

**Original Research Article****Vestibular functioning in patients after mastectomy with and without lymphoedema**

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**ABSTRACT**

Introduction: Mastectomy is considered as a major disruptive experience in a women's life. Lymphoedema is one of the debilitating physical sequelae, arising as a result of mastectomy, which results in long-term upper limb morbidity. Aim and Objective: To find out and compare the effect of mastectomy on vestibular functioning in patients with and without lymphoedema. Methodology: The study was done on the sample of 60 post-mastectomy subjects (30 with lymphoedema; 30 without lymphoedema) who were assessed for vestibular functioning using Dix-Hall pike manouever. Results: There was a significant difference seen in vestibular functioning in patients with and without lymphoedema, and vestibular functioning was more affected in lymphoedema group as compared to the patients without lymphoedema. Conclusion: It was concluded that patient education regarding the early use of arm following mastectomy can lead to reduction in the development of lymphoedema thus preventing the upper extremity impairments and risk of developing vestibular dysfunction.

**1. Introduction**

Breast cancer is the most common cancer in the world among women. The age group commonly affected is 35-55 years[1]. It occurs more often in left breast than the right and is bilateral in about 4% of cases[2]. Clinically, the breast cancer usually presents as a solitary, painless, palpable lump which is detected quite often by self-examination[3]. Traditionally, 50% to 75% of all breast cancer was detected by self-examination. Currently, emphasis is on early diagnosis by mammography, techniques like: fine needle aspiration cytology (FNAC), stereotactic biopsy and frozen section[3]. Breast cancer treatments include surgery, radiation and systemic chemotherapy[4]. Halsted introduced in 1984 the radical mastectomy in treatment of breast cancer. The radical mastectomy was associated with extensive upper limb morbidity. Fortunately, these impairments have become less common as the radical mastectomy has been replaced by the modified radical mastectomy in which the pectoral muscles were preserved[5]. On the other hand, the axillary lymph node status is the most significant prognostic variable in patients with breast cancer. Axillary lymph node dissection (ALND) is associated with long-term upper limb morbidity. Sentinel lymph node biopsy (SLNB) removes selectively the lymph node that receives the metastatic drainage from the tumor[6]. Lymphoedema is one of the predominant physical sequelae of surgery related to breast cancer, which is defined as the accumulation of protein rich interstitial fluid as a result of impaired lymphatic function. Post-mastectomy lymphoedema may result from surgical removal of lymph nodes and lymphatic drainage pathways. It develops in 5% to 42% of women following breast cancer treatment, depending upon the aggressiveness of treatment. It results in pain, impairments in shoulder ROM and upper extremity strength with greater

restrictions in upper limb activities[4]. According to Diana et al (2008) it has been seen that after mastectomy, lymphoedema develops which affects the shoulder range of motion[7]. Also, Samborski W. (2006) & C. Hall et al (2009) have shown that following mastectomy there is an alteration in the weight distribution which affects the trunk posture and thus can further affect the neck posture[8,9].

Thus, the aim of the study was to find out and compare the effect of mastectomy vestibular functioning in patients with and without lymphoedema.

**2. Methodology**

A sample of 60 post-mastectomy subjects was taken from Rajiv Gandhi Cancer Institute and Research Centre, Rohini. The inclusion criteria consisted of Stage-I/ II post-mastectomy (with SLNB/ALND) patients[5], treated with either chemotherapy/radiotherapy, [5] age between 35-55 years[1], with/without lymphoedema (Grade I & II)[4], and upto 5 years of surgery[5]. Subjects were excluded, if they had bilateral surgery[10], were any diagnosed case of upper-limb musculoskeletal problems[4], secondary tumour at other site/prior breast carcinoma[4,10], neurological/psychiatric illness[11], systemic illness/cardiac abnormality or any cardiac surgery[11].

All the post-mastectomy subjects fulfilling the inclusion criteria were recruited. Entire procedure was explained and informed consent was obtained from the subjects. All the subjects were screened using Gulick Anthropometric Tape

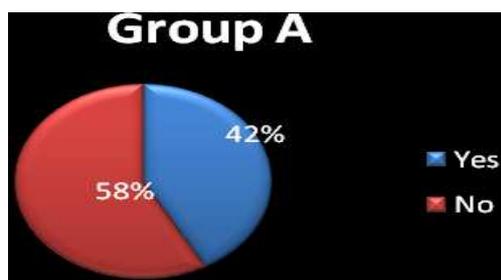
Measure[12,13]. Gulick Anthropometric Tape Measure was used to measure the arm circumference which showed that an inter-limb difference greater than or equal to 2 cm. is indicative of lymphoedema[13]. All the subjects having lymphoedema were placed in Group A. The subjects with no signs and symptoms of lymphoedema were placed under Group B. Vestibular functioning was assessed using Dix-Hall pick maneuver which is used to diagnose benign paroxysmal positional vertigo (BPPV)[15].

### 2.1 Data Analysis

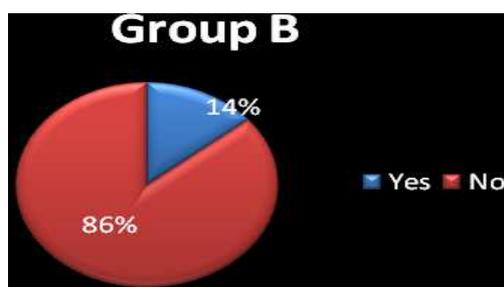
Statistics were performed using SPSS 17.00 software. Chi-square test was used to analyse the comparison of vestibular functioning between mastectomy patients with and without lymphoedema.

### 3. Results

The study consisted of 2 groups namely: Group A (with lymphoedema) of 30 subjects with the mean age ( $X = 45.03$ ), and Group B (without lymphoedema) of 30 subjects with the mean age ( $X = 45.07$ ). After statistical analysis, it was found that there exists a difference in the vestibular functioning between the two groups, which showed that vestibular dysfunction occurred more in patients with lymphoedema as compared to those without lymphoedema.



Graph No.1: Pie-chart of Group A showing Vestibular Dysfunction



Graph No.2: Pie-chart of Group B showing Vestibular Dysfunction

### 4. Discussion

In the current scenario, breast cancer is one of the most frequently occurring neoplasms among women[1]. Early diagnosis and technological advances allows treatment and survival of patients but leaving a concern about post-operative

complications. Mastectomy, which is used as the primary surgical treatment of breast cancer, is considered as a major disruptive experience in a women's life.

Lymphoedema is one of the most debilitating physical sequelae of mastectomy following axillary lymph node dissection (ALND) or sentinel lymph node biopsy (SLNB)[4].

Moreover, following mastectomy there is an alteration in the weight distribution which affects the trunk posture and thus further affects the neck posture[8, 9]. Breast-cancer-related lymphoedema contributes to reduced tendency to use the limb, thus further causing limitation of the activities. Also, the weight of the limb due to lymphoedema makes the musculature of the shoulder and shoulder girdle become retracted, thus tensioning the cervical and neck muscles, and making the head inclined and rotate, which further worsens the neck posture.

Therefore, the study was designed to evaluate and compare the vestibular functioning in patients with and without post-mastectomy lymphoedema and the results revealed a difference in vestibular functioning in patients with lymphoedema as compared to those without lymphoedema.

In the present study, it was found that the vestibular dysfunction occurred more in women with lymphoedema as compared to women without lymphoedema. Evidences have shown that mastectomy significantly affects the vertebral column resulting in body posture disturbances. Cinira et al (2013) evaluated the alterations in posture and range of motion of the upper limbs in women after mastectomy and lymphadenectomy and concluded that post-mastectomy there were asymmetries and modifications in the posture which seemed to get worsen due to lymphoedema. It has been observed that weight of the limb due to lymphoedema causes protrusion of the contralateral shoulder, reducing the trunk inclination angle on the ipsilateral side which results in head rotation on the ipsilateral side causing poor neck posture[16].

The cervical spine has an important role in providing the proprioceptive input mainly due to abundance of cervical mechanoreceptors and their central and reflex connections to the vestibular, visual and central nervous systems. This explanation makes sense with the study of Julia Treleaven et al (2008) which concluded that dysfunction of the cervical receptors in neck posture alterations can alter afferent inputs subsequently changing the integration, timing and tuning of sensorimotor control which is evident as changes in cervical joint position sense, eye movement control, postural stability and reports of dizziness and unsteadiness by the patients. As a result, due to neck posture alterations, the peripheral vestibular system gets involved thus resulting in the common symptom of vertigo[17].

Therefore, the present study investigated and compared the presence of vestibular dysfunction, using the Dix-Hallpike test, among the post-mastectomy with and without lymphoedema patients. The concluding observation shows that there is a difference in vestibular functioning between the two groups.

In summary, this is the first study to evaluate and compare the vestibular functioning in patients with and without post-mastectomy lymphoedema.

## 5. Conclusion

The present study concluded that a difference is found in vestibular functioning in patients with lymphoedema as compared to those without lymphoedema. This fact, keeping in mind, one can teach the posture correction techniques to breast cancer patients with lymphoedema, as well as, one can also design a vestibular rehabilitation protocol for 'at risk' patients in order to avoid the occurrence of BPPV.

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