosed the cases of BPPV with 91% accuracy . It was found that most common position causing nystagmus was SHR followed by HHS, followed by SHL. But VNG diagnosed the other cases of peripheral vertigo and also the central ones. VNG was able to differentiate between central and peripheral cases of vertigoAlso it can tell whether the loss is Unilateral or Bilateral or both and if Unilateral then to which side. VNG was also helpful in diagnosing the role of additional identification like MRI in diagnosis of VertigoAlso MRI was found to be very useful as compared to CT in diagnosis of central vertigo.While CT had a role in diagnosis of Acute vertigo episodes , MRI was helpful to delineate the central cause of Vertigo.

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I. INTRODUCTION

Vertigo is defined as the hallucination of movement , either of self (subjective) or the enviroment(objective)(1)

Vertigo is the tenth most common reason for referral to neurophysician .It is one of the most under diagnosed symptomatology 80% patient had no diagnosis reached and the most misdiagnosed condition .Benign positional vertigo is the most frequent vestibular disorder displaying a 10% incidence rate in general population. Women are more often affected and symptoms typically appear in 4th and 5th decade of life. In 1980 Epley proposed free floating densities located in semicircular canals deflect the cupula creating the sensation of vertigo. This is well documented by Canalithiasis Theory .Although these canaliths located in the Posterior SCC, The Lateral and Superior canal may also be involved.(1)Patients with BPPV complain of vertigo with change in head position, rolling over, or getting out of bed, vertigo is often side specific. Vertigo occurs suddenly and lasts for less than 1 minute.(1)Attacks are seperated by remissions however patient may complain of constant light headedness between the episodes. Diagnosis is made primarily through history and also by eliciting typical physical findings during Dix Hallpikemaneuver.(1) The Dix Hallpikemaneuver entails guiding a patient through a series of movements known to elicit nystagmus in a patient with BPPV. Posterior canal BPPV accounts for 80-90% cases, while lateral canal BPPV occurs in 10-20% of patients and Anterior canal BPPV is very rare (1-2%).(2) Posterior canal BPPV and lateral canal BPPV are well defined entities , their diagnosos is based on direction of nystagmus elicited by head position change, which include upbeating and torsional in posterior canal BPPV and horizontal in in horizontal canal BPPV. The diagnostic criteria for anterior canal BPPV is less clearly defined. Even the existence of AC BPPV has been questioned.(2) The presence of downbeat nystagmus with or without a component torsional testing is only described feature of AC BPPV.(2)

Videonystagmography is a complete diagnostic system for recording, analysing and reporting eye movements using video imaging technology in which hi –tech video goggles with infrared cameras are used.(3)VNG can differentiate between central and peripheral lesions and if peripheral; it can decipher between unilateral and bilateral vestibular loss.VNG addresses the functionality of each ear.(4)

VNG helps document unilateral / bilateral loss of vestibular function, confirm BPPV and detect central lesions that are missed during a routine biophysical examination.(5) VNG helps decide whether additional tests (MRI) are needed and helps in preoperative evaluation.(5)

Most commonly involved SCC is horizontal due to its anatomical location.(6) During Dix Hallpike test the rotatory nystagmus in the form of twitching movements directed towards the affected ear is seen after 5 to 10 seconds and disappears in 45 seconds.(7)

VNG tests include the following:(8)

1. Tests of Occulomotor function with fixation.This includes saccade, tracking and optokinetic tests and optokinetic tests.
2. Tests of gaze stabilization (with or without fixation, alertness level): includes gaze or spontaneous nystagmus, nystagmus, static position tests.
3. Caloric tests.
4. Tests for specific etiology includes Dix Hallpikemaneuver (dynamic positioning), pressure tests (fistula).
5. Other head shake test, hyperventilation test. Etc


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II. AIMS AND OBJECTIVES

AIMS

1) To evaluate the clinical profile of patient presenting to the ENT OPD differentiating peripheral vestibular lesions from central vestibular lesions to classify different peripheral vestibular lesions and to exactly detect which Semicircular canal is involved using videonystagmography.
2) To compare conventional method ie Dix hallpike in detecting peripheral vertigo with VNG.

OBJECTIVES:

1)To differentiate between peripheral vestibular lesions and central lesions
2)Precise differentiation of acute unilateral vestibulopathy from central lesions with vestibular symptoms.
3)To detect exactly which SCC is affected in particular peripheral vestibular lesion
4)Comparing conventional method ie dixhallpike with VNG.

III. MATERIALS AND METHODS:

MATERIALS : The present study was conducted in the ENT department of Adesh Institute of Medical Sciences and Research , Bathinda.
Study Design : This prospective observational study was conducted among the study participants attending the hospital .
Study period of 1 YEAR.
Study Participants: All patients of Vertigo attending ENT OPD.

INCLUSION CRITERIA:

All patients with vertigo.
Age : 18 to 70 years
Sex : male and female
Unilateral or bilateral

EXCLUSION CRITERIA:

Patients on antivertigo drugs
Patients on antipsychotics drugs
Pregnant females
Patients with stents .
Patients with cervical collar.
Ethical Clearance : Ethical Clearance was obtained from Institutional Ethical Committee of AIMSR , Bathinda.

METHODS:

Through history and general examination of all the participants was done.

1. The participants were explained about the test prior to testing.
2. Bilateral ear Otoscopy was performed in each participant to detect any ear abnormality or diseased condition.
3. All the tests included in the system of the VNG machine were performed.

4. The participants were informed about each intermittent test position and were advised to wait for the tester to guide them to the position.
5. During each test eye movements were recorded, tests were carried out for a stipulated time as was feeded in the VNG machine.
6. Furthermore video recording was also done to maintain the record of the patient for later time.
7. Calibration of VNG machine was done periodically.

DIX HALLPIKE TEST

1)THE patient for the maneuver was seated in upright position . It was ensured that patient is oriented so that when they put in supine position the head will hang off the edge of table.

2)The patient turned his head to 45 degree and the hands are placed in a position where the neck is supported. Before the manuever patient was instructed to open his eyes.

The patient was layed back maintaining 45 degree head turn and patient head was extended 20degree below horizontal plane.

1) Patient eyes were observed for 30 seconds.
2) Dix hallpike was done on both the sides .

Stastical analysis:

Data was entered into Microsoft Excel sheet and exportedto data editor of Stastical Package for Social Sciences (SPSS Ver 23) wherein stastical analysis was done. Categororical variables were described as frequencies and percentages.Continuous variableswere descibed as mean and standard deviation.Chi square test was used to analyze the relationship between two categorial variablesand T-TEST was used to compare a continuous variable between two groups. A p value of < 0.05 was considered as statistically significant.

IV. RESULTS

AGE WISE DISTRIBUTION OF VERTIGO

The Vertigo was seen most commonly in middle age individuals ie 30-50 years of age ie 75%, followed by 50- 70 years of age ie 20%, followed by 70 -90 years of age ie 3% and it was least common in 16-3O years ie 2%

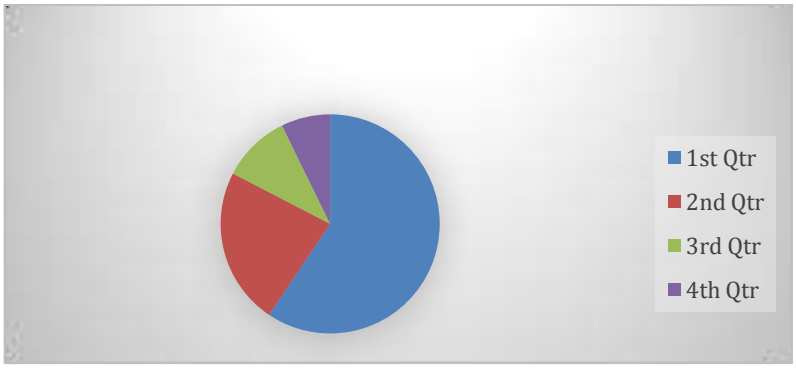


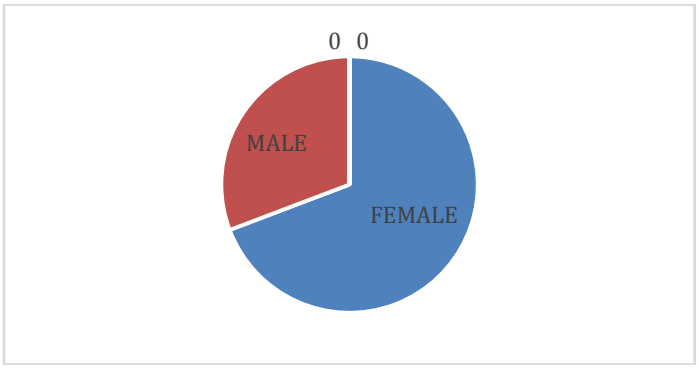
FIGURE 1 : Age wise distribution

AGE	% DISTRIBUTION
16-31 YEARS	2%
31-50 YEARS	75%
51-70 YEARS	20%
70 -90 YEARS	3%

GENDER WISE DISTRIBUTION OF VERTIGO

FEMALE WERE EFFECTED MORE COMMONLY IE 65% As compared to males ie 35%.

GENDER	PERCENTAGE
FEMALE	65%
MALE	35%



TYPE OF VERTIGO

IN the study 75% had peripheral vertigo and 25% had Central vertigo .Confirmation was made by the sequence of tests on VNG and Dix Hallpike was performed .

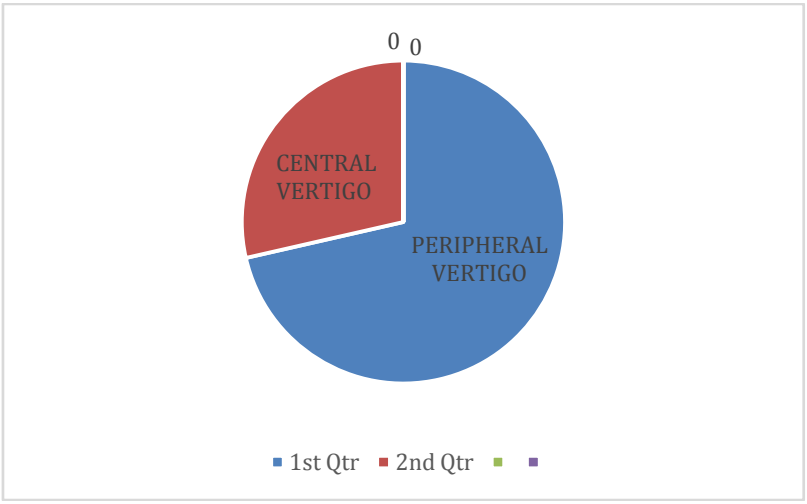


FIGURE 3 : PERIPHERAL AND CENTRAL VERTIGO PERCENTAGE

TYPE OF VERTIGO	PERCENTAGE
PERIPHERAL VERTIGO	75%
CENTRAL VERTIGO	25%

TABLE OF CANAL INVOLMENT:

Posterior semicircular canals were involved in 70% of patients followed by Anterior ie 20%, followed by Horizontal in 10% individuals.

SEMI CIRCULAR CANAL	% OF PATIENTS
POSTERIOR Semicircular canal	70%
ANTERIOR Semicircular canal	20%
Horizontal Semicircular canal	10%

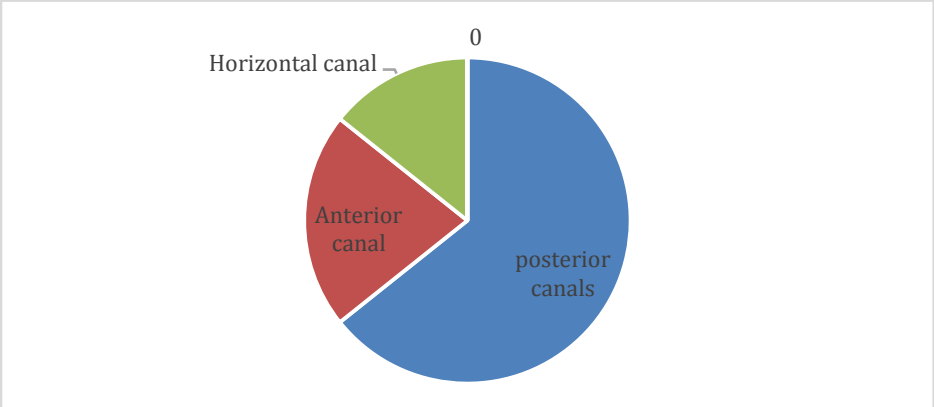


FIGURE 3: Canal Involvement percentage

DIX HALLPIKE TEST and VNG COMPARISON on detection and differentiation of Different types of Vestibular disorders:

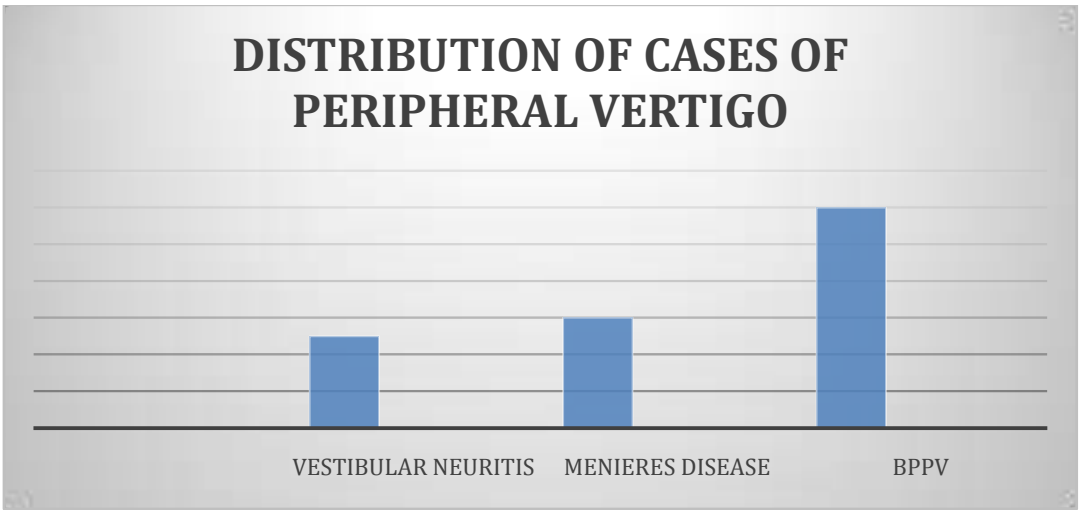
VNG was a step ahead from dix hallpike because of the fact it had array of test to find out the exact cause of vertigo.

METHOD	PERCENTAGE OF CASES DETECTED
DIX HALLPIKE	91% of Peripheral vertigo
VNG	98% cases of peripheral and central vertigo

VNG was more effective in detection of peripheral and central vestibular disoders. VNG was able to distinguish Unilateral from bilateral vestibulopathy.

Different types of Peripheral disrders reported .Following is the list of different peripheral disrders reported:
BPPV
Menieres disease
Vestibular neuritis
Labyrinthitis, Perilymph fistula, Acoustic neuroma,Vestibular Schwannoma

Type of peripheral disorders	Percentage of patients
BPPV	35 patients
Menieres disease	18 patients
Vestibular neuritis	10 patients
Others (Labyrinthitis, Perilymph fistula, Acousticneuroma,Vestibular Schwannoma	7 patients



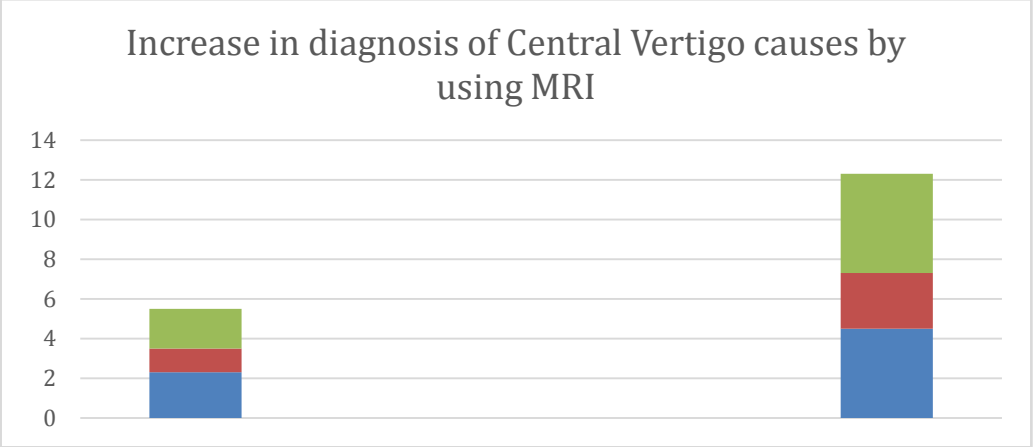
Central causes include the following-:
Parkinsonism

Aberrant artey malformation
Multiple Sclerosis
Focal cerebral lesions
Stroke
Pressure on the vessel (Anterior cerebellar artery)by vertebrae
Posterior cerebellar artery syndrome.

Imaging plays an important role in diagnosis and treatment of the patients with vestibular and temporal bone abnomalities viz CT and MRI.MRI is very useful in diagnosis of vertigo of central origin.Misdiagnosis of central nervous system pathology results in significant morbidity and mortality.

CENTRAL CAUSES	PERCENTAGE
PARKINSONISM	2
MULTIPLE SCLEROSIS	6
PICA	5
Anterior cerebellar artery syndrome	7
Stroke	8
Migraine	6
Cranial nerve palsies	5

The central causes of vertigo include an array of causes .The findings of these causes were seen on examination and on CT scan and MRI.The senstivity of MRI was was approximately 90% and specifity 100% in the diagnosis of cases of central



V. DISCUSSION:

The present study was carried out in the Department of ENT ,Adesh Institute of medical Sciences ,Bhatinda.
The discussion is done under following letter heads

1. Age Distribution
2. Gender
3. Symptomatic positivity
4. Type of Vertigo
5. Dix hallpike test application
6. Epleys performed
7. .Semicircular canal involvement
8. Symtomatic improvement on follow up

Majority of study subjects in our styudy belonged to 40-60 years of age.Bisdorff et.al(2000) (13) found no correlation between age and prevalence of vertigo.Copperwheat (2005) (15) did not found any correlation between age and presence of vertigo. Deka (1985) (1) found that vertigo was more common in 20-50 year age group. .Bas Donmesi et al(2016)(27) found that the most common age group were in 40-60 years of age.

Gender distribution

Copper wheat (2005) (15) demonstrated prevalence of vertigo more in females as compare to male poulation. Mc Auley et.al 1996 (28) demonstrated equal number of both the genders being affected .Froehling and Silverstein (1991) (25) found more women affected than men.The present study demonstrated more number of females were affect ed as compared to males.Sunami etal (2004) (29) Examined 89 patients using VNG and found that 61 males and 28 females were having vertigo mostly in the age group of 25 -40 years Total 8 positions were used for positional static testing .It was also found that all eight positionsprovoked nystagmus .

Symptomatic positivity

Geisser et al (2000) (12) demonstrated presence of unsteadiness and spinning position in all the 29 tested participants.In the present study also the symptomatic positivity was 98%; with only 2% individuals being stmptomatically negative.**Copperwheat (2005) (15)** investigated prevalence and repeatibility of peripheral nystagmus in 40 healthy participants with no history of otologic disorder and with pure tone hearing threshold appropriate to their age. Using VNG the study showed a significant difference in relation to average and peak SPVS in the vBRS, BLS, C positions in which older group displayed significantly greater SPV magnitude than younger group. **Scheinder (2002) (11)** examined 25 healthy participants aged 23to 60 years for presence of PN in nine test positions. These were HU, C, HHR, HHL, BRS, BLS, SHS, SHR and SH

BPPV seems to be the commonest disorder as seen in 65% 0f the patients .This finding was consistent with Debasish Burman (16) 20% in patients of peripheral vertigo. Menieres disease was the second peripheral disorder associated with vertigo .In study of Mawson and Ludman (17) (1979) it was the commonest disorder. Deka etal 1985 (1)also reported positivity of 11% in their study of peripheral vertigo.Jan Bermeistein et al (18) found in their study that most common diagnosis werephobic postural vertigo,BPPV, Vestibular Neuritis, Psychogenic vertigo and Menieres disease.

DIX HALLPIKE PERFORMED

Copper wheat (2005) (15) found that certain positions he used a total of eight test positions..He found a clear predominance of HLB PN cross the entire studywith VUB being the second most common type of Peripheral nystagmus

Shephard and Telian (1996) (14) found nystagmus with SPV.6% in any head or body position.

In our study also Dix hallpike was performed in all the patients and the incidence of Peripheral vertigo was most common in SHR Position followed by HHS position.

Semicircular canal :

In our study the posterior semicircular canals were affected in 70 % of cases followed by lateral and then Anterior semicircular canals.

LS Parnes (2020) (19) found a multi canal involvement not even sparing the anterior Semicircular canals.

Albernaz et al (2014) (10) in June 2014 studied a sample of 200 patients with a clinical history of vestibular disturbances who were submitted to a vHIT including all six semicircular canals and abnormal responses of anterior and posterior canals were found in several patients either alone or combined with altered responses of the lateral canals .

Commonest cause of Central vertigo in the present study was Vertebobasilar insufficency ie in 7 patients followed by Multiple sclerosis, Parkinsonism and Migranious headache.Kanthleen A. Delany(1984)(25) found that cerberovascular disease accounted for 19% of all cases of vertigo.Neuhauser H. (1991) (20) found the prevalence of migranious headache was 7% in their study.

Epley was found to cure 95% cases of peripheral vertigo in the present study.Barin (2006) (26) found that Epleys was very effective in curing subjects of BPPV on every visit Epleys was performed for the cure of the patients of Bppv and a resolution rate of 75% was noted.Shah S. and VishwakarmaR. (2014) (21) studied 35 patients of BPPV , there was improvement in 31 patients after 1st CRP , 3patients showed improvement after 2 nd CRP and 1 with 3rd CRP.

VNG was able to diagnosis 98% of cases of peripheral vertigo and 87% cases of Central vertigo in our study.Also it was able to distinguish Unilateral vestibular lesion from Bilateral vestibular lesions.Mc Caslin et al (2009) (22) found that VNG helps in diagnosis of and confirmation of patients with BPPV , detect central lesions that are missed during routine physical examination .They also mentioned that VNG decides whether additional tests like MRI are required or not.

SHR position was the position in which most of our study bsubjects ie 65% showed nystagmus followed by HHR, followed by SHL position .Our finding was consistent with Bisdorff et al (2000) (13)

Bisdorff et al assessed horizontal and vertical components of peripheral nystagmusin 40 healthy participants .Howeveronly 18 out of 40 participantsunderwent typical static positional testing While the study reported 100% prevalence of peripheral nystagmus in all the 18 subjects.The study demonstrated that supine head right , supine head left elicited equal degree of nystagmus.The head up position elicited lowest nystagmus.The study did not differentiated supine Nystagmus from peripheral nystagmus.**Scheinder (2002) (11)** examined 25 healthy participants aged 23to 60 years for presence of PN in nine test positions. These were HU, HHR, HHL, BRS, BLS, SHS, SHR and SHL.

Prevalence of PN was 48% with each test position eliciting PN in at least one participant. The highest prevalence of PN occured in HHL position and smallest prevalence occured in SHR and SHS positions.**Levo et al (2004) (9)** evaluated the reliability of VNG system in detecting spontaneous, positional and head shaking nystagmus in 20 participants with no H/O of vertigo, balance problems, otological disease or neurological disorders. The overall prevalence of nystagmus was 55%.The SHR and SHL elicitednystagmus in maximum participants. Shephard and Telian (1996) (14) who argued that head hanging positions can help investigate the various head position in gravitational field.

25% OF the study subjects showed abnormal saccades ie slow and assymetric on the random saccade test.Badr E. Mostafa (23) in study found that abnormal random saccade and smooth pursuit test were present in 23% of the cases.

Kefah Karawani 2018 aso found abnormal saccades in VNG test in his subjects and an abnormal VHit test (24).

VI. CONCLUSION

A total of 100 patients were examined in our study.This is a hospital based prospective study .Age group 30-50 years were more commonly involved.Females were involved more tha male abut 65 females were involved and only 35 males were involved.Peripheral vertigo was seen in 75% of patients and central in only 25% of patients.Antivertigo medications and vertigo excercises improved the treatment outcome in all patients of peripheral vertigo.Posterior canal was involved in 70 patients followed by Anterior and then horizontal canals.Among the peripheral causes of vertigo BPPV was present in 35% 0f patients followed by Menieres disease in 18% of patients.Among the central cause Stroke or an ischaemic focus was present in majority of patients presenting with central vertigo followed by multiple sclerosis .VNG was able to diagnose ,differentiate most of the cases of vertigo with 85% accuracy as compared ti coinventional methods ie Dix Hallpike.Also MRI was found to be very useful as compared to CT in diagnosis of central vergtigo.With the increase in age cases of abnormal findings on MRI scan and central vertigo were increased.The senstivity of MRI ws 90% and specifity 100% in diagnosis of patients with central vertigo.

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