METHOD
CHAPTER III

METHOD

The present investigation was designed to test various hypotheses concerning psychosocial and audio-vestibular aspects of patients with vertigo. The empirical verification of the proposed hypotheses is dependent, firstly on the reliable measurements of the variables of ultimate interest, and secondly, on the methods and procedures employed for deriving conclusions from such measurements. This required:

(i) Selection of adequate sample
(ii) Selection of appropriate tools that could be profitably used for reliable and valid measures.
(iii) Selecting suitable statistical techniques for analysing the data.

Thus, it is pertinent to describe the sample, discuss the tools and the methods and procedures employed in completing the research being reported.

The description of the sample providing data for testing the proposed hypotheses is given in the subsequent pages. This chapter also describes the tools which have been used for classifying subjects into different groups as well as for examining their psychosocial attributes. In addition, the information concerning administration and scoring of the tests used is also given in subsequent pages. Moreover, the procedure of analysis has also been discussed.

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Subjects

A total of hundred subjects were subdivided into five groups of 20 subjects each, viz. Cervical spondylosis, Benign Paroxysmal Positional Vertigo (BPPV), Meniere's disease, Hypertension and Psychogenic Vertigo. The sample was drawn from the 'Vertigo clinic' run by Department of Otolaryngology, Postgraduate Institute of Medical Education and Research, Chandigarh.

A matched control group comprising of 20 normal subjects was also drawn randomly from the employees of the department.

A detailed description of the sample is given in Table 3.1.

Tools used

The following tools were used:

1. Pure tone audiometry
2. Speech audiometry
3. Impedance audiometry
4. Tone Decay Test
5. Cold caloric test
<table>
<thead>
<tr>
<th>GROUP</th>
<th>SEX</th>
<th>N</th>
<th>AGE RANGE</th>
<th>MEAN AGE</th>
<th>EDUCATION</th>
<th>MARITAL STATUS</th>
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9. IPAT Anxiety Scale Questionnaire (Cattell and Scheier, 1963).

1. Pure tone Audiometry

The purpose of examining hearing is to aid in the process of making decisions regarding the type and extent of hearing loss a patient may have. The reliability of the test is based upon interrelationships among such factors as calibration of equipment, test environment, patient performance, and examiner sophistication.

The hearing tests were performed in an acoustically treated airconditioned test room of Audiology and Speech Rehabilitation Unit, Department of Otolaryngology, Postgraduate Institute of Medical Education and Research, Chandigarh.

The air conduction thresholds were obtained for the frequencies 250-8000 Hz (using TDH - 50 earphones) using the Beltone 2000 clinical Audiometer (calibrated to ANSI S3.6 1969 standards) and the bone conduction thresholds were obtained using BM-79 bone vibrator. The thresholds were determined with Hughson and Westlake’s (1944) ascending method modified by Carhart and Jerger (1959).

The patients were briefed about the procedure and instructed to indicate the appreciation of tone in the ear by lifting the index finger of the right hand. Patients were tested at 1000 Hz at 40dB to start with (Carhart and Jerger, 1959), because this frequency is easily heard by most
people and has been said to have high test-retest reliability. The intensity was decreased in 10 dB steps or alternatively increased in 5 dB steps till the patients indicated the appreciation of pure tone. Approximately 5 seconds inter-stimulus interval was given. The same procedure was repeated at 2000, 4000, 8000, 500, and 250 Hz.

Patients in whom hearing loss was detected on air conduction were tested by bone conduction. Adequate masking was used whenever necessary.

2. Speech Audiometry

The list of Hindi Spondee and Phonetically Balanced (PB) words by Abrol et al. (1971) was used to determine the speech reception threshold (SRT) and speech discrimination score (SDS) respectively. Live monitored voice was used for all these tests. A distance of 6 cms. between the lips of the tester and the microphone was maintained. An effort was made to pronounce the words as clearly and uniformly as possible.

Speech Reception Threshold

The procedure was explained briefly and a few examples of spondee words (disyllabic words with equal stress on each eg. Door-way, Black-board) were given. The test was initially administered at 15 dBSL of the average of 500, 1000, and 2000 Hz pure tone thresholds (Pure tone Average). Six spondee words were presented and if the
patient responded by repeating all of them correctly, the intensity level was reduced in 3dB steps till the patient repeated 50% of the words correctly.

Speech Discrimination Score

The audiometer was now set at 40 dB above the patient’s SRT (provided it does not reach the patient’s uncomfortable loudness level) and 50 phonetically balanced (PB) words were presented. The number of words repeated correctly were multiplied by 2 to get the percentage discrimination score.

3. Impedance Audiometry

An automatic tympanometer, Madsen Electronics 331 was used for impedance audiometry. It uses a low frequency probe tone of 226Hz for the purpose of tympanograms and a 1000 Hz tone at 100 dB is given for obtaining the acoustic reflex.

The patients were asked to keep quiet and advised not to swallow during the test. The probe tip was kept at the external end of the external auditory canal and an air tight seal was obtained. The graph thus obtained was analysed for compliance and pressure values.

The various types of tympanograms include Type A, Type A_D, Type A_G, Type B and Type C.

4. Tone Decay Test

Tone decay testing is a diagnostic and screening
procedure for retrocochlear lesions. In clinical practice, tone decay is either measured at or near threshold (Threshold tone decay), or well above threshold (Supra threshold tone decay). Threshold tone decay is defined as a decrease in threshold sensitivity resulting from the presence of a barely audible sound.

Rosenberg’s 1-minute modification of the Carhart tone decay test (1958) was used. The test was administered at 5dB SL at 1000, 2000 and 4000 Hz for 60 sec. The patient was instructed to keep his finger raised as long as he heard the tone. If the patient was able to hear the tone for full 60 seconds, the test was negative. If the subject indicated that he no longer heard the tone before 60 seconds were completed, the intensity was raised in 5-dB steps without stopping the watch till 60 seconds were over. The amount of tone decay was then computed.

Interpretation (Rosenberg, 1958)

0-5dB normal
10-15dB mild
20-25dB moderate
30dB or more marked.

Rosenberg (1969) indicated that mild to moderate levels of tone decay were frequently seen in pathology involving the organ of corti, whereas marked tone decay almost always indicated retrocochlear pathology.
5. Cold caloric test

Kobrak's cold caloric test was used to evaluate the vestibular apparatus. The patient's head was first positioned so that the lateral semicircular canal was in a vertical plane. 5cc of ice cold water was used to irrigate the external auditory canal. The cold water cools the bone around the lateral semicircular canal as this was placed near to the tympanic membrane. The cooling causes a convection current within the labyrinthine fluid which moves away (ampullofugal) from the crista of the lateral semicircular canal. This bends the cristae downwards and so mimics a paralytic lesion by reducing the resting tone. The resultant nystagmus was directed towards the opposite ear.

Response with 5cc of water was taken as normal, with 10cc or more of cold water was taken as hypoactive labyrinth and no response with 20cc of water was taken as dead labyrinth. The total duration of nystagmus was measured.


Sen's 120 item Personality Trait Inventory (P.T.I) was derived from a very popular and widely used Minnesota Multiphasic Personality Inventory. MMPI is a well established personality questionnaire, the most researched personality instrument in the world (Reynolds and Sundberg, 1976), with proven clinical validity and in fact

*Kobrak's cold caloric test is done for routine screening purposes. Since the findings on cold caloric test were within normal 64 limits, Hallpike bithermal irrigation test & electro stapedography were not done.
over 200 instruments have been derived from it, in different languages, all over the world.

The scale measures eight dimensions of personality, namely activity, cyclothymia, superego, dominance, paranoid tendency, depressive tendency, emotional unstability and introversion.

In this study Hindi adaptation of Sen’s PTI (Verma, Pershad and Mahajan, 1990) has been used. In the Hindi adaptation, the authors included a social desirability scale to the eight personality traits being measured by Sen’s P.T.I in English. The Hindi adaptation of PTI comprises of 90 items equally distributed over the personality dimensions included in the test. In this study only introversion and social desirability scales have been employed. The other scales were excluded since the psychological attributes referring to these excluded scales have been tapped by means of other self report measures included in this study.

The subject is requested to answer each item in terms of two alternatives i.e. ‘yes’ or ‘no’. The psychometric characteristics of Hindi adaptation of PTI are fairly well documented (Mahajan, Pershad, and Verma, 1990a; Mahajan, Pershad, and Verma, 1990b; Mahajan, Pershad, and Verma, 1990c).
7. The Revised UCLA Loneliness Scale  (Russell, Peplau and Cutrona, 1980).

The revised UCLA Loneliness scale is a series of 20 statements designed to measure a respondent’s endorsement of several self-reported experiences and behaviours (e.g., perceived social isolation, and disturbed interpersonal relationship) which measure the general state of loneliness. The scale is based on the presumption that loneliness is unidimensional. The revised version of the self-report UCLA Loneliness scale is designed to counter the possible effects of response bias in the original scale (Russell, Peplau, & Ferguson, 1978). 10 of the original items were retained, while the remaining 10 were rewritten so as to represent opposite wordings of the original scale items. Thus, the scale appears well balanced with equal number of positive and negative statements. Out of 20 Items, half reflect satisfaction with social relations and half reflect dissatisfaction. The respondent is asked to rate each statement on a four point scale: often, sometimes, rarely and never. Often answers are coded as 4, sometimes as 3, rarely as 2 and never as 1 for 10 negatively worded items and scoring is reversed for the 10 positively worded items. The total score for the Revised UCLA Loneliness scale is a sum of the coded answers. High scores on the measure reflect greater loneliness. Internal reliability coefficients for the scale exceed 0.90 and test retest...
correlations exceed 0.70 for 2 months and 0.60 for 3 months (Russell, 1982). Potential relationships between loneliness and social desirability have been tested, but have not been found reliable.

Validation studies demonstrated that UCLA scale has very high concurrent and discriminant validity. Concurrent validity for the new measure was indicated by demonstrating that lonely people report experiencing emotions theoretically linked to loneliness and do not report experiencing emotions unrelated to loneliness. Lonely individuals also reported more limited social activities and relationships. Discriminant validity for revised loneliness scale was indicated by evidence that scores on the measure were not confounded by social desirability. Scores on the scale were also found to correlate more highly with other measures of loneliness than with the measures of mood and personality variables that were examined.

The adequacy of reliability and validity of this scale has been demonstrated repeatedly (Mikulincer and Segal, 1991; Upmanyu, Upmanyu, and Dhingra, 1992, 1990; Kalliopuska and Laitinew, 1987; Russell, 1982). It is clear from the review of related literature that the revised UCLA loneliness scale has been used extensively by researchers interested in measuring loneliness.


The Zung SDS, developed by Zung (1965) to "fill
the need for assessing depression whether an affect, a symptom or a disorder", was chosen because of its accepted clinical value (Blumenthal, 1975). It covers a broad range of depressive symptomatology dealing with the areas of pervasive affect, physiological concomitants (Zung, 1965). Additionally, it is short, convenient to administer, and being self completed it is not subject to the halo effect of rater bias spoken of by Pilowsky, Levine, and Boulton (1969) and Kendell (1968).

The scale was designed to provide a brief quantification of depressive state. It comprises of 20 items, rated on a four point scale. Of the 20-items used, ten are worded symptomatically positive, and ten symptomatically negative. Thus, the scale appears well balanced with equal numbers of positive and negative statements. The items include such statements as "I feel down hearted and blue", "I have trouble with constipation", "I get tired for no reason", "My life is pretty full".

The respondent is given a choice between the categories "none or a little of the time", "some of the time", "part of the time", and "most or all of the time" with numerical values ranging from 1 to 4 for positively worded items and 4 to 1 for negative statements. The total sum of scores for twenty statements range from 20 to 80, with a higher score signifying severe depression tendencies and a lower score signifying less depression tendencies.
Zung (1965) reported that the Zung-D index of 50 serves as a criterion score to distinguish clinically depressed persons from normals. The author has extensively documented psychometric properties of the scale. Moreover, Zung (1971) argued that the Zung-D can discriminate the measurements of depression and anxiety in a clinical population. More recently, Gabrys and Peters (1985) found support for the scale’s reliability by judge or self report and the predictive and discriminant validities with functionally diverse groups. Another recent study (Tanaka-Matsumi and Kameoka, 1986) reported Cronbach alpha coefficient of 0.81 for a sample of 391 normal college students. The author also found evidence for convergent validity but the discriminant validity was not clearly demonstrable, as pairs of anxiety and depression scores correlated strongly.

Another recent study (Schaefer et al., 1985) estimated the internal consistencies of Zung Self Rating Depression scale by computing alpha coefficients. The Zung alphas were 0.90 (psychiatric ward) and 0.86 (chemical dependency ward). The author found that the results favour the Zung over the MMPI-D scale and to a lesser degree, the Beck Depression Inventory as a measure of depressive symptomatology in men. In general the Zung produced better validity coefficients than the Beck which in turn yielded higher correlations with the criteria than did the MMPI.
depression scale. The authors further concluded that additional research on the scales' validities in women would be useful.

The Zung depression scale does not include items for guilt, increased appetite, weight gain, increased sleep, and psychomotor retardation. It implies that this self-report measure does not provide full coverage of the diagnostic criteria for major depression disorder (MDD). Despite this, the scale has been extensively used by researchers to quantify the severity of depressive symptoms. The psychometric characteristics of the scale have been well documented in Indian set up (Upmanyu and Reen, 1990, 1991).

9. IPAT Anxiety Scale Questionnaire

(ASQ: Cattell and Scheier, 1963)

In clinical practice or research, whether the diagnosis is for psychotherapeutic purposes, or for problems of internal medicine caused by life stress, it is increasingly necessary to have standard and dependable estimates of the role of anxiety. There are also many situations in the educational and social psychology where accurate measurement of anxiety level is of prime importance.

The IPAT Anxiety Scale Questionnaire was developed from extensive research and practice as a means of getting clinical anxiety information rapidly, objectively and in a standard manner. It is a brief, non-stressful and clinically
valid questionnaire for measuring anxiety, applicable to all but the lowest educational levels and appropriate for ages of 14 or 15 years on upwards throughout the adult range.

The test is easily administered individually or to large groups at one time. The questionnaire consists of 40 questions distributed among the five anxiety measuring factors according to each personality components centrality as a source or expression of anxiety. A brief description of the factors follows:
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<th>Factors</th>
<th>NO. of Items</th>
<th>Items by Nos. on Test</th>
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<td></td>
<td></td>
<td>6, 21, 22, 23, 24</td>
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<tr>
<td>C(-) : Ego weakness, lack of ego strength</td>
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<td></td>
<td></td>
<td>25, 26, 27</td>
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<tr>
<td>L : Suspiciousness or paranoid insecurity</td>
<td>4</td>
<td>8, 9</td>
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<td></td>
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<td>28, 29</td>
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<tr>
<td>O : Guilt proneness</td>
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<td>10, 11, 12, 13, 14, 15</td>
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<tr>
<td></td>
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<tr>
<td>Q₄ : Frustative tension or Id pressure</td>
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<td></td>
<td>36, 37, 38, 39, 40</td>
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</table>

Each question has three response alternatives. Any single item contributes to any one of the five components/factors.

The psychometric characteristics of the questionnaire are well documented. The questionnaire has also been extensively used in India and found useful (Upmanyu and Reen, 1990, 1991; Upmanyu and Singh, 1984; Upmanyu, Gill, and Singh, 1982; Hundal and Upmanyu, 1974; Hundal, Sudhakar, and Sidhu, 1972).

Three kinds of scores are possible:

1. A single total anxiety score based on all forty items.
2. A breakdown into:

(a) an unrealized, covert "cryptic question" anxiety score, score A, for 1-20 items; and
(b) an overt, symptomatic, conscious anxiety score, score B, 21-40 items.

Score A+B sum to the total score. When used separately these scores can be presented for interpretation as a ratio of overt to cryptic anxiety (score B/score A) though Bendig (1959) has suggested using, instead, a difference score B-A.

3. A breakdown of total anxiety into the five personality components of anxiety.

In this study, scores on five different components of second-order anxiety factor have been used.

Clinical Diagnosis of Patients complaining of Vertigo

The criteria used for the clinical diagnosis of patients who complained of Vertigo was as under:

1. Cervical spondylosis

The diagnosis was based on the clinical and radiological evidence, as suggested by Samuel Turek (1984). The radiological evidence in the form of narrow intervertebral disc, anterior and posterior osteophytes, reduction of cervical lordosis, and increased density of the opposing vertebral cortices, were taken to be indicative of cervical spondylosis. The clinical evidence like continuous
aching pain, that became worse with activity in assuming the erect position and relieved by recumbency, application of heat, analgesics and rest, presence of muscle spasms, reduction of cervical lordosis and an inability to hold the head erect for more than short periods was taken as indicative of cervical spondylosis.

2. Benign Paroxysmal Positional Vertigo (BPPV)

It is characterized by brief, often intense vertigo that occurs only on change of position. The diagnosis of BPPV is made by positional testing with the Dix-Hallpike maneuver. A positive response to this maneuver consists of the following:

- Vertigo occurring after a latent period of a few seconds after the head is placed with the diseased ear down.

- Nystagmus, after the same latent period, that beats in a horizontal-rotatory mode with the quick phase to the downward ear.

- Subsidence (fatigability) of vertigo and nystagmus after several seconds, with the head being held in the provoking position.

All three of these responses must be present for a diagnosis of benign positional vertigo.

3. Meniere’s disease

A careful detailed history is the most important guide to correct diagnosis. Meniere’s disease is usually typical, with deafness and vertigo, or it can be atypical
subvariety having vertigo alone (vestibular Meniere’s disease) or hearing loss and cochlear symptoms alone (cochlear Meniere’s disease).

The **Vestibular symptoms** in Meniere’s disease are:

1. Episodic paroxysmal vertigo,
2. A feeling of imbalance or disequilibrium that can last for a longer period of time,
3. Positional vertigo that exacerbates an attack or occurs between attacks of vertigo, and
4. A sensation of nausea or vomiting.

The **classic cochlear symptoms** of the disease are:

1. Progressive fluctuating sensori-neural hearing loss,
2. Tinnitus,
3. Loudness intolerance, and
4. Diplacusis.

The feeling of fullness in the ear is another important symptom of Meniere’s disease.

4. **Hypertension**

The term arterial hypertension describes the persistent elevation of arterial blood pressure. For epidemiological purpose and in the interest of establishing uniform usage, the 1984 report on the Third Joint National Committee on detection, evaluation and treatment of hypertension has provided a useful categorization of
arterial pressure which are as below:

Normotensive: Normal BP in adults is <140mm of Hg systolic and 90mm Hg diastolic.

Borderline Hypertensives: Pressure values between elevated and normal that is where systolic BP ranges from 140mm to 159mm Hg and diastolic 90mm Hg.

Hypertensives: Elevated BP values are a systolic pressure > 160mm Hg and/or a diastolic pressure > 95mm Hg.

5. Psychogenic Vertigo

The diagnostic criteria for the recognition of psychogenic vertigo includes:
- Absence of any demonstrable organic disease.
- Vague nature of the sufferer's complaint.
- Highly dramatic way in which the patient describes his symptoms.
- Presence of emotional stress

Administration of Psychological Tests

The different tests were administered individually in accordance with the instructions given by the authors for respective tests. The instructions were read aloud as well as the instructions in typed form were provided to the
subjects. The doubts of the subjects were removed before permitting them to answer the different questionnaires.

The tests were administered in a uniform sequence involving three different sessions. In the first session, the Personality Trait Inventory was administered to the subjects. The second session involved the administration of IPAT anxiety scale questionnaire. Zung Self-Rating Depression Scale and the Revised UCLA Loneliness scale were administered in the third session.

Sincere efforts were made to establish rapport with the subjects in order to elicit reliable and authentic information. Subjects were told that the information was being collected purely for research purpose. They were also assured that information to be collected would remain strictly confidential and presented in a form in which no person could be identified.

The tests for audio-vestibular functions were administered individually to all the subjects in two sessions under similar conditions.

Measures obtained

The following measures were obtained for each subject:

(A) Psychosocial measures
(B) Audio-vestibular measures

(A) Psychosocial measures

The tests were scored strictly in accordance with
the procedure suggested by the authors of different tests. As a result of scoring different tests several measures mentioned below were obtained:

1. **Two measures of personality using Personality Trait Inventory** *(Verma, Pershad, and Arunima, 1990)*
   - i) Introversion
   - ii) Social desirability

2. **Five measures concerning second order factor of anxiety were obtained by scoring IPAT anxiety scale questionnaire** *(Cattell, and Scheier, 1963)*
   1. Q₃ : Defective integration, lack of self-sentiment
   2. C : ego weakness, lack of ego strength ;
   3. L : Suspiciousness or paranoid-tendency;
   4. O : Guilt proneness ;
   5. Q₄ : Frustrative tension or id pressure.

3. A single measure of loneliness was obtained by scoring Revised UCLA Loneliness Scale *(Russell, Peplau, and Cutrona, 1980).*

4. A single measure of depression was obtained by scoring Zung Self-Rating Depression Scale *(Zung,1965).*

5. Information about the age, sex, occupational status,

* The scores on seven dimensions, namely activity, cyclothymia, super-ego, dominance, depressive tendency, paranoid tendency, and emotional instability have not been used since these measures have been obtained by the separate scales i.e. Zung’s Self-Rating Depression Scale, revised UCLA Loneliness Scale and IPAT Anxiety Scale Questionnaire.
educational status, type of family and marital status was also obtained for each subject.

(B) **Audio-vestibular measures**

The following audio-vestibular indices were obtained:
1. Puretone thresholds.
2. Speech reception threshold and speech discrimination scores.
3. Middle ear status.
4. Differentiating cochlear vs retrocochlear pathology.
5. Caloric testing.

**Analysis**

Keeping in view the objectives of the study, analysis of variance (ANOVA) was applied to ascertain the relative position of different groups on various dimensions of psychological as well as audio-vestibular functioning. Depending upon the results obtained as a result of the application of analysis of variance, following Goon et al (1972) critical difference or the least significant difference was also computed. The obtained results have been presented meaningfully in the subsequent pages.