

**EFFICACY OF FIBRIN SEALANT IN PREVENTION OF  
SEROMA FORMATION IN PATIENTS UNDERGOING MRM  
FOR CARCINOMA BREAST**

**By**

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## ABSTRACT

**Introduction:** Carcinoma Breast has become the most common malignancy noted in the Indian female population. The most comprehensive form of treatment associated with the least incidence of Recurrence as well as Disease-free survival is considered to be Modified Radical Mastectomy with Systemic Chemotherapy along with Adjuvant radiotherapy when indicated. Collection of Serous fluid in the subcutaneous dead space, or seroma is the most Common Complication occurring post-operatively. For almost thirty years, Various Fibrin sealants, such as fibrin glue (FG) and fibrin spray, have been utilized in surgical procedures as tissue glue to bind subcutaneous tissue, as a supplement to hemostasis. and as a hemostatic and sealing agent.

**Aim:** Efficacy of Fibrin sealant in preventing seroma formation in patients undergoing MRM for Carcinoma Breast.

**Methods:** This was a RCT conducted from November 23 to September 2025 at R L Jalappa Hospital comparing Drain output and day of drain removal between study and control groups. Excel sheet was used for data entry and (SPSS) - Version 19 was used to analyse the Obtained Data . Hypothesis testing was performed using Chi Squared test of Significance along with Mann-Whitney U test with a p value of < 0.05 being significant.

**Results:** The mean total drain fluid among the FB group in comparison with the control group showed significant difference with a 0.015 p value. The duration of drain removal showed a statistical significance for drain removal duration between the groups (p value =0.041).

**Conclusion:** It is inferred that the use of fibrin sealant leads to a remarkable reduction in the seroma formation assessed by drain output and also aids in removing the drain earlier in patients undergoing MRM invariable of the stage of the breast carcinoma.

## INTRODUCTION

The most frequent postoperative complication following modified radical mastectomy is seroma formation, and no one technique has been proven to be consistently successful in preventing it<sup>1</sup>. Carcinoma Breast has become the most common malignancy noted in the Indian female population<sup>2</sup>. The curability ratios have increased over the years owing to developments in oncology and surgery<sup>2,3</sup>. The most comprehensive form of treatment associated with the least incidence of Recurrence as well as Disease-free survival is considered to be Modified Radical Mastectomy with Systemic Chemotherapy along with Adjuvant radiotherapy when indicated.<sup>4</sup> Common complications encountered in the Post-operative period include Seroma/ hematoma Formation, nerve injury, skin Skin flap necrosis, lymphedema leading to upper limb swelling, myalgia, Surgical Site Infection (SSI), etc with seroma formation being the most frequently encountered<sup>5,6</sup>. The flaps' ability to cling to the tissue bed is hampered by seroma buildup, which raises them off the axilla and chest wall. Significant morbidity, including Skin flap necrosis, may result from it. Additionally, it has long been believed that the fluid accumulation results from lymph draining

from the separated axillary and mammary lymphatics. However, after reading the research, it seems that this is more of an assumption than a confirmed truth<sup>4,7</sup>.

The incidence of seroma varies greatly with a 15% to 81%<sup>8</sup> range. Seroma formation can lengthen the recovery time by raising the infection likelihood, impeding wound healing, causing skin flap necrosis and extended pain, thereby increasing the likelihood of wound dehiscence. The incidence of post-mastectomy pain is becoming more widely recognized as a surgical side effect rather than an issue. Not every patient, nevertheless, has clinical signs. The patient's recuperation may be hampered by complications such as seroma, which may result in prolonged hospital stays, higher medical costs, and possible postponements of essential therapy<sup>9</sup>. The extent of Axillary lymph node dissection, presence of metastatic lymph nodes and need of post-operative adjuvant radiotherapy are some of the variables that lead to the creation of seroma. The exact role that each component plays in the development of seroma is still up for discussion, though<sup>10</sup>.

According to current knowledge, increased serum Fibrinolytic activity as part of Inflammatory response leads to seroma formation. According to a different school of thinking, it results from the lymphatics being cut off during surgery<sup>11</sup>. Research has demonstrated the role of breast size<sup>1</sup>, patient age<sup>7</sup>, hypertension<sup>12</sup>, presence and number of metastatic lymph nodes in the axilla, prior biopsy, and use of heparin<sup>13</sup>.

Placing surgical drains into the wound region is the most popular method of avoiding seroma; however, not everyone agrees that this method is effective, and the issue still exists despite the use of drains. Additional methods assessed to lower the incidence of seroma formation include topical tetracycline application, laser scalpel, restricted shoulder movement, quilting sutures, harmonic scalpel use, and fibrin glue application all of which Fundamentally act by Reducing dead space created.<sup>14-16</sup>

For almost thirty years, fibrin sealants, such as fibrin glue (FG) and fibrin spray, have been utilized during surgical procedures. In plastic, reconstructive, and burn surgery, it is used as a tissue glue in addition to or a substitute to staples or sutures to bind subcutaneous tissue. On the surfaces of subcutaneous tissue, it can also serve as a supplement to hemostasis. Following breast and axillary surgery, FG has been one of the most commonly reported methods in humans since its reported role in reducing seroma Formation in mammalian models after mastectomy in 1996<sup>17,18</sup>.

Fibrin Sealant initiates the terminal phase of the coagulation cascade in the presence of factor XIII and calcium chloride, combining fibrinogen and thrombin to create a "fibrin clot," Imitating the normal physiology. FG is believed to function as an adhesive and a hemostatic agent, covering those vasculature and lymphatic channels too small to be secured by traditional ligation<sup>17</sup>. This research aimed to assess the effectiveness of fibrin glue in preventing Seroma Formation.

## OBJECTIVES

- To assess the incidence of seroma formation in patients undergoing MRM without intra-operative Fibrin sealant for Carcinoma Breast.
- To assess the incidence of seroma formation in patients undergoing MRM with intra-operative Fibrin sealant application for Carcinoma Breast.
- To compare the incidences of both the study groups and thereby assesses the efficacy of Fibrin sealant in reducing seroma formation in patients undergoing MRM for Carcinoma Breast.

## REVIEW OF LITERATURE

Seroma formation is the most frequent early wound consequence which is an aberrant accumulation of serous fluid in the dead space of the breast, axilla, or post-mastectomy skin flap after breast-conserving surgery. Nonetheless, definition of seroma varies throughout published studies. Although typically of small effect, this assumed complication may lengthen hospital stays, complicate rehabilitation, and put an excessive strain on the health budget. The prevalence of seroma formation varies greatly, ranging from 15 to 81%<sup>19-21</sup>. In addition to being associated with arm lymphoedema, it can postpone the start of adjuvant treatment, cause SSI, delaying healing process. Though opinions vary on each factor's specific significance in the pathophysiology of seroma, a number of variables are implicated in its development<sup>22-24</sup>. The primary pathophysiology of seroma is currently unclear and up for debate. Although the best methods to lower the risk of Seroma Formation are unclear, several strategies have been documented and are actively being used<sup>24</sup>.

### Pathogenesis

The understanding of the pathophysiology in Seroma Formation is Incomplete. As a reaction to the stress of Surgery during initial wound healing, seroma formation occurs by acute inflammatory exudates<sup>25,26</sup>. Oertli et al<sup>27</sup> thought that Seroma Formation was influenced by fibrinolytic activity. The extent of axillary lymph node metastasis was the Key determinant in seroma Formation as shown by Petrek et al<sup>28</sup>.

Gonzalez et al<sup>29</sup>, Hashemi et al<sup>30</sup> demonstrated the role of the kind of surgery and stated that it was the sole statistically significant factor affecting the incidence of Seroma Formation. They found that the seroma rate was greater after a MRM than after axillary dissection and broad local excision. In the three studies mentioned, the incidence of Seroma Formation was

unaffected by variables including age, obesity, tumour size, and neoadjuvant treatment. In contrast to Breast conservation surgery (BCS), extensive dissection during mastectomy and axillary lymphadenectomy destroys vessels, and the Exudation so caused produces seroma formation<sup>31</sup>. The flaps' ability to cling to the tissue bed is hampered by seroma Formation, which raises them off the chest wall and axilla. Significant morbidity, delay in wound healing, SSI, Skin flap necrosis, wound dehiscence, extended hospitalization, delayed recovery, and delay in initiating adjuvant treatment beginning, may result from it<sup>32,33</sup>.

### **Prevention and reduction of Seroma Formation**

There is No evidence of one treatment which has proven consistently and dependably successful, despite the number of practical approaches claimed in preventing or minimize seroma Formation.<sup>34,35</sup>

#### *Surgical techniques*

The rate of Seroma Formation is thought to be decreased by careful attention to breast surgery procedures that minimize leaking from vasculature and erase the dead space. Numerous surgical procedures have been employed in this regard, but their efficacy in lowering the frequency and amount of seroma has produced inconsistent results.

#### *Tissue dissection techniques*

The incidence and magnitude of seroma Formation have been found to be significantly influenced by tissue dissection procedures used in Carcinoma Breast surgery. Electrocautery has been demonstrated to shorten incision times, reduce bleeding, and transfusion requirement since Kakos et al<sup>36</sup> proposed its use for breast dissection in the 1970s; nevertheless, it may also result in more wound problems<sup>37-39</sup>. Ultrasonic dissection is well-documented in In hepatic and cardiovascular procedures in causing lesser thermal damage in comparison with electrocautery. According to Campbell and Irshad<sup>40</sup>, patients who had harmonic scalpel treatment had a low rate of seroma buildup. Because there was less drainage overall during axillary dissection, Lumachi et al<sup>41,42</sup> demonstrated that the ultrasonic dissection Cohort had a considerably lesser duration to removal of drain. The function of argon improved tissue dissection in lowering Seroma Formation has not been well investigated. Wyman and Rogers<sup>43</sup> found that MRM performed with a Laser scalpel reduced Haemorrhage, but had no other advantages overall In comparison with Traditional MRM. It is demonstrated that argon-enhanced electrosurgery lowers intraoperative blood loss and the need for transfusions after surgery<sup>44,45</sup>. Ridings et al<sup>45</sup>, in contrast with Kerinet al<sup>44</sup> demonstrated the Effect of reduced thermal stress causing decreased tissue inflammation, thereby decreasing the incidence of Seroma Formation, thus substantiating the increasing evidence against of use Diathermy in MRM. Results on the advantages of alternate dissection methods utilizing laser scalpel and ultrasonic scissors over electrocautery or sharp dissections are conflicting and unclear. These also have clear financial ramifications.

Closing a wound to Reduce dead space. It has been demonstrated that surgical methods to eliminate or minimize the dead space after axillary dissection and surgery lower

the risk of Seroma Formation. In order to promote wound healing, Halsted<sup>46</sup> previously recommended obliterating axillary dead space. In their institution, Chilson et al<sup>33</sup> reported more recently that flap tacking significantly reduced the rate of seroma and the frequency of follow-up for aspirating seroma. According to O'Dwyer et al<sup>47</sup>, early drain removal was noted when the underlying muscle and skin flap were sutured together, thereby Obliterating dead space and reducing Seroma Formation following mastectomy associated with early drain removal. Coveney et al<sup>48</sup> found that patients in whom skin flaps suturing of skin flaps was done along with muscles of the chest wall had much less drainage than those who just had traditional skin flap closure. Schuijtvlot et al<sup>49</sup> conducted a more recent prospective research in which they examined the effects of buttress and non-buttress sutures following axillary dissection and breast-conserving surgery. They demonstrated that buttress sutures, when used after axillary dissection without an axillary drain, minimize the production of seromas.

### **Use of Fibrin sealants**

A non-globular, fibrous protein is Fibrin, which forms an integral part of the Coagulation cascade. To aid in blood coagulation, thrombin hydrolyzes fibrinogen and transforms it into fibrin. Bergel originally described the use of fibrin hemostatic drugs in 1909, which contained hemorrhage in tiny blood arteries by using hemoglobin powder<sup>50</sup>. Fibrin glue was utilized in several clinical applications throughout the 1970s and 1980s due to its high biocompatibility, low toxicity, inertness, and lack of hemolytic impact<sup>51,52</sup>. Also they examined the fibrin glue's hemostatic mechanism as well as the categorization of currently available compounds. It provides an overview and examines its particular use in cosmetic surgery and breast reconstruction.

#### *The way fibrin agents work to stop bleeding*

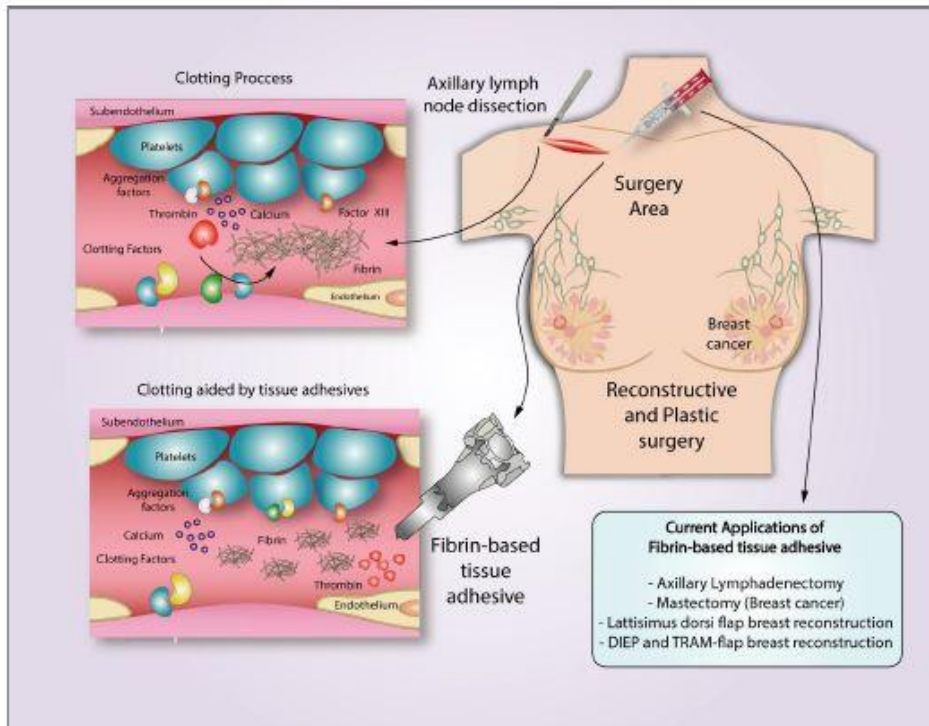
Analyzing the hemostatic impact of fibrin requires an understanding of the blood coagulation process. Inert fibrinogen converting to fibrin (active form), one of the key pathways in coagulation is the end consequence of a series of plasma factors. These physiological characteristics are used by both types of tissue fibrin adhesives<sup>53,54</sup>. The same ingredients required to produce a clot are present in fibrin tissue adhesives. The substrate is changed into its stable product by catalysts. Because the catalysts and substrate are kept as distinct parts, needless contact is avoided. Likewise, fibrinogen and thrombin should be maintained apart until a therapeutic use is required. Together, these two elements create an active chemical. To inhibit the breakdown of the fibrin clot, the second component might also have a drug with anti-fibrinolytic property additional with thrombin<sup>55,56</sup>. Thrombin Concentration is one of the factors in fibrin glue. Increasing concentration of thrombin increases fibrin clot formation and the polymerization rate. A high thrombin concentration causes fast coagulation in a sealant. A slower polymerization rate and a lower thrombin concentration are more suited when harvesting a flap or cutaneous graft.

#### *Application of fibrous tissue adhesive in breast surgery*

### **Axillary lymphadenectomy**

Treatment for Carcinoma Breast includes sentinel lymph node biopsies (SLNB) and axillary lymph node dissection. Although it aims in stopping tumour cells from spreading through lymphatic capillaries, it may also harm the axillary lymphatic network. According to published research, individuals who have axillary lymph node dissection have a 24–65% chance of developing upper extremity lymphedema<sup>57,58</sup>. With a prevalence of up to 85%, Seroma Formation is a frequent consequence that occurs when serous fluid build up in the axilla or dead space following axillary lymph node dissection<sup>59</sup>. Applying fibrin glue topically following axillary lymph node dissection has been shown to decrease daily postoperative drainage and hospitalization, but it has no effect on Seroma Formation<sup>60,61</sup>. A collagen patch and fibrin glue were given to the axilla in 25 of 50 patients who had Breast surgery and axillary lymph node dissection; the remaining 25 patients received standard treatment<sup>62</sup>. The scientists came to the conclusion that while using collagen patches and fibrin glue does not completely stop seromas from forming, it does shorten their length and size.

In older patients having axial lymph node dissection, fibrin glue can lessen the extent of hematoma, shorten the time and need for puncture, aid halt bleeding, lessen the extent and leaking of lymphedema, and lessen the development of seroma<sup>63</sup>. Also, 159 individuals with Carcinoma Breast who had a mastectomy and axillary lymph node dissection were split into two groups for this research<sup>64</sup>: 79 individuals had closed drainage separately, whereas 80 patients had fibrin glue applied in the axilla with a closed drainage system. It was determined that using fibrin glue did not stop seromas from forming or shorten their duration or size. When compared to appropriate drain placement, a comparable experiment found that the use of fibrin sealant did not significantly reduce the Seroma formation. Higher expenses, laborious methods, and larger aspiration volumes are drawbacks of adhesive usage, which suggests that there is no real benefit to use fibrin glue over appropriate drain placement.



**Figure 1.** Breast plastic surgery may involve critical complications associated to the integrity of microvascular anastomosis, tissue adhesion and incidence of seromas. Fibrin adhesives have been used to prevent postoperative complications derived from breast cancer surgery, lymphadenectomy, mastectomy, latissimus dorsi and DIEP-TRAM breast reconstructive procedures.

## **Latissimus Dorsi (LD) flap breast reconstruction**

One common and dependable breast reconstruction procedure is the LD flap. Regretfully, seroma of the donor site is its most frequent consequence, occurring up to 79 percent of the time<sup>66,67</sup>. The development of the so-called "dead space" following flap mobilization is essential to the processes underlying seroma formation<sup>68</sup>. Seroma Formation as a postoperative consequence varies from patient to patient and might involve skin flap necrosis and pain from SSIs<sup>69,70</sup>.

The effects of quilted suture, triamcinolone acetonide, and fibrin tissue adhesive on the development of postoperative seromas were examined in a comparative investigation<sup>71</sup>. The effectiveness of fibrin glue as a therapy was also investigated in the study. Additionally, 76 patients who had LD flaps for total breast reconstruction were included. Every participant had Carcinoma Breast and had undergone axial dissection and mastectomy.

The total rate of seroma was 31%. In the first and second weeks following surgery, the group that received the quilted suture saw noticeably reduced leaking. When compared to other groups, the quilting-suture statistically decreased the likelihood of seroma to 5.0 percent. Ten days prior, drainage was eliminated using a quilting suture. Every other issue had the same frequency in each group. Therefore, fibrin glue by itself is not superior to other seroma prevention techniques. Furthermore, a quilting suture is more effective than glue.

The effects of quilted suture and fibrin adhesive alone and in combination were investigated in a review<sup>72</sup>. Three investigations compared quilting suture with fibrin to just the quilting suture seam<sup>73-75</sup>. Compared to using the quilting suture alone, the probability of seroma formation was decreased by almost 50% when both factors were used together. Despite its seeming practicality, this difference was not statistically significant. It is acceptable to assume that fibrin glue usage is not required in LD flap breast reconstruction in the absence of statistically meaningful outcomes.

## **Compression dressing**

To lower the risk of Seroma Formation, external compression dressings have long been used to the axilla and chest wall to completely obliterate the dead space. Since there is little anecdotal evidence to support its usage following surgery for Carcinoma Breast, compression dressings have largely been abandoned. In randomized studies, O'Hea et al<sup>76</sup> and Chen et al<sup>77</sup> discovered that compression dressings increased the incidence of Seroma Formation rather than reducing it. In addition to inconsistent effectiveness, patients' pain and limited tolerance are other issues with compression dressings.

## **The use of drains**

Of all the methods used to avoid or lessen the frequency of Seroma Formation, the use of drains following Carcinoma Breast surgery is arguably the most studied and contentious. After Carcinoma Breast surgery, a drain is frequently utilized in the hopes of preventing or minimizing seroma buildup.

Murphey devised suction drainage in 1947 with the hope that it would provide negative pressure and eradicate the dead space following axillary dissection and breast tissue removal<sup>78-80</sup>. Negative pressure that causes skin flaps to adhere to the chest wall may promote wound healing, lower the risk of infection, Skin flap necrosis, or dehiscence, and stop Seroma Formation<sup>81,82</sup>. However, there are disagreements regarding the ideal suction pressure, the quantity of drains, the length of drainage, and even whether a drain should be used at all after Carcinoma Breast surgery<sup>82,83</sup>.

### **Recent Literatures:**

**Gilly FN et al<sup>84</sup> (1998)** assessed FG's ability to stop lymphorrhea following AD in cases of Carcinoma Breast. Following the lymphadenectomy process, cases were randomly assigned to one of two groups: group 1 received no FG, and group 2 had 2 ml of FG administered to the AD region. Group 1 experienced considerably higher mean daily post-op drainage. Six days following the procedure, the mean total drainage volume for groups 1 and 2 was 407.8 ml and 214.4 ml, respectively.

Groups 1 and 2 experienced mean post-op hospital stays of 10.1 and 8.0 days, respectively. Each group showed one delayed seroma. FG did not impact delayed Seroma Formation following AD for Carcinoma Breast, although it appears to decrease daily postop drainage and hospital stay.

**Moore M et al<sup>85</sup> (2001)** determined the dosage response of this effect and assessed the safety and efficacy of fibrin sealant as a sealing agent to shorten the amount and duration of serosanguinous fluid outflow. They observed that the amount and duration of fluid outflow from the axilla after lumpectomy were considerably decreased by a 4 mL AD dosage of fibrin sealant.

The number of days needed for drain removal and fluid drainage was considerably decreased in the modified MRM patients when a 16 mL AD dosage was paired with an 8 mL skin flap dose. No significant problems linked to the sealant or viral seroconversions were seen in patients with fibrin sealants.

**Jain PK et al<sup>86</sup> (2004)** assessed the impact of fibrin sealant and drainage on the occurrence of Seroma Formation. They observed that neither the drain group nor the group without drains had a significantly different incidence of seroma. Patients without a drain experienced significantly lower post-op pain scores and hospital stays. The frequency and overall amount of seroma were significantly reduced after mastectomy without a drain when fibrin sealant was used. They asserted that drains were linked to a longer post-op stay and greater pain scores following Carcinoma Breast surgery, and that they did not limit Seroma Formation. Fibrin sealant was used to lower the incidence of Seroma Formation in individuals who undergone mastectomy.

**Johnson LN et al<sup>87</sup> (2005)** assessed how well Hemaseel APR fibrin sealant prevented seromas during breast surgery in comparison to traditional drain insertion. They observed that the FG group had a Seroma Formation rate of 36.8%, whereas the control group had a rate of 45.5%. Wound complications occurred at a comparable rate. The FGgroup had

noticeably larger aspirate volumes. Compared to FG, drain implantation saved patients money. Even though the rate of seroma formation was not significantly reduced by using fibrin sealant as opposed to drain placement, the higher expense, difficult method, and larger aspirate volumes suggest that there is no benefit to using FG over drain placement using the method outlined.

**Ruggiero R et al<sup>88</sup> (2008)** claimed that drainage between PODs 3 and 4 was eliminated using FG suction. When compared to the group getting conventional therapy, individuals who received FG and collagen patches saw a substantial decrease in the amount and duration of seromas as well as a decrease in evacuative punctures. They asserted that while using FG with collagen patches did not always stop seromas from forming, it does lessen their size, duration, and the need for evacuative punctures.

**Ko E et al<sup>89</sup> (2009)** examined how FG usage affected the length of drainage and total drain output in patients with Carcinoma Breast following lumpectomy and AD. In general, the drainage time, total drain production, and seroma incidence were comparable between the FG and control groups. However, subgroup analysis revealed that individuals experiencing stage II or III AD had a lower drain output and drainage duration when fibrin glue was used. In patients with Carcinoma Breast following a lumpectomy and level II or III AD, FG usage decreased drainage length and total drain output.

**Ruggiero R et al<sup>90</sup> (2009)** claimed that between PODs 3 and 4, suction drainage was eliminated. When compared to the group getting conventional therapy, patients receiving FG saw a substantial decrease in the severity and duration of seromas as well as a decrease in the number of evacuative punctures. They asserted that while FG usage decreases seroma amplitude, duration, and evacuative punctures, it does not necessarily stop Seroma Formation.

**Cipolla C et al<sup>91</sup> (2010)** assessed how well FG prevented Seroma Formation following AD. According to their findings, FG patients had a small advantage in terms of the number of seroma aspirations and the average length of axillary drainage installation. The mean quantity of total axillary drainage and total seroma volume did not differ remarkably between the two patient groups. They came to the conclusion that using FG did not stop seromas from forming or lessen their size or duration.

**Hivelin M et al<sup>92</sup> (2010)** found that, following a median follow-up of 20 months, no negative effects were recorded when FG was used in deep inferior epigastric perforator flaps (DIEP). Patient's height, weight, or age nor their BMI were associated with drainage volumes or durations.

In both groups, the duration of thoracic drainage was longer than that of abdominal drainage. In the FG group, thoracic drains were withdrawn early and average discharged volumes from thoracic region were lower. Following the application of fibrin sealant, the duration of stay was similarly shortened. They asserted that following rapid reconstruction of the breast by DIEP flap, the use of fibrin sealant dramatically reduced the amount and length of post-op drainage in the thoracic region.

**Bonjar MRM et al<sup>93</sup> (2012)** evaluated the efficacy of conventional drain placement against FG with conventional drain placement in preventing seromas following breast surgery. They observed that the control group's seroma generation rate was 24.1%, whereas the FG

group's was 16.1%. Wound complications occurred at a comparable rate. Even while applying fibrin sealant reduced the incidence of Seroma Formation by a non significant amount when compared to drain placement, the more expensive and time-consuming method suggests that there is no benefit to utilizing FG over drain insertion using the method outlined.

**Sajid MS et al<sup>94</sup> (2013)** evaluated the data about FG's efficacy in patients having axillary and breast surgery. They claimed that the frequency of post-op seroma, mean amount of seroma, infection of the wound, postop complications, and duration of hospital stay were not decreased by using FG beneath skin flaps after breast and axillary surgery. FG decreased the length of time that persistent seromas needing repeated aspirations lasted as well as the overall amount of drained seroma. They came to the conclusion that FG had no effect on the length of hospital stays, SSIs, complications, mean volume of seroma, or incidence of post-op seroma in patients having Carcinoma Breast surgery.

**Benevento R et al<sup>95</sup> (2014)** evaluated the long-term effects on lymphedema and the effectiveness of low thrombin FG in lowering the serous outflow from the axillary surgical site in patients receiving AD for Carcinoma Breast. They observed that patients who administered FG had lower serum output gathered in drain after surgery (94.3 vs 176 ml) and shorter time of post operational hospital stay. There was no difference in the incidence of seroma between the groups at the 4-week follow-up. Furthermore, the sole independent indicator of Seroma Formation was obesity. At the 4-week follow-up, overweight individuals experienced fewer seromas than control overweight patients. There were no variations in lymphedema across the groups. They came to the conclusion that following breast surgery, the axilla generated less fluid when low-thrombin FG was present. Patients who are overweight could be the best candidates for this medication. The prevalence of lymphedema was not elevated by such a sealant.

**Bastelaar JV et al<sup>96</sup> (2017)** shown that following flap fixation with sutures, the group saw substantially reduced Seroma Formation. Patients who underwent mastectomy plus sentinel node biopsy or MRM and those who underwent flap fixation with vicryl or glue needed seroma aspiration far less frequently. According to this study, post-op seroma aspiration is decreased when flaps are fixed following mastectomy using tissue glue or sutures. Flap fixing may therefore result in reduced pain for the patient.

**Fawzy A et al<sup>97</sup> (2017)** identified the function of FG spray in lowering the amount and duration of seromas following breast surgery. They said that there was no discernible difference between the two groups' mean ages, the number of LN removed, or the rate of post-op infection. The FG group benefited from a notable decrease in hospital stay duration. The length of the drain installation was much shorter for the FG group.

Significant reductions in incidence and volume were seen in the amount of post-op serous fluid and the incidence of post-op seroma, which was 35% in the control group and 5% in the FG group. They asserted that the use of FG sealant during MRM led to a discernible and substantial reduction in the volume, duration, and post-op rate of Seroma Formation.

**Chang YT et al<sup>98</sup> (2020)** assessed the effectiveness of fibrin sealants in lowering seroma in Carcinoma Breast patients receiving AD. They observed that there were no appreciable variations in the incidence of seroma, duration of hospital stay, or frequency of SSI between the fibrin sealant group and the control group. Significant intergroup variations

were seen in the drainage volume, drainage time, and lower seroma volume. They also out that fibrin sealants had no effect on lowering seroma volume and drainage volume and duration.

**Kabbash MM et al<sup>99</sup> (2020)** examined the various strategies for preventing the development of seromas after MRM. They discovered that whereas DM, cancer stage, and the amount of LN infiltrated and eliminated had no effect on seroma formation after MRM, hypertension, obesity, blood transfusions, and bloody fields are at significant risk of developing seroma after MRM. With a low frequency of established seroma and associated problems, flap fixation was shown to be the most effective technique for preventing seroma formation. However, the use of tranexamic acid before and after surgery was found to have no effect in preventing the production of seromas following MRM. They asserted that the MRM is a useful operation that shortens the time and volume of fluid drained and dramatically lowers the frequency of Seroma Formation.

**Luca AD et al<sup>100</sup> (2020)** examined how well intraoperative fibrin sealant versus synthetic cyanoacrylate glue reduced the development of seromas in BC patients who had breast surgery and AD in comparison to non-sealant usage. They separated the cases into three groups: group A received an axillary suction drain; group B received an axillary suction drain and Tisseel; and group C received an axillary suction drain and adhesive. The volume of serum drained in first three PODs, the length of hospital stay, and the incidence of seroma did not differ significantly between the three groups. In comparison to groups A and B, group C experienced a lower rate of postop infections and maintained an axillary drain for a much shorter period of time. According to them, there is no proof that using surgical glues might lessen the development of seroma in BC patients after AD. However, the use of cyanoacrylate adhesive in conjunction with a closed suction axillary drain appears to help decrease the number of days that the axillary drain is permanent and the incidence of postop infections, both of which are known to cause delays in the initiation of adjuvant oncological treatments.

**Marquez JE et al<sup>101</sup> (2020)** found that fibrin sealants, both with and without surgical drains, are effective at preventing seromas in reduction mammoplasty. The patients were divided into two groups: those with fibrin sealant (group 1) and those without. The demographics of the patients did not differ statistically. The rate of seroma did not significantly differ between groups 1 and 2. The occurrence of seroma in Group 1 was further examined by type of sealant. When compared to the pair of sealant and surgical drains, group 1's usage of sealant alone was more probable to cause Seroma Formation. They asserted that using offibrin sealants during reduction mammaplasty has no effect on the pace at which seromas occur. The incidence of seromas may rise if fibrin sealants are applied without surgical drainage. Plastic surgeons could think about assessing the advantages and disadvantages of employing fibrin sealants in ambulatory procedures, either with or without drains.

**Faisal M et al<sup>102</sup> (2021)** assessed the possibility that FG might reduce Seroma Formation after MRM. They observed that there was no significant difference in tumour size, number of lymph nodes, age, pathology, or stage of Carcinoma Breast between the groups. The median number of days before drain removal was reduced by 8 days in FG group (7 days) as compared to the control group (15 days). Compared to the control group, the total drain output volume of the FG group's patients was noticeably lower. They asserted that after MRM, FG dramatically reduces Seroma Formation.

**Azhar Y et al<sup>103</sup> (2021)** assessed FG's ability to reduce post-mastectomy seroma volume and decrease hospital stays. They observed no significant differences in tumour size, number of lymph nodes, age, histopathological type, or stage of Carcinoma Breast. Nonetheless, cumulative drain output was noticeably lower in the FG group's patients. The treatment group's median seroma volume was 9.30 mL, whereas the control group's median was 20.90 mL. They came to the conclusion that FG considerably shortened hospital stays and reduced Seroma Formation.

**Sharma S et al<sup>104</sup> (2022)** compared the results of the two groups to assess the impact of intraoperative FG sealant application on drain output and Seroma Formation in patients receiving MRM. They discovered that both groups' drain output on POD 1 and total drain output were measured, and that there was a substantial mean difference between them. A substantial difference in means was also identified when the patients were distributed based on the amount of Seroma Formation.

Additionally, it was shown that the mean difference for the amount of days the drain remained in-situ was substantial. According to their claims, the quantities and rates of seroma formation were reduced when fibrin sealant was used during MRM closures. This resulted in reduced patient pain and speedier drain removals.

**Tolba EE et al<sup>105</sup> (2023)** assessed how FG helped patients with Carcinoma Breast have fewer seromas following MRM. They reported that the general rate of seroma and the total volume of drained fluids were lower in the FG group compared in control group. Both the volume and incidence of seromas were significantly reduced with the usage of FG. As a result, hospital stays and the amount of time until the drains were withdrawn were also significantly reduced.

## **MATERIALS AND METHODS**

**Study Design:** Randomized Controlled Study

**Study Area:** Department of General Surgery in RL Jalappa Hospital

**Study population:** Cases underwent MRM

**Study period:** November 2023 to September 2025

**Inclusion criteria:** All women between the ages of 19-85 years with Carcinoma breast undergoing MRM

**Exclusion criteria:**

- Recurrent Carcinoma Breast.
- Presence of coagulopathy and/or liver disease
- Previous history of radiation to the chest/ excessive scarring of the chest.
- Lactating women.
- Patients who have received Neo-adjuvant radiotherapy

**Sample size:** All cases who underwent MRM during the study period were included and thus a total of Forty three cases were included.

**Ethical committee approval:** Ethical committee approval was obtained

**Data Collection:** After taking the written informed consent, cases were randomly allotted to test group (fibrin glue group) and control group (without fibrin glue group) using a computer generated random numbers. Following which the principal investigator assessed the detailed history of the participants and clinically examined the patients and diagnosis of AR was made using ARIA classification.

In test group, fibrin sealant was used intra-operatively after specimen excision. Patients in group B are the control group in whom there was no fibrin sealant application. All patients will undergo standard MRM. At the end of surgery, a closed suction drain was placed and the amount of drain was documented everyday till drains are removed. The drain was removed when the output was  $\leq 30$ ml each day for 3 consecutive days. Wound was closely observed for seroma formation, fullness, redness, fluctuation and ultrasound of breast and axilla were performed as and when required. Aspiration or Ultrasound guided aspiration was done when it is significant and was documented till discharge is nil or insignificant. If any infection, culture and sensitivity of the wound were done and appropriate antibiotics were given.

**Data analysis**

The data was entered in excel sheet and analyzed using Statistical Package for Social Sciences (SPSS) - Version 19. Descriptive statistics with mean, standard deviation and proportions (%) were calculated for quantitative variables. To test the hypothesis Chi Square test, Mann-Whitney U test were used. p value of  $<0.05$  was considered as statistically significant.

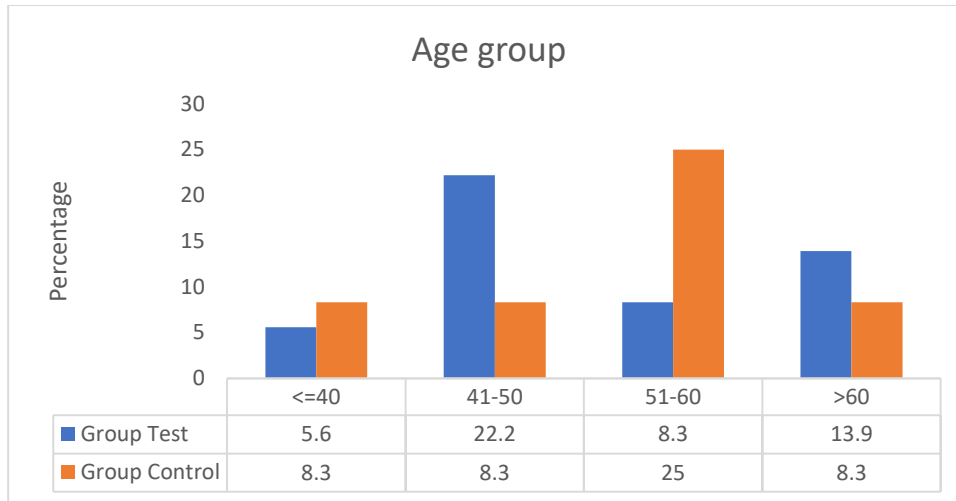
**RESULTS**

In this study among FB group 5.6%, 22.2%, 8.3% and 13.9% of the participants were in the age group of  $\leq 40$  years, 41-50 years, 51-60 years and  $> 60$  years of age respectively whereas in the control group 8.3%, 8.3%, 25% and 8.3% of the participants were in the age range of  $\leq 40$  years, 41-50 years, 51-60 years and  $> 60$  years of age respectively. There was no statistical association for age between FB group and control group (p value =0.113).

**Table 1: Age vs FB and control group**

Age group	Group		Total	p value
	Test	Control		
$\leq 40$ years	3 (6.5)	4 (10)	7 (16.6)	0.113
41-50 years	9 (19.5)	4 (10)	13 (30.6)	
51-60 years	5 (10)	8 (20)	13 (30.6)	
$>60$ years	6(13.0)	4 (10)	10 (22.2)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 1: Age vs FB and control group**

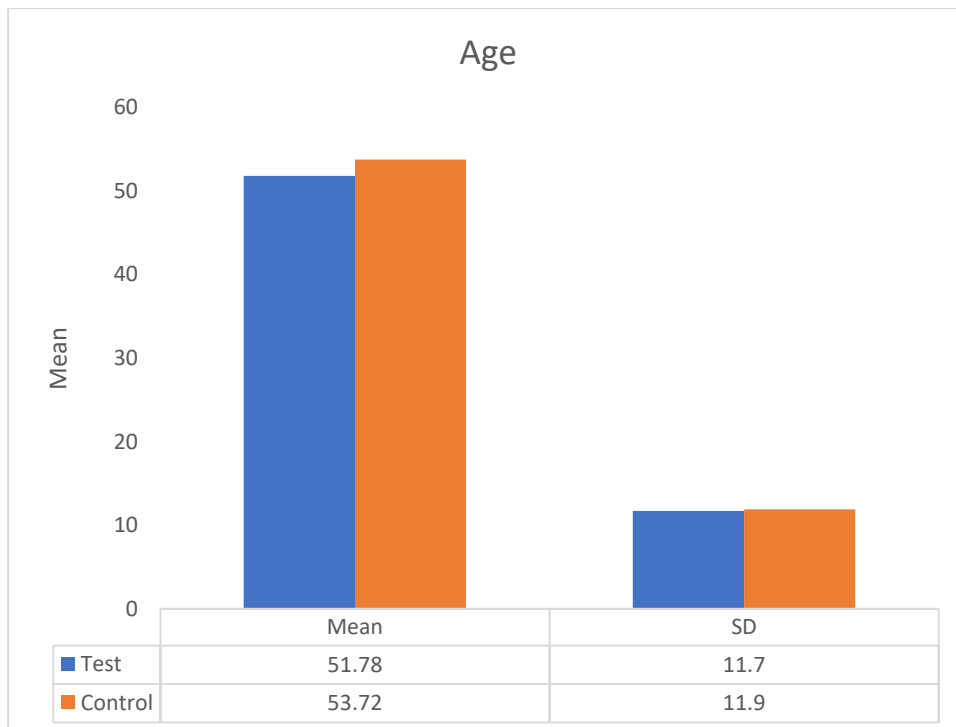


The mean age among the FB group was  $51.78 \pm 11.7$  years whereas the mean age among control group was  $53.72 \pm 11.9$  years. The difference in mean age between the groups was insignificant ( $p$  value = 0.558).

**Table 2: Mean age among the FB group and control group**

Group	Age (in yrs)	p value
Test	$51.78 \pm 11.7$	0.558
Control	$53.72 \pm 11.9$	

**Graph 2: Mean age among the FB group and control group**

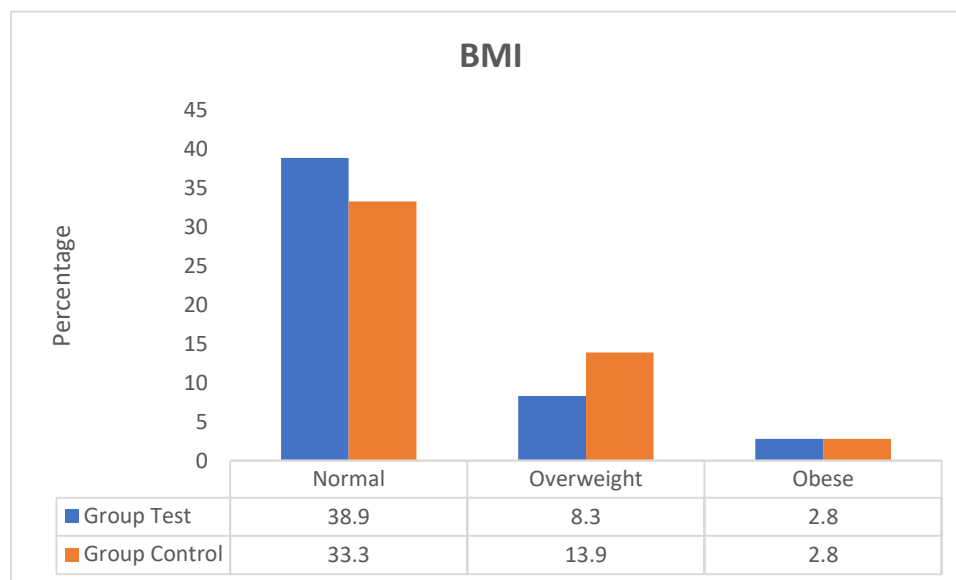


On assessing the BMI, among 72.2% of the cases with normal BMI 38.9% of them were in FB group and 33.3% of the cases were in control group. Likewise among 22.2% of the cases who were found to be overweight 8.3% of the cases were in FB group and 13.9% of the cases were in control group. Among 5.6% of obese participants 2.8% of the cases were in FB group and control group each. The association between FB and control group for BMI was insignificant statistically (p value =0.7211).

**Table 3: BMI vs FB and control group**

BMI	Group		Total	p value
	Test	Control		
Normal	18 (38.9)	13 (32.5)	29 (72.2)	0.7211
Overweight	4 (8.3)	6 (15.0)	10 (22.2)	
Obese	1 (2.8)	1 (2.5)	2 (5.6)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 3: BMI vs FB and control group**



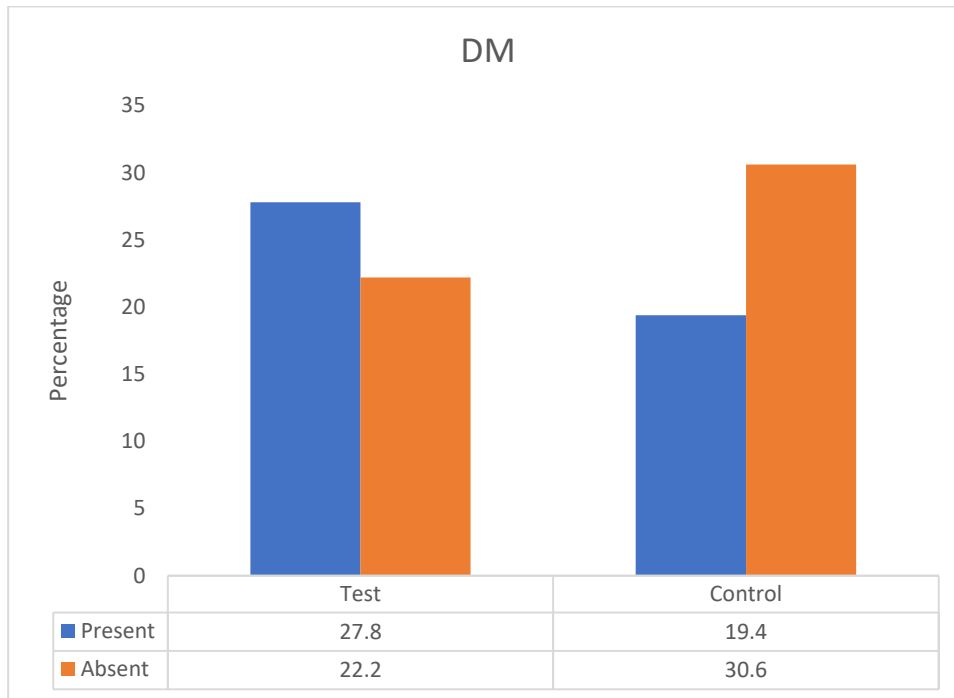
In this current study, DM was present among 27.8% of the cases from FB group and 19.4% of the cases from control group whereas DM was absent among 22.2% of the cases in FB group and 30.6% of the cases in control group. There was no association recorded for DM and the groups (p value =0.3165).

**Table 4: DM vs FB and control group**

DM	Group		Total	p value
	Test	Control		
Present	12 (27.8)	8 (20.0)	20 (47.2)	0.3165
Absent	11(22.2)	12 (30.0)	23 (52.8)	

Total	23 (53)	20 (47)	43 (100)	
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**Graph 4:DM vs FB and control group**

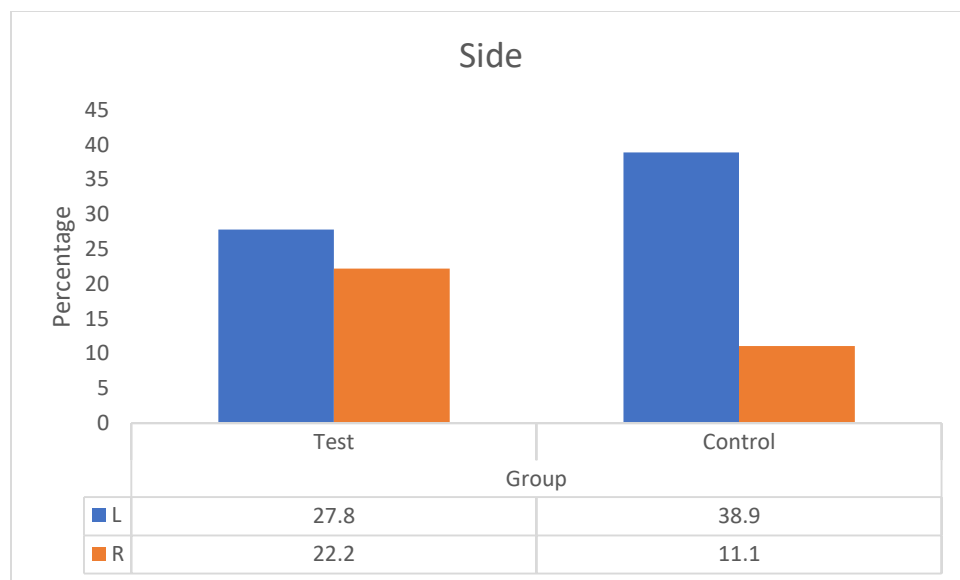


Based on the side of Carcinoma Breast 27.8% and 38.9% of the participants among FB group and Control group had left sided lesion respectively, while 22.2% of the cases from FB group and 11.1% of the cases from control group had right sided lesion, but there was no association recorded for side of lesion between the FB group and control group participants (p value =0.157).

**Table 5: Side of the lesion vs FB and control group**

Side	Group		Total	p value
	Test	Control		
Left	12 (27.8)	14 (38.9)	26 (60.3)	0.157
Right	11 (22.2)	6 (11.1)	17 (39.7)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 5: Side of the lesion vs FB and control group**

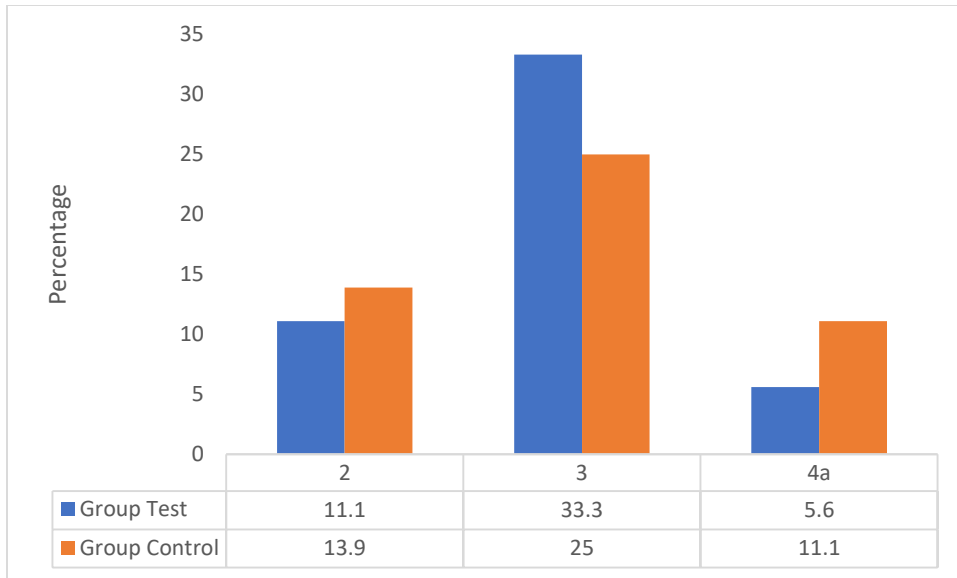


Based on the tumour grading 11.1%, 33.3% and 5.6% of the participants from FB group was in grade 2, grade 3 and grade 4a respectively while in control group 13.9%, 25% and 11.1% of the participants were noted in grade 2, grade 3 and grade 4a respectively. There was no statistical association noted for tumour grade between the groups (p value =0.547).

**Table 6: Tumour grade vs FB group and control group**

Tumour grade	Group		Total	p value
	Test	Control		
Grade 2	5 (11.1)	6(13.9)	11 (25)	0.547
Grade 3	15 (33.3)	12 (25)	27 (58.3)	
Grade 4a	3 (5.6)	5 (11.1)	8 (16.7)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 6: Tumour grade vs FB group and control group**

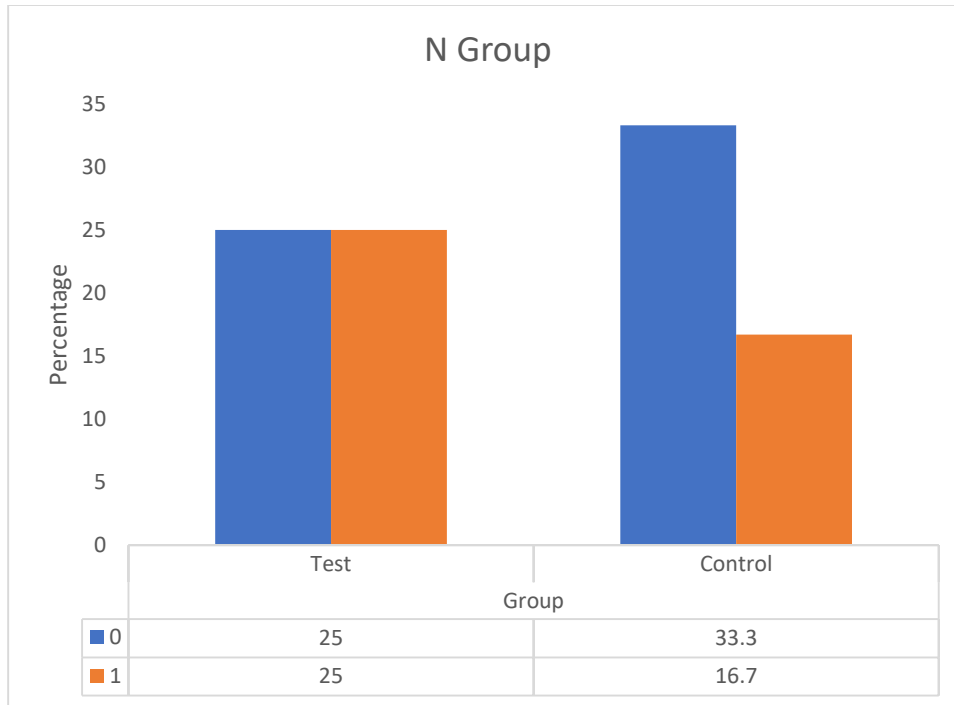


On assessing the groups based on Lymphnode grade 25% of the cases in FB group and 33.3% of the cases in control group had grade 0 involvement whereas 25% of the cases in FB group and 16.7% of the cases in control group had grade 1 involvement. The association for node grading between FB and control group was insignificant (p value =0.310).

**Table 7: Node grade vs FB and control group**

Node grade	Group		Total	p value
	Test	Control		
Grade 0	10 (23)	13 (33.3)	23 (53.3)	0.310
Grade 1	13 (25)	7 (16.7)	20 (42.7)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 7: Node grade vs FB and control group**

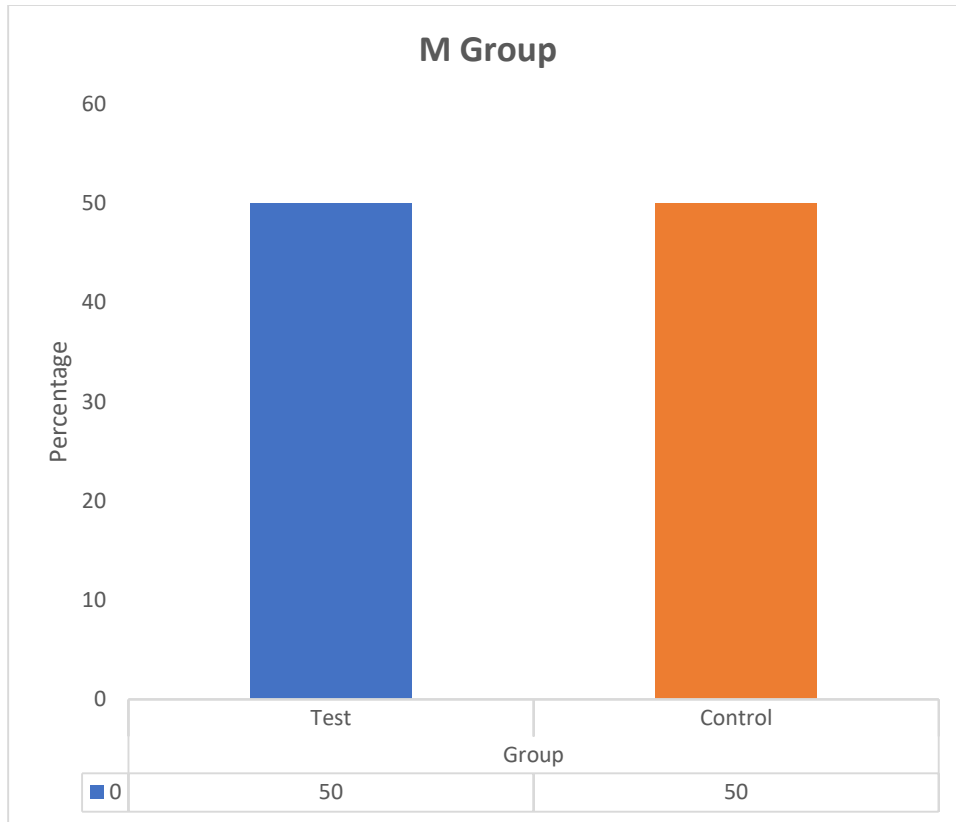


In this current study grade 0 metastasis was recorded among 50% of the cases in FB group and 50% of the cases in control group.

**Table 8: Metastasis grade vs FB and control group**

Metastasis grade	Group		Total
	Test	Control	
Grade 0	23 (53)	20 (47)	43 (100)
Total	23 (53)	20 (47)	43 (100)

**Graph 8: Metastasis grade vs FB and control group**



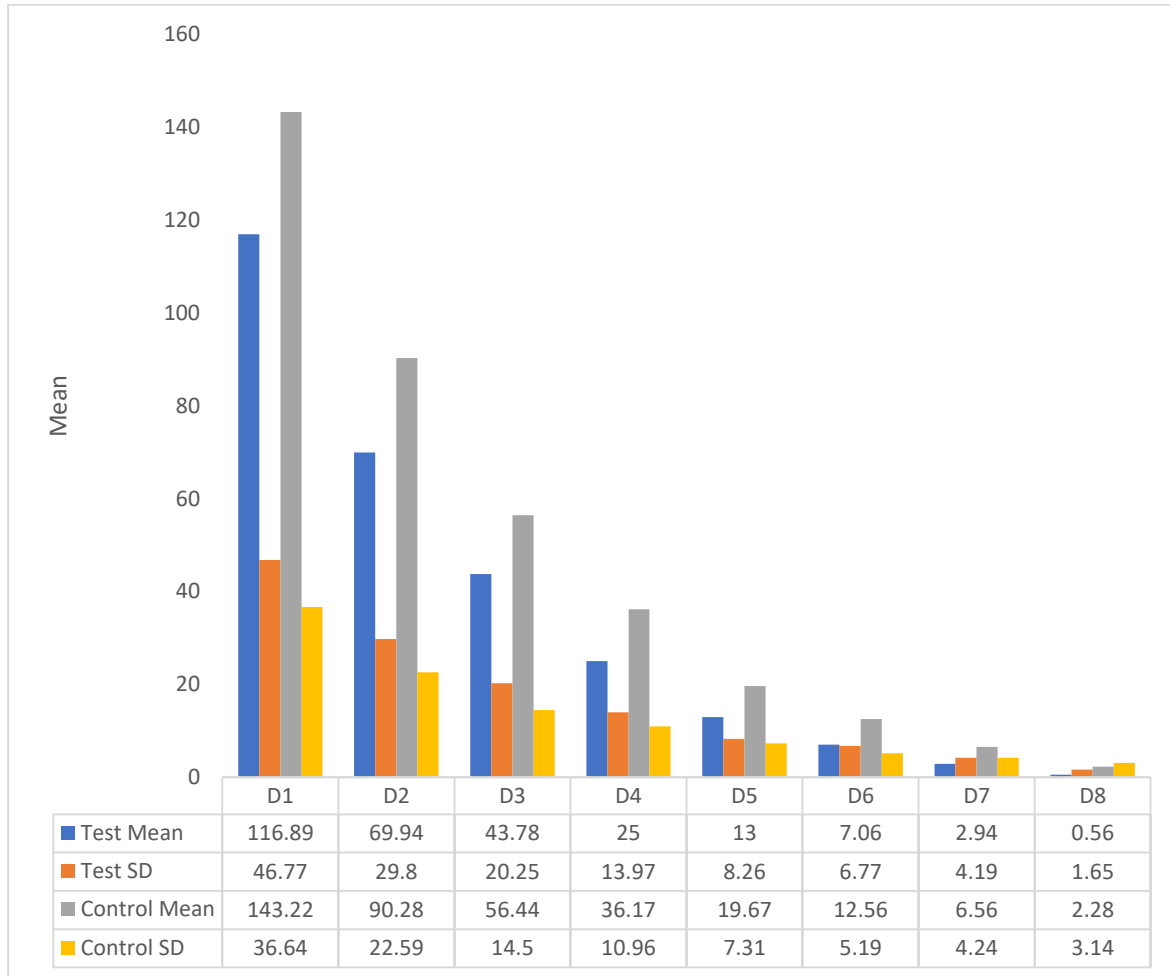
Post-operative, mean seroma drain fluid level among FB group and control group was shown in the table, it was noted that there was significant statistical difference in the drain fluid level between the FB group and control group on Day 1, day 2, day 3, day 4, day 5, day 6, day 7 and day 8 with significant p values.

**Table 9: Post-operative drain vs FB and control group participants**

<b>POD</b>	<b>Test</b>	<b>Control</b>	<b>p value</b>
Day 1	116.89±46.77	143.22±36.64	0.030*
Day 2	69.94±29.8	90.28±22.59	0.015*
Day 3	43.78±20.25	56.44±14.5	0.028*
Day 4	25.0±13.97	36.17±10.96	0.010*
Day 5	13.0±8.26	19.67±7.31	0.039*
Day 6	7.06±6.77	12.56±5.19	0.010*
Day 7	2.94±4.19	6.56±4.24	0.017*
Day 8	0.56±1.65	2.28±3.14	0.040*

\*Significant

**Graph 9: Post-operative drain vs FB and control group participants**



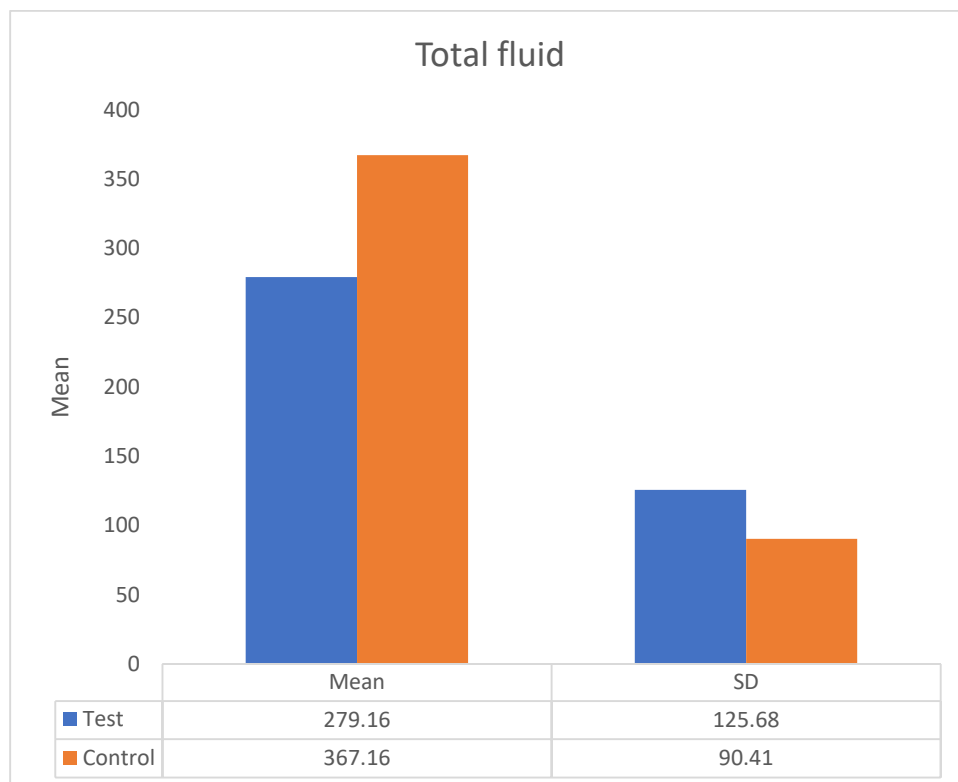
The mean total drain fluid among the FB group was  $279.16 \pm 125.68$  ml while the mean drain fluid among the control group was  $367.16 \pm 90.41$  ml, with significant difference in mean drain fluid level between both the groups (p value=0.016).

**Table 10: Mean Total drain fluid among FB group and Control group participants**

Group	Total drain fluid	p value
Test	279.16±125.68	0.016*
Control	367.16±90.41	

\*Significant

**Graph 10: Mean Total drain fluid among FB group and Control group participants**



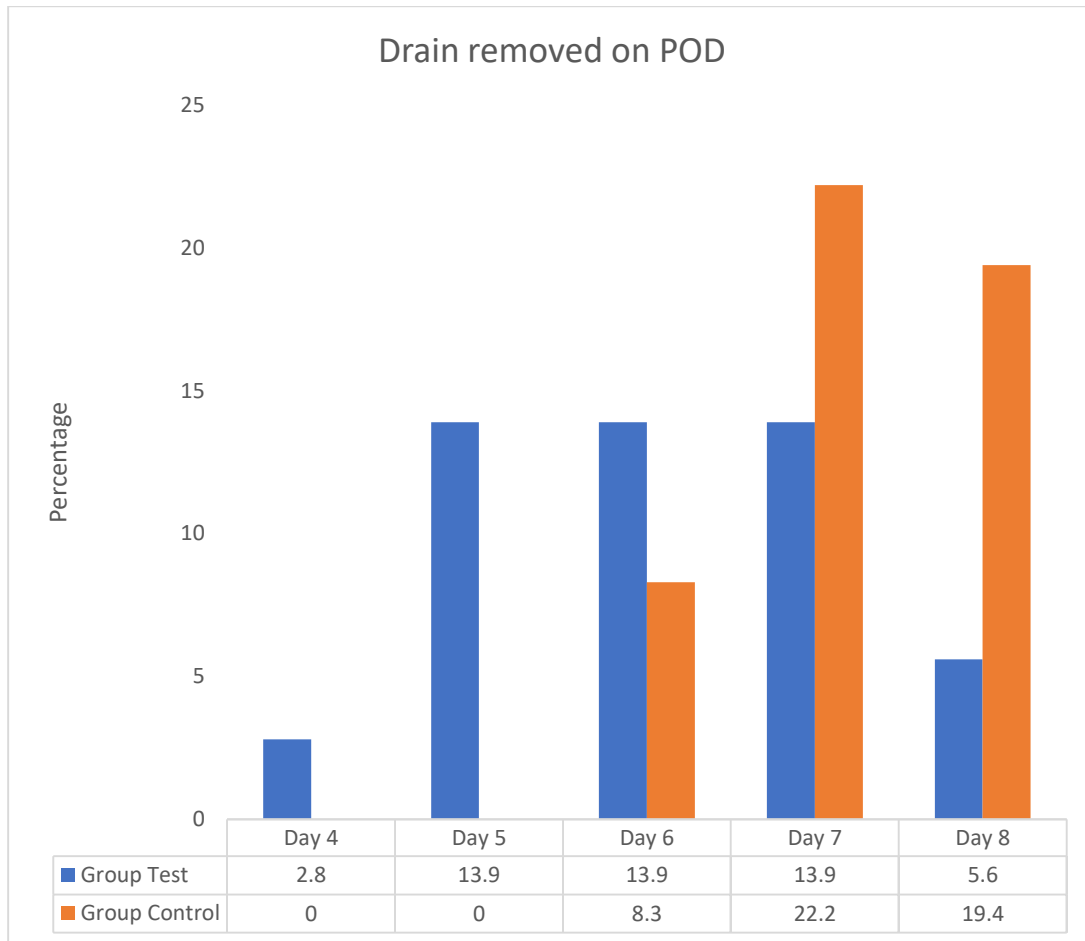
Based on the duration of drain removal, it was day 4 among 2.8% of the cases, day 5 among 13.9% of the cases, day 6 among 13.9% of the cases, day 7 among 13.9% of the cases and day 8 among 5.6% of the cases in FB group whereas it was day 6 among 8.3% of the cases, day 7 among 22.2% of the cases and day 8 among 19.4% of the cases which shows a statistical significance for drain removal duration between the groups (p value =0.041).

**Table 11: Drain removal duration among FB and control group**

Drain removed on POD	Group		Total	p value
	Test	Control		
Day 4	1 (2.8)	0	1 (2.8)	0.041*
Day 5	5 (11.9)	0	5 (11.9)	
Day 6	7 (13.9)	3 (8.3)	10 (22.2)	
Day 7	7 (13.9)	10 (22.2)	17 (36.1)	
Day 8	3 (4.6)	7 (18.4)	10 (23)	
Total	23 (53)	20 (47)	43 (100)	

\*Significant

**Graph 11: Drain removal duration among FB and control group**



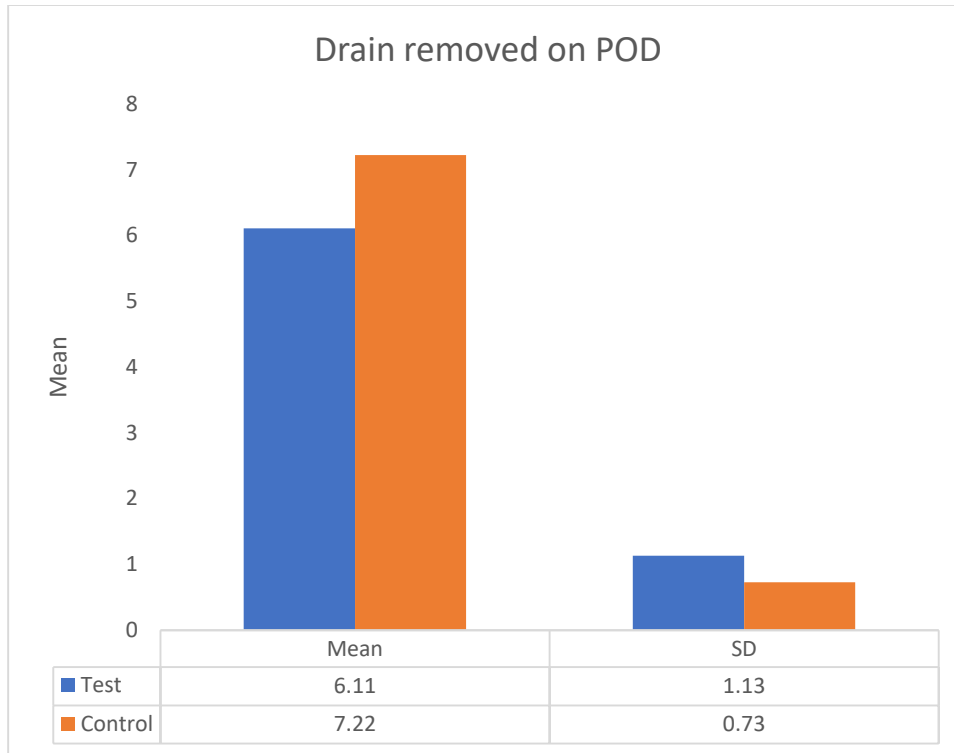
The mean time duration for drain removal on POD was  $6.11 \pm 1.13$  days among the FB group and  $7.22 \pm 0.73$  days among the control group, with significant difference between FB and control group for drain removal (p value = 0.003).

**Table 12: Mean drain removal on POD**

Group	Drain removed on POD	p value
Test	$6.11 \pm 1.13$	0.003*
Control	$7.22 \pm 0.73$	

\*Significant

**Graph 12: Mean drain removal on POD**



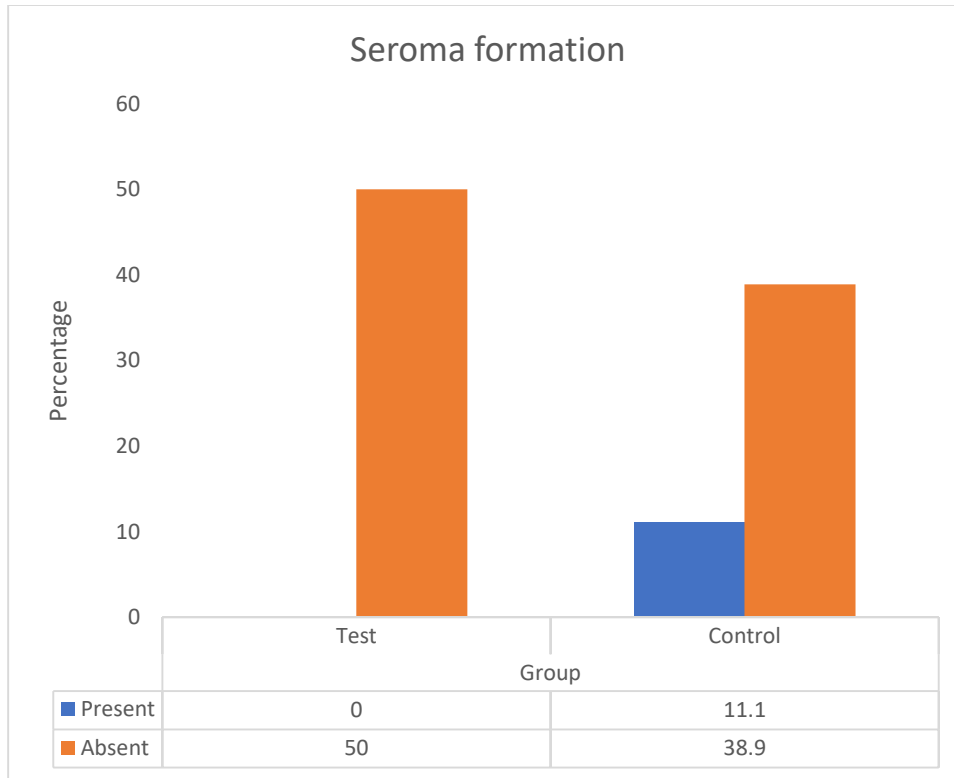
In this present study seroma formation was noted among 11.1% of the cases in control group alone while no case was recorded with seroma in the FB group. The association between the groups based on seroma formation was statistically significant (p value =0.0338).

**Table 13: Seroma formation vs FB group and control group**

Seroma formation	Group		Total	p value
	Test	Control		
Present	0	4 (11.1)	4 (11.1)	0.0338*
Absent	23 (50)	16 (38.9)	39 (88.9)	
Total	23 (53)	20 (47)	43 (100)	

\*Significant

**Graph 13: Seroma formation vs FB group and control group**

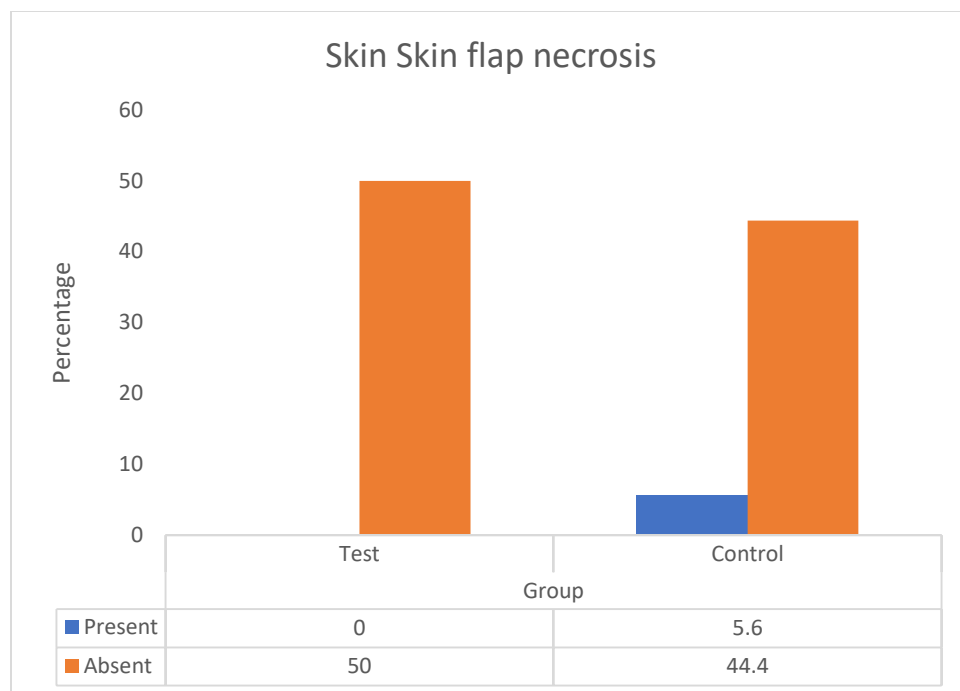


Skin Skin flap necrosis was present among 5.6% of the cases in control group while no cases were recorded with skin Skin flap necrosis in FB group, the association for skin Skin flap necrosis between both the groups was insignificant (p value =0.1455).

**Table 14: Skin Skin flap necrosis vs FB group and control group**

Skin Skin flap necrosis	Group		Total	p value
	Test	Control		
Present	0	2 (4.6)	2 (5.6)	0.1455
Absent	23 (53)	18 (45.4)	34 (94.4)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 14: Skin Skin flap necrosis vs FB group and control group**

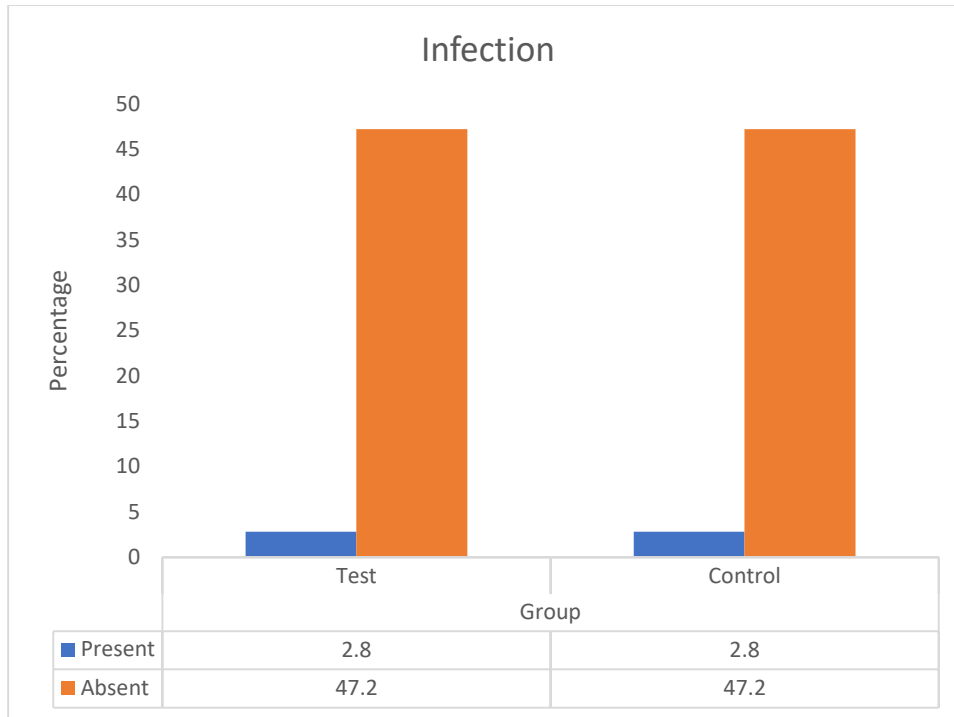


Post-operative infection was noted among 2.8% and 2.8% of the cases in FB group and control group respectively with no association between the groups for occurrence of infection (p value =1.000).

**Table 15: Infection vs FB and control group**

Infection	Group		Total	p value
	Test	Control		
Present	1 (2.8)	1 (2.8)	2 (4.6)	1.0000
Absent	22 (51.2)	19 (42.2)	41 (95.4)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 15: Infection vs FB and control group**

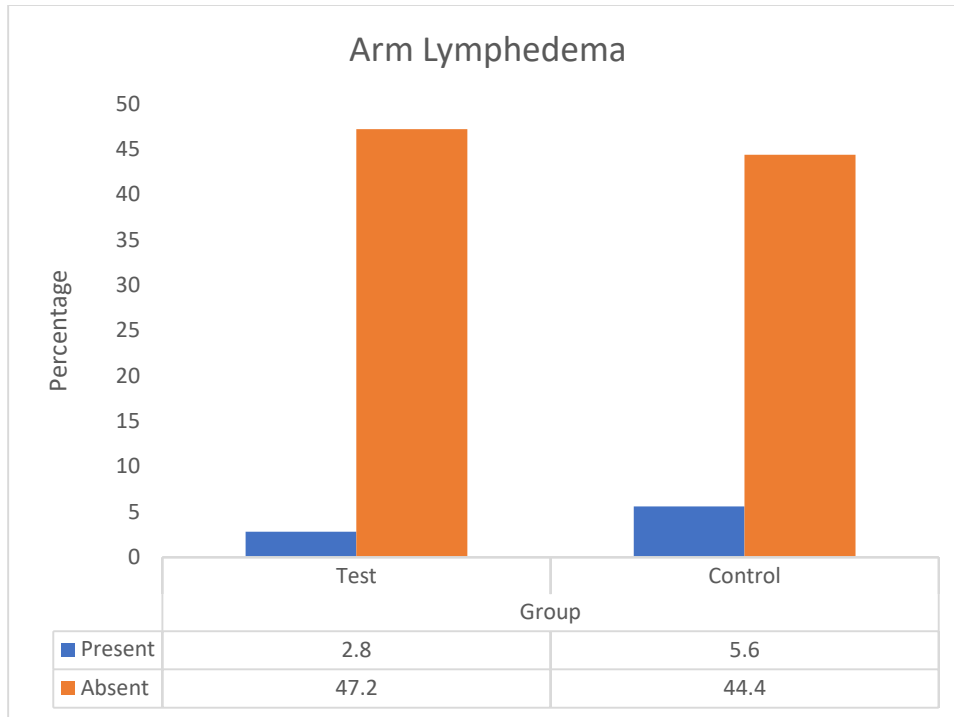


Arm Lymphedema was present among 2.8% of the cases in FB group and 5.6% of the cases in control group but the association for arm lymphedema was noted to be insignificant (p value =0.5462).

**Table 16: Arm Lymphedema vs FB group and control group**

Arm Lymphedema	Group		Total	p value
	Test	Control		
Present	1 (1.8)	2 (3.6)	3 (5.3)	0.5462
Absent	22 (51.2)	18 (43.4)	40 (94.7)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 16: Arm Lymphedema vs FB group and control group**

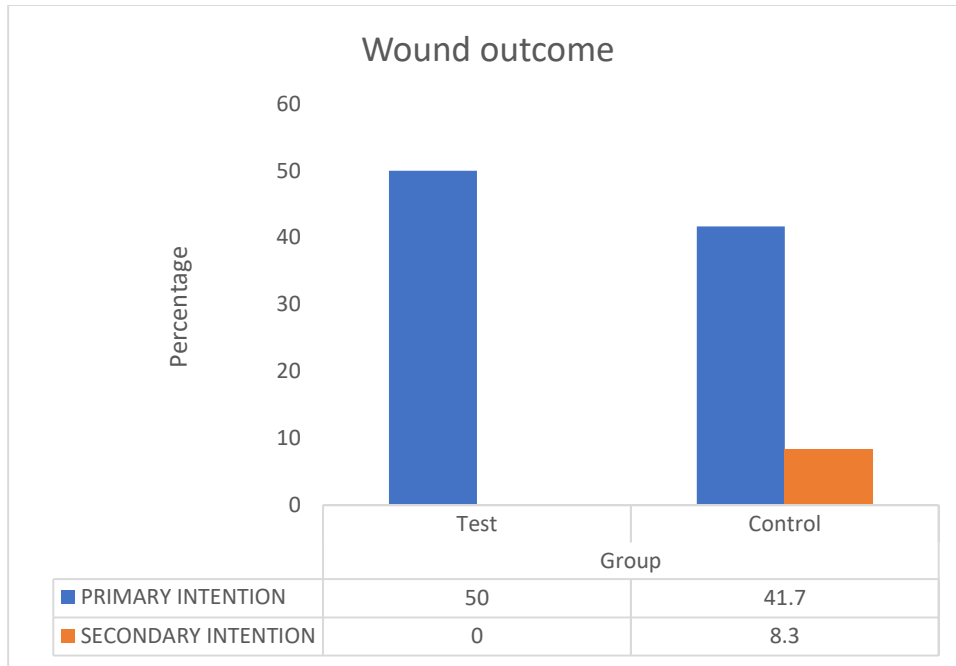


On assessing the wound outcome primary intention healing happened among all 50% of the cases in FB group whereas 41.7% of the cases in control group had primary intention and the remaining 8.3% of the cases had secondary intention wound healing, but the association was found to be not significant statistically (p value =0.070).

**Table 17: Wound outcome vs FB and control group**

Wound outcome	Group		Total	p value
	Test	Control		
Primary intention	22 (50)	18 (41.7)	33 (91.7)	0.070
Secondary intention	1(2.1)	2 (6.2)	3 (8.3)	
Total	23 (53)	20 (47)	43 (100)	

**Graph 17: Wound outcome vs FB and control group**

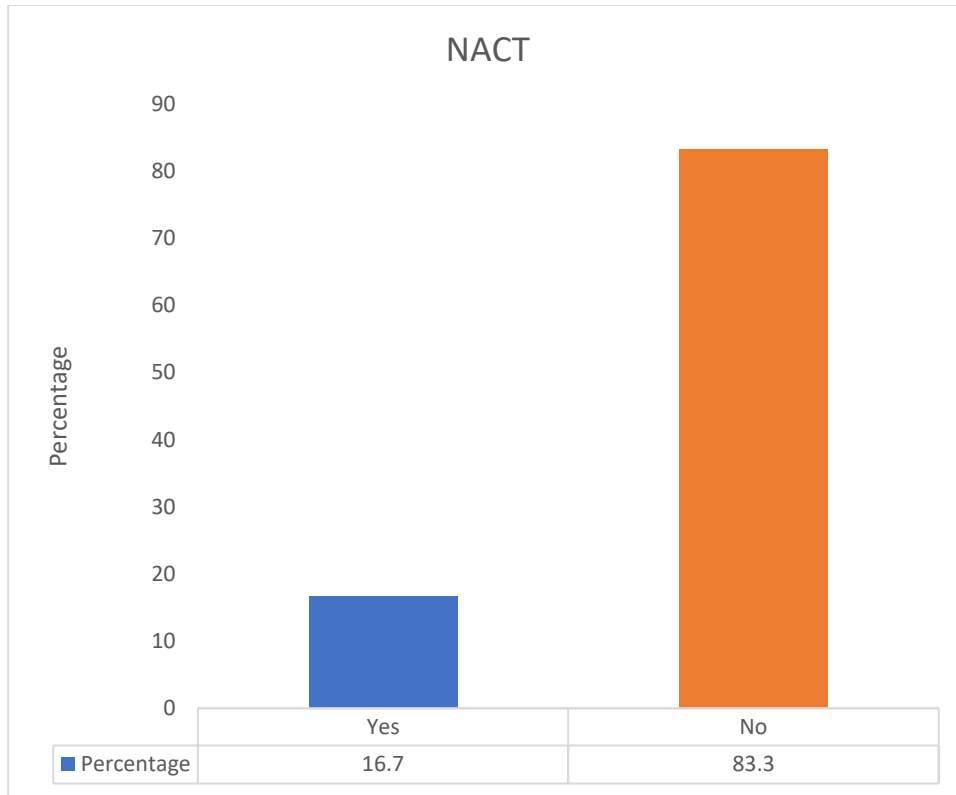


Neoadjuvant chemotherapy was administered among 16.7% of the cases in our study.

**Table 18: NACT among the study participants**

NACT	Frequency	Percentage
Yes	6	13,9
No	37	86.1
Total	43	100

**Graph 18: NACT among the study participants**



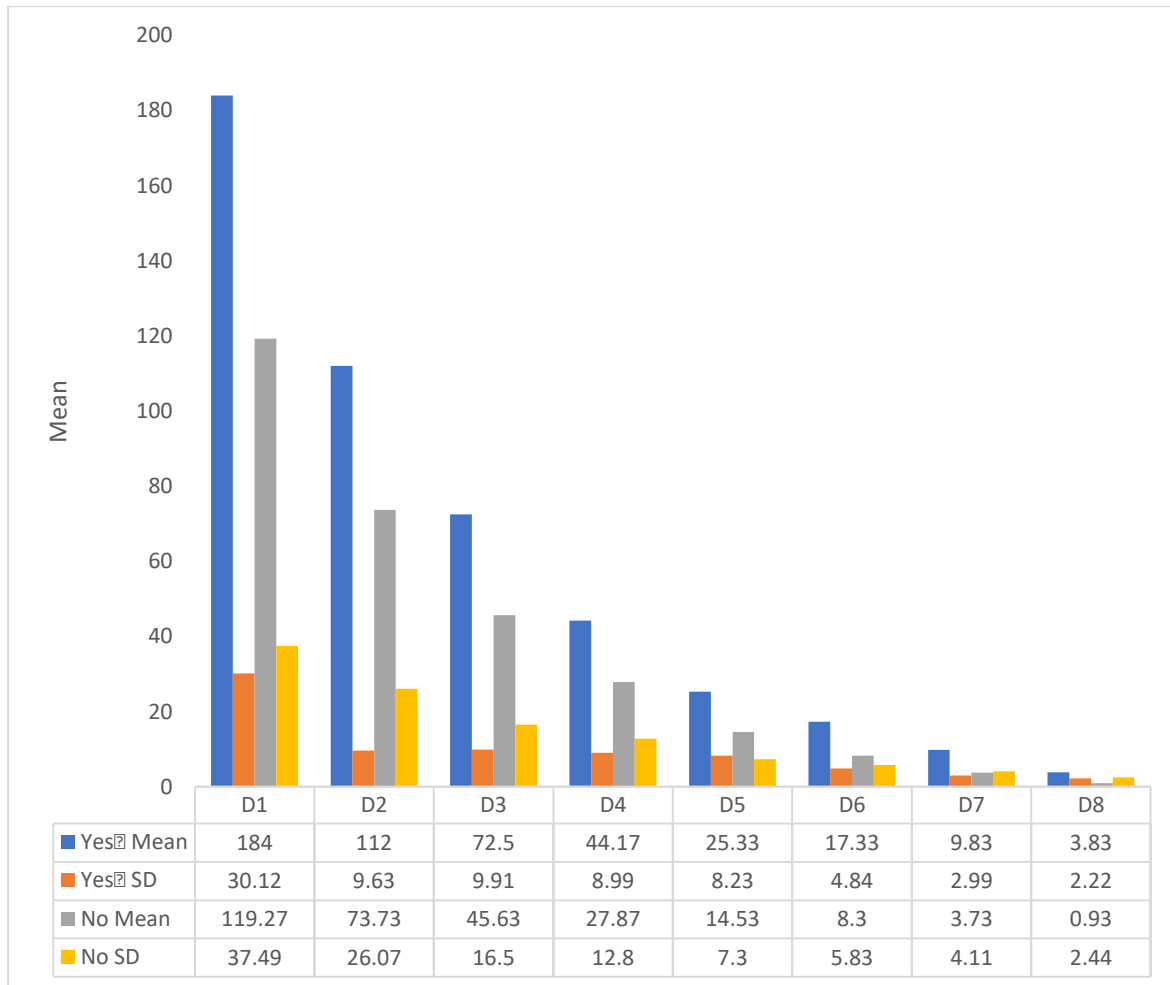
In this study comparing NACT administered patients and non NACT patients the fluid collection during POD from Day 1 to Day 8 was found to be statistically significant which indicates there was statistical difference in mean POD based on NACT.

**Table 19: POD among NACT and NACT administered cases**

<b>POD</b>	<b>NACT Yes (N=6)</b>	<b>NACT No (N=37)</b>	<b>p value</b>
Day 1	184.0±30.12	119.27±37.49	0.002*
Day 2	112.0±9.63	73.73±26.07	0.001*
Day 3	72.50±9.91	45.63±16.5	0.002*
Day 4	44.17±8.99	27.87±12.8	0.007*
Day 5	25.33±8.23	14.53±7.30	0.011*
Day 6	17.33±4.84	8.30±5.83	0.003*
Day 7	9.83±2.99	3.73±4.11	0.004*
Day 8	3.83±2.22	0.93±2.44	0.002*

\*Significant

**Graph 19: POD among NACT and NACT administered cases**



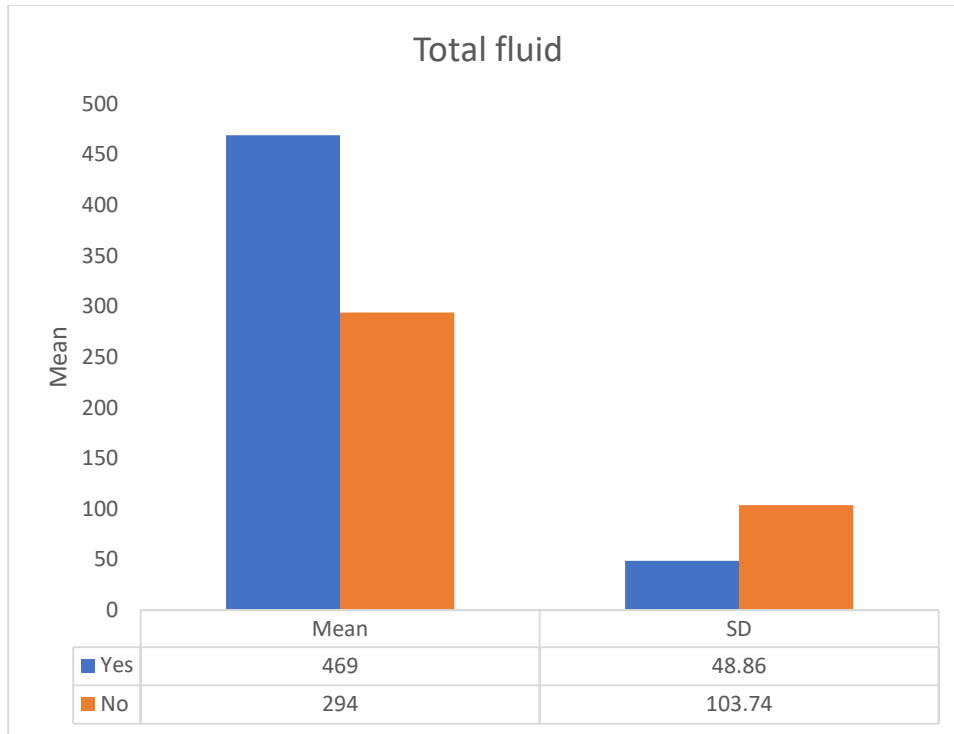
The mean total fluid collection among NACT administered candidates was  $469.0 \pm 48.86$  ml and non NACT candidates was  $294.0 \pm 103.74$  ml. the difference in mean total fluid collection based on NACT was significant (p value =0.016).

**Table 20: Mean total fluid collection**

NACT	Total fluid	p value
Yes	$469.0 \pm 48.86$	0.016*
No	$294.0 \pm 103.74$	

\*Significant

**Graph 20: Mean total fluid collection**



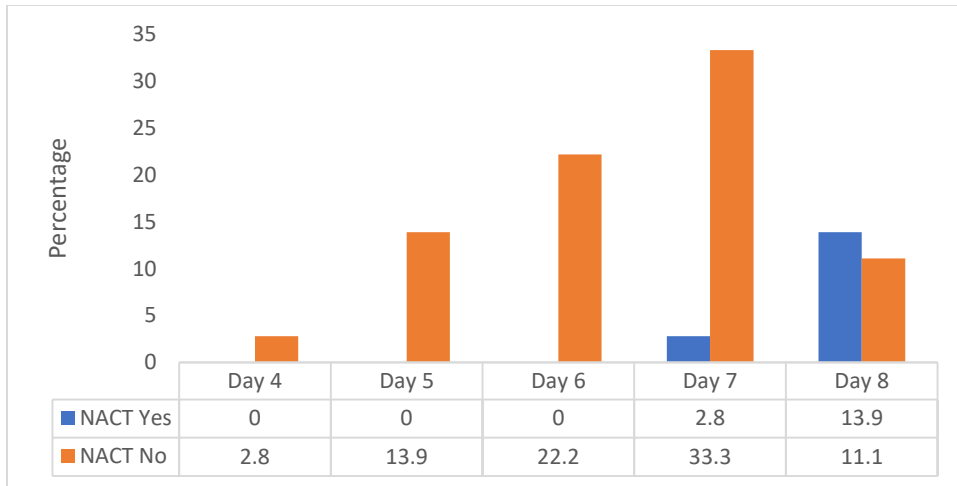
Based on the drain removed on POD, it was day 7 among 2.8% of the cases, day 8 among 13.9% of the cases in NACT group whereas it was day 4 among 2.8% of the cases, day 5 among 13.9% of the cases and day 6 among 22.2% of the cases, day 7 among 33.3% of the cases and day 8 among 11.1% of the cases in non NACT group. There was significant association recorded for drain removed on POD between NACT and Non NACT group in this study.

**Table 21: Drain removed on POD vs NACT**

Drain removed on POD	NACT		Total	p value
	Yes	No		
Day 4	0	1 (2.8)	1 (2.8)	0.010*
Day 5	0	6 (13.9)	6 (13.9)	
Day 6	0	9 (22.2)	9 (22.2)	
Day 7	1 (2.8)	14 (33.3)	15 (36.1)	
Day 8	5 (13.9)	5 (11.1)	10 (25)	
Total	6 (16.7)	37 (83.3)	43 (100)	

\*Significant

**Graph 21: Drain removed on POD vs NACT**



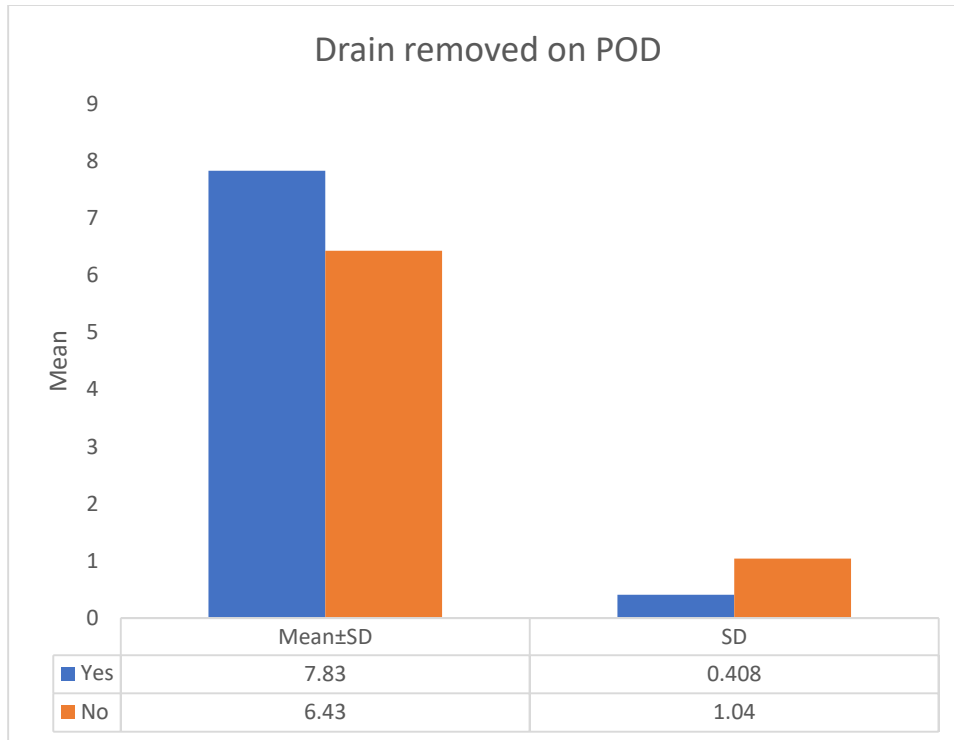
The duration of drain removed on POD among NACT administered patients was  $7.83 \pm 0.40$  days while among non NACT cases was  $6.43 \pm 1.04$  days, with significant difference in mean drain removed on POD days (p value= 0.002).

**Table 22: NACT vs mean Drain removed on POD among the participants**

NACT	Drain removed on POD	p value
Yes	$7.83 \pm 0.40$	0.002*
No	$6.43 \pm 1.04$	

\*Significant

**Graph 22: NACT vs mean Drain removed on POD among the participants**

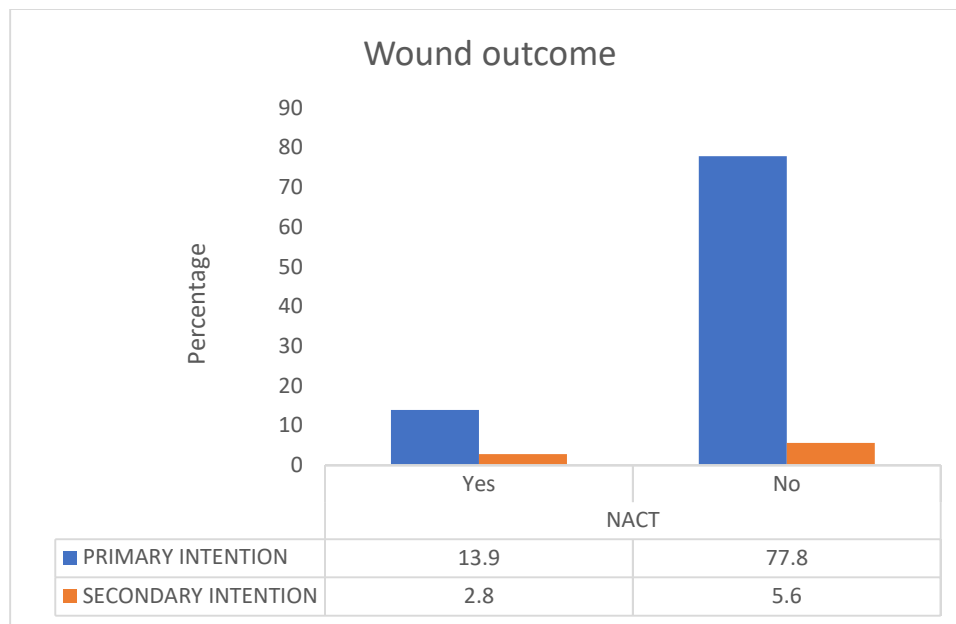


Similarly the wound outcome primary intention healing occurred among 13.9% of the cases who had NACT whereas 77.8% of the cases in do not had NACT had primary intention healing. The association between NACT and non NACT cases for wound outcome was not significant (p value =0.418).

**Table 23: Wound outcome vs NACT**

Wound outcome	NACT		Total	p value
	Yes	No		
Primary intention	5 (13.9)	35 (81.7)	40 (93.3)	0.418
Secondary intention	1 (2.4)	2 (4.3)	3 (6.7)	
Total	6 (16.7)	37 (83.3)	43 (100)	

**Graph 23: Wound outcome vs NACT**



## DISCUSSION

In this study among FB group 5.6%, 22.2%, 8.3% and 13.9% of the participants were in the age group of  $\leq 40$  years, 41-50 years, 51-60 years and  $> 60$  years of age respectively whereas in the control group 8.3%, 8.3%, 25% and 8.3% of the participants were in the age range of  $\leq 40$  years, 41-50 years, 51-60 years and  $> 60$  years of age respectively. There was no statistical association for age between FB group and control group. The mean age among the FB group was  $51.78 \pm 11.7$  years whereas the mean age among control group was  $53.72 \pm 11.9$  years. The difference in mean age between the groups was insignificant.

On assessing the BMI, among 72.2% of the cases with normal BMI 38.9% of them were in FB group and 33.3% of the cases were in control group. Likewise among 22.2% of the cases who were found to be overweight 8.3% of the cases were in FB group and 13.9% of the cases were in control group. Among 5.6% of obese participants 2.8% of the cases were in FB group and control group each. The association between FB and control group for BMI was insignificant statistically.

In this current study, DM was present among 27.8% of the cases from FB group and 19.4% of the cases from control group whereas DM was absent among 22.2% of the cases in FB group and 30.6% of the cases in control group. There was no association recorded for DM and the groups. Based on the side of Carcinoma Breast 27.8% and 38.9% of the participants among FB group and Control group had left sided lesion respectively, while 22.2% of the cases from FB group and 11.1% of the cases from control group had right sided lesion, but there was no association recorded for side of lesion between the FB group and control group participants.

Based on the tumour grading 11.1%, 33.3% and 5.6% of the participants from FB group was in grade 2, grade 3 and grade 4a respectively while in control group 13.9%, 25% and 11.1% of the participants were noted in grade 2, grade 3 and grade 4a respectively. There was no statistical association noted for tumour grade between the groups. On assessing the groups based

on Lymph node grade 25% of the cases in FB group and 33.3% of the cases in control group had grade 0 involvement whereas 25% of the cases in FB group and 16.7% of the cases in control group had grade 1 involvement. The association for node grading between FB and control group was insignificant. In this current study grade 0 metastasis was recorded among 50% of the cases in FB group and 50% of the cases in control group.

Post-operative, mean seroma drain fluid level among FB group and control group was shown in the table, it was noted that there was significant statistical difference in the drain fluid level between the FB group and control group on Day 1, day 2, day 3, day 4, day 5, day 6, day 7 and day 8 with statistical significance. The mean total drain fluid among the FB group was  $279.16 \pm 125.68$  ml while the mean drain fluid among the control group was  $367.16 \pm 90.41$  ml, with significant difference in mean drain fluid level between both the groups.

Based on the duration of drain removal, it was day 4 among 2.8% of the cases, day 5 among 13.9% of the cases, day 6 among 13.9% of the cases, day 7 among 13.9% of the cases and day 8 among 5.6% of the cases in FB group whereas it was day 6 among 8.3% of the cases, day 7 among 22.2% of the cases and day 8 among 19.4% of the cases which shows a statistical significance for drain removal duration between the groups. The mean time duration for drain removal on POD was  $6.11 \pm 1.13$  days among the FB group and  $7.22 \pm 0.73$  days among the control group, with significant difference between FB and control group for drain removal.

In this present study seroma formation was noted among 11.1% of the cases in control group alone while no case was recorded with seroma in the FB group. The association between the groups based on seroma formation was statistically significant. Skin flap necrosis was present among 5.6% of the cases in control group while no cases were recorded with skin flap necrosis in FB group, the association for skin flap necrosis between both the groups was insignificant. Post-operative infection was noted among 2.8% and 2.8% of the cases in FB group and control group respectively with no association between the groups for occurrence of infection. Arm Lymphedema was present among 2.8% of the cases in FB group and 5.6% of the cases in control group but the association for arm lymphedema was noted to be insignificant. On assessing the wound outcome primary intention healing happened among all 50% of the cases in FB group whereas 41.7% of the cases in control group had primary intention and the remaining 8.3% of the cases had secondary intention wound healing, but the association was found to be not significant statistically. Neoadjuvant chemotherapy was administered among 16.7% of the cases in our study.

In this study comparing NACT administered patients and non NACT patients the fluid collection during POD from Day 1 to Day 8 was found to be statistically significant which indicates there was statistical difference in mean POD based on NACT. The mean total fluid collection among NACT administered candidates was  $469.0 \pm 48.86$  ml and non NACT candidates was  $294.0 \pm 103.74$  ml. the difference in mean total fluid collection based on NACT was significant. Based on the drain removed on POD, it was day 7 among 2.8% of the cases, day 8 among 13.9% of the cases in NACT group whereas it was day 4 among 2.8% of the cases, day 5 among 13.9% of the cases and day 6 among 22.2% of the cases, day 7 among 33.3% of the cases and day 8 among 11.1% of the cases in non NACT group. There was significant association recorded for drain removed on POD between NACT and Non NACT group in this study.

The duration of drain removed on POD among NACT administered patients was  $7.83 \pm 0.40$  days while among non NACT cases was  $6.43 \pm 1.04$  days, with significant difference in mean drain removed on POD days. Similarly the wound outcome primary intention healing

occurred among 13.9% of the cases who had NACT whereas 77.8% of the cases in do not had NACT had primary intention healing. The association between NACT and non NACT cases for wound outcome was not significant.

Findings of the present study were comparable with the findings of the following studies. Gilly FN et al<sup>19</sup> reported that following the lymphadenectomy process, cases were randomly assigned to one of two groups: group 1 received no FG, and group 2 had 2 ml of FG administered to the AD region. Group 1 experienced considerably higher mean daily post-op drainage. Six days following the procedure, the mean total drainage volume for groups 1 and 2 was 407.8 ml and 214.4 ml, respectively. Groups 1 and 2 experienced mean post-op hospital stays of 10.1 and 8.0 days, respectively. Each group showed one delayed seroma. FG did not impact delayed Seroma Formation following AD for Carcinoma Breast, although it appears to decrease daily postop drainage and hospital stay. Moore M et al<sup>20</sup> observed that the amount and duration of fluid outflow from the axilla after lumpectomy were considerably decreased by a 4 mL AD dosage of fibrin sealant. The number of days needed for drain removal and fluid drainage was considerably decreased in the modified MRM patients when a 16 mL AD dosage was paired with an 8 mL skin flap dose. No significant problems linked to the sealant or viral seroconversions were seen in patients with fibrin sealants.

In consistent with this study, Jain PK et al<sup>21</sup> observed that neither the drain group nor the group without drains had a significantly different incidence of seroma. Patients without a drain experienced significantly lower post-op pain scores and hospital stays. The frequency and overall amount of seroma were significantly reduced after mastectomy without a drain when fibrin sealant was used. They asserted that drains were linked to a longer post-op stay and greater pain scores following Carcinoma Breast surgery, and that they did not limit Seroma Formation. Fibrin sealant was used to lower the incidence of Seroma Formation in individuals who undergone mastectomy. Johnson LN et al<sup>22</sup> observed that the FG group had a Seroma Formation rate of 36.8%, whereas the control group had a rate of 45.5%. Wound complications occurred at a comparable rate. The FG group had noticeably larger aspirate volumes. Compared to FG, drain implantation saved patients money. Even though the rate of seroma formation was not significantly reduced by using fibrin sealant as opposed to drain placement, the higher expense, difficult method, and larger aspirate volumes suggest that there is no benefit to using FG over drain placement using the method outlined.

Additionally, Ruggiero R et al<sup>23</sup> claimed that drainage between PODs 3 and 4 was eliminated using FG suction. When compared to the group getting conventional therapy, individuals who received FG and collagen patches saw a substantial decrease in the amount and duration of seromas as well as a decrease in evacuative punctures. They asserted that while using FG with collagen patches did not always stop seromas from forming, it does lessen their size, duration, and the need for evacuative punctures. Ko E et al<sup>24</sup> noted that the drainage time, total drain production, and seroma incidence were comparable between the FG and control groups. However, subgroup analysis revealed that individuals experiencing stage II or III AD had a lower drain output and drainage duration when fibringlue was used. In patients with Carcinoma Breast following a lumpectomy and level II or III AD, FG usage decreased drainage length and total drain output. Cipolla C et al<sup>26</sup> reported that FG patients had a small advantage in terms of the number of seroma aspirations and the average length of axillary drainage installation. The mean quantity of total axillary drainage and total seroma volume did not differ remarkably between the two patient

groups. They came to the conclusion that using FG did not stop seromas from forming or lessen their size or duration.

However, Hivelin M et al<sup>27</sup> found that, following a median follow-up of 20 months, no negative effects were recorded when FG was used in deep inferior epigastric perforator flaps (DIEP). Patient's height, weight, or age nor their BMI were associated with drainage volumes or durations. In both groups, the duration of thoracic drainage was longer than that of abdominal drainage. In the FG group, thoracic drains were withdrawn early and average discharged volumes from thoracic region were lower. Following the application of fibrin sealant, the duration of stay was similarly shortened. They asserted that following rapid reconstruction of the breast by DIEP flap, the use of fibrin sealant dramatically reduced the amount and length of post-op drainage in the thoracic region. Bonjar MRM et al<sup>28</sup> observed that the control group's seroma generation rate was 24.1%, whereas the FG group's was 16.1%. Wound complications occurred at a comparable rate. Even while applying fibrin sealant reduced the incidence of Seroma Formation by a non significant amount when compared to drain placement, the more expensive and time-consuming method suggests that there is no benefit to utilizing FG over drain insertion using the method outlined.

In another study, Sajid MS et al<sup>29</sup> claimed that the frequency of post-op seroma, mean amount of seroma, infection of the wound, postop complications, and duration of hospital stay were not decreased by using FG beneath skin flaps after breast and axillary surgery. FG decreased the length of time that persistent seromas needing repeated aspirations lasted as well as the overall amount of drained seroma. They came to the conclusion that FG had no effect on the length of hospital stays, SSIs, complications, mean volume of seroma, or incidence of post-op seroma in patients having Carcinoma Breast surgery. Benevento R et al<sup>30</sup> observed that patients who administered FG had lower serum output gathered in drain after surgery and shorter time of post operational hospital stay. There was no difference in the incidence of seroma between the groups at the 4-week follow-up. Furthermore, the sole independent indicator of Seroma Formation was obesity. At the 4-week follow-up, overweight individuals experienced fewer seromas than control overweight patients. There were no variations in lymphedema across the groups. They came to the conclusion that following breast surgery, the axilla generated less fluid when low-thrombin FG was present. Patients who are overweight could be the best candidates for this medication. The prevalence of lymphedema was not elevated by such a sealant.

Similarly, Fawzy A et al<sup>32</sup> said that there was no discernible difference between the two groups' mean ages, the number of LN removed, or the rate of post-op infection. The FG group benefited from a notable decrease in hospital stay duration. The length of the drain installation was much shorter for the FG group. Significant reductions in incidence and volume were seen in the amount of post-op serous fluid and the incidence of post-op seroma, which was 35% in the control group and 5% in the FG group. They asserted that the use of FG sealant during MRM led to a discernible and substantial reduction in the volume, duration, and post-op rate of Seroma Formation. Chang YT et al<sup>33</sup> observed that there were no appreciable variations in the incidence of seroma, duration of hospital stay, or frequency of SSI between the fibrin sealant group and the control group. Significant intergroup variations were seen in the drainage volume, drainage time, and lower seroma volume. They also stated that fibrin sealants had no effect on lowering seroma volume and drainage volume and duration. Kabbash MM et al<sup>34</sup> discovered that whereas DM, cancer stage, and the amount of LN infiltrated and eliminated had no effect on seroma formation after MRM, hypertension, obesity, blood transfusions, and bloody fields are at significant risk of

developing seroma after MRM. With a low frequency of established seroma and associated problems, flap fixation was shown to be the most effective technique for preventing seroma formation. However, the use of tranexamic acid before and after surgery was found to have no effect in preventing the production of seromas following MRM. They asserted that the MRM is a useful operation that shortens the time and volume of fluid drained and dramatically lowers the frequency of Seroma Formation.

In line with this study, Marquez JE et al<sup>36</sup> found that fibrin sealants, both with and without surgical drains, are effective at preventing seromas in reduction mammoplasty. The patients were divided into two groups: those with fibrin sealant (group 1) and those without. The demographics of the patients did not differ statistically. The rate of seroma did not significantly differ between groups 1 and 2. The occurrence of seroma in Group 1 was further examined by type of sealant. When compared to the pair of sealant and surgical drains, group 1's usage of sealant alone was more probable to cause Seroma Formation. They asserted that using offibrin sealants during reduction mammoplasty has no effect on the pace at which seromas occur. The incidence of seromas may rise if fibrin sealants are applied without surgical drainage. Plastic surgeons could think about assessing the advantages and disadvantages of employing fibrin sealants in ambulatory procedures, either with or without drains. Faisal M et al<sup>37</sup> observed that there was no significant difference in tumour size, number of lymph nodes, age, pathology, or stage of Carcinoma Breast between the groups. The median number of days before drain removal was reduced by 8 days in FG group (7 days) as compared to the control group (15 days). Compared to the control group, the total drain output volume of the FG group's patients was noticeably lower. They asserted that after MRM, FG dramatically reduces Seroma Formation.

Additionally, Azhar Y et al<sup>38</sup> observed no significant differences in tumour size, number of lymph nodes, age, histopathological type, or stage of Carcinoma Breast. Nonetheless, cumulative drain output was noticeably lower in the FG group's patients. The treatment group's median seroma volume was 9.30 mL, whereas the control group's median was 20.90 mL. They came to the conclusion that FG considerably shortened hospital stays and reduced Seroma Formation. Tolba EE et al<sup>40</sup> reported that the general rate of seroma and the total volume of drained fluids were lower in the FG group compared in control group. Both the volume and incidence of seromas were significantly reduced with the usage of FG. As a result, hospital stays and the amount of time until the drains were withdrawn were also significantly reduced.

## **CONCLUSION**

In the present study, the fibrin group and the control group (non fibrin) group were similar in terms of age, BMI, presence of diabetes mellitus, laterality of pathology, and TNM staging.

On assessing the drain output, in the fibrin sealant group the drain output was significantly lesser than the control group invariable of the post operative day, till the drains were removed. Additionally, the drain removal was significantly earlier in fibrin group compared to the control group. Notably, the incidence of seroma formation was lesser in fibrin group compared to control group. However, the skin flap necrosis, rate of infection, arm lymphedema and wound outcome were similar in both the groups.

Also, those cases underwent NACT had comparatively more drain output and drain removal was later compared to non NACT cases. However the wound outcome was similar in both NACT and non NACT groups.

We infer that the use of fibrin sealent remarkably reduces the seroma formation, drain output and also helps in early removal of drain in cases those who underwent MRM in variable of the stage of the breast carcinoma.

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