

**EFFECT OF INFRARED THERAPY ON WOUND HEALING
AND PAIN AMONG MOTHERS WHO UNDERWENT
CAESAREAN SECTION AT SELECTED HOSPITAL,
COIMBATORE.**

ASWATHY. M

A Dissertation Submitted to
The Tamil Nadu Dr. M.G.R Medical University,
Chennai -32.

In Partial Fulfillment of the Requirement for the
Award of the Degree of
MASTER OF SCIENCE IN NURSING
2016

This is to certify that the dissertation entitled **Effect of Infrared Therapy on Wound Healing and Pain among Mothers who Underwent Caesarean Section at Selected Hospital, Coimbatore** is a bonafide work done by **Aswathy.M, College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences** in partial fulfillment of the University rules and regulations for award of **M.Sc. Nursing Degree** under my guidance and supervision during the academic year **2016**.

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The Tamil Nadu Dr. M. G. R. Medical University, Chennai –32.

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Abstract

Child Birth either through normal delivery or caesarean section is a unique dynamic process, where fetal and maternal physiologies interact symbiotically. Aim of the present study was to assess the effect of infrared therapy on wound healing and pain among mothers who underwent caesarean section at Sri Ramakrishna Hospital, Coimbatore. True experimental pretest - posttest with control group design was adopted and 20 mothers were selected using Purposive sampling technique. REEDA wound assessment scale and Numerical Pain Rating Scale was used to assess the wound healing and pain. Infrared therapy was applied using infrared lamp with 50 cm distance at 45° angle for 15 minutes twice daily from the 3rd postoperative day till the day of discharge to the experimental group and the control group received routine nursing care.

The result shows that there was a significant difference in the level of wound healing among experimental group ($df=8$, $t=2.54$ at 0.05 level of significance) and a significant difference in the posttest level of pain between the groups ($df=18$, $t=3.8$ at 0.05 level of significance). There was a significant difference in the pretest and posttest level of pain in the experimental group ($df=8$, $t=14.33$ at 0.05 level of significance). Improvement was seen in the wound healing and pain among control group also. None of the selected demographic variables of the mothers had association with the level of wound healing but the age and weight had an association with the level of pain. There was no correlation identified between wound healing and pain.

The researcher would like to conclude that caesarean wound care is an important aspect and this can be achieved only by developing appropriate clinical services and undertaking more high quality basic and clinical research.

INTRODUCTION

The experience of transformation from womanhood into motherhood is a privilege reserved exclusively for women. Pregnancy and childbirth are wonderful and remarkable moments of life. Giving birth to a child can be one of the most joyful experiences of a woman's life, but it is undeniably one of the most painful experiences too. Naturally, expectant mothers spend a lot of time thinking about how they will give birth. Although most people believe that vaginal birth is the best way to deliver, sometimes a Caesarean section cannot be avoided (Bobak & Jenson 1993). Caesarean section was introduced in clinical practice as a lifesaving procedure both for the mother and the baby. It is a surgical procedure in which the incision is made on the mother's abdomen and the uterus to deliver the products of conception. Caesarean birth is used most often as a prophylactic measures, to alleviate problem of birth such as cephalo pelvic disproportion, failure to progress in labour or fetal distress. (Charles & Kathryn, 2009)

A major concern in maternal and child health nursing is the increasing number of caesarean birth being performed annually. In India, the incidence of primary caesarean birth is about 30.2% or one-third of births (National Vital Statistics System, 2008). Majority of the states are within the WHO specified range of Caesarean section (5 to 15%). Among that, five states are above the range and 12 states below the specified range. The report also says that the prevalence of Caesarean section is generally more in the southern states.(Chayan, 2008)

After the baby is born via C-section, the result is a wound that must heal and pain is common during this healing process. Wound healing acceleration and pain management in women underwent Cesarean surgery could help them to return to their normal functioning, especially to begin breastfeeding their newborns as one of the most important aspects of newborn care. Failure in complete healing of the wound is one of the probable complications of caesarean section. (Mokmeli, 2007)

Post caesarean wound infection due to delayed wound healing and pain are not only a leading cause of prolonged hospital stay but a major cause of the widespread aversion to caesarean delivery in developing countries. Management of those problems is essential to decrease the chance of infection, length of the hospital stay, pain and helps to return for normal function. (Ezechi , 2009)

Mothers who undergo caesarean section should achieve immediate recovery than other surgical patients because of maternal and neonatal wellbeing. Several studies have investigated many approaches and protocols of wound healing and pain management in women undergoing caesarean section. Though different approaches have been introduced, these approaches are still inadequate and unsatisfactory in many patients. Thus it seems that postoperative management in this group of people is more challenging than other surgical patients. (Shahraki, Jabalameli & Ghaedi , 2012)

Infrared Rays have a therapeutic effect of increasing the blood supply and relieving the Pain. This will increase the supply of oxygen and nutrient available to the tissues, accelerate the removal of the waste products and help to bring about

the resolution of inflammation (Eastman 1950). When the heat is mild, the relief of pain is probably due to the sedative effect on the superficial sensory nerve endings (Ezechi 2009). It also helps to achieve muscular relaxation. Infrared rays also have the physiological effect on cutaneous vasodilation due to liberation of chemical vasodilators, histamine and similar substance, as well as possible direct effect on the blood vessels. (Thumma Cecilamma, 2012)

Stronger heating of infrared stimulate the superficial nerve endings. It has been noticed that pain is due to accumulation of waste products and because of stronger heating, the blood flow increases and removes that waste product and the pain is relieved. In some cases the relief of pain is probably associated with muscle relaxation. Muscle relaxes most readily when the tissue is warm. The relief of pain itself facilitates muscle relaxation. So the infrared radiation is considered as a choice of Electro Therapy Modality for the wound healing and pain among mother who underwent caesarean .(Danso & Adu-Sarkodie ,1998)

1.1 Need for the study

World Health Statistics (2012) reported that 9% of all the births in India were by caesarean section. It was also reported that the caesarean section rate in China was three times higher than that of India at 27% and Sri Lanka accounted for 24%. Bangladesh too recorded caesarean section rates higher than India at 13% , Bhutan recorded 12% and the Maldives 32%.

The estimate for caesarean section rates in East Asia also shows that it is well above the 15% mark. India is also not excluded from this trend. Though the estimates of caesarean section rates in India is 7.1% in the year 1998, there is 16.7% change in the rates annually in India (Stanton & Holtz ,2006), which is one

of the highest among the countries. A five-year audit from a large teaching hospital in Kolkata showed a caesarean section rate of 49.9 % and another study in Chennai showed an alarming caesarean section rate of 50%. (Sreevidya & Sathiyasekaran, 2003)

Postpartum period is a challenging time for women, as a result of stressors such as fluctuation in hormone levels, caring for a newborn baby and recovering from the actual process of delivery is essential. A postoperative wound complication further intensifies an already difficult period of adjustment. Approximately 15% of women undergoing caesarean delivery develop postoperative complications. (Upton & Solowiej 2010)

Further more, management of postoperative pain after a caesarean section is rather different from other surgeries, mainly because the woman needs a fast recovery to take care of the newborn. One should choose drugs and techniques that do not alter the consciousness and ability to walk. But the drugs used for treatment or prevention of postoperative pain may affect the fetus and newborn through placental circulation or breastfeeding. (Shahraki, Jabalameli & Ghaedi, 2012)

Post caesarean patients differ from the general surgical population because of concern on exposure to analgesic drugs to the newborns and because of a need for early physical request than after a surgery. Pain treatment after childbirth may even less adequate than after surgery. This is because of the restraint to use non-steroidal anti-inflammatory drugs or adequate doses of opioids during breastfeeding. (Lavan, 2006)

Persistent pain after caesarean section has been investigated in a Danish study by Nikolajsen, Sorensen, Jensen, Kehlet (2004), where they reported that 12.3% of the parturients experienced persistent pain at the end of a follow-up period ranging from 6 to 18 months. Daily pain was reported in 5.9 % of the patients. In this study, the risk factors for persistent pain were caesarean section under general anesthesia, as well as previous pain problems, and recall of severe acute postoperative pain.

A study from Finland found a significant difference in persistent pain 1 year after delivery between caesarean section and vaginal delivery. The persistent pain was mild in 55% of the women in both groups and intense or unbearable in four women after caesarean section and in six women after vaginal birth. Persistent pain was significantly more common in women with previous pain, previous back pain and any chronic disease. The women with persistent pain recalled significantly more pain on the day after caesarean section. (Kainu et al. 2010)

Essenach, Pan & Smiley (2008) compared the occurrence of chronic pain after caesarean section and after vaginal delivery. The prevalence of severe acute pain within 36 hour postpartum was found to be 10.9 % and persistent pain after 8 weeks related to the risk of persistent postpartum pain, whereas no relation was observed concerning mode of delivery. Women with severe acute postpartum pain had a 2.5 fold increased risk of persistent pain.

We experience infrared light every time we feel the heat of the sun on our skin. Technically, what we are experiencing in these instances is thermal infrared light. And the Infrared lamps are the electronic device which emits infrared rays.

Infrared ray has a therapeutic effect of increasing blood supply. This helps in increasing the supply of oxygen and nutrients needed to the tissues and helps to bring about the resolution of inflammation. It also helps in muscle relaxation and relief of the muscle spasm associated with injury or inflammation. Infrared rays also have the physiological effect on cutaneous vasodilation due to liberation of chemical vasodilators, histamine and similar substance. (Danso & Adu-Sarkodie, 1998)

Dash & Selvi (2013) conducted a true experimental study to evaluate the effectiveness of infrared rays on wound healing in the experimental group comparison with control group. All subjects in the experimental group had healed caesarean wound almost on 5th & 7th postoperative day. The study result showed that infrared light application was effective in enhancing wound healing.

With the support of the literature and by understanding the effect of infrared therapy on wound healing and pain, the researcher would like to apply the infrared ray on caesarean wound for its effectiveness on wound healing and pain among mothers who underwent caesarean section.

1.2 Statement of the Problem

Effect of Infrared Therapy on Wound Healing and Pain among Mothers who underwent Caesarean Section at Selected Hospital, Coimbatore.

1.3 Objectives of the study

- 1.3.1 To assess the level of wound healing among mothers who underwent caesarean section.
- 1.3.2 To assess the level of pain among mothers who underwent caesarean section.
- 1.3.3 To evaluate the effect of infrared therapy on wound healing and pain among mothers who underwent caesarean section.

1.4 Operational definition

1.4.1 Effect

It refers to the outcome of infrared ray application on wound healing and pain among mothers who underwent caesarean section.

1.4.2 Infrared therapy

It is the therapy using a ray applied through infrared lamp on the caesarean wound with a distance of 50 cm at 45 degree angle twice daily for 15 minutes from 3rd post-operative day till the day of discharge among mothers who underwent caesarean section.

1.4.3 Wound healing

It refers to the status of wound that is observed as a score by using the REEDA wound assessment scale.

1.4.4 Pain

It refers to the perception of pain observed by the mothers who underwent caesarean section that is measured as a score using numerical pain rating scale.

1.4.5 Mothers who underwent caesarean section

Primi and multiparous mothers who underwent caesarean section in their 3rd postoperative day during the period of data collection.

1.5 Hypothesis

H₁ : There will be a homogeneity in the pretest level of wound healing between experimental and control group mothers who underwent caesarean section.

H₂ : There will be a significant difference in the post test level of wound healing between the experimental and control group mothers who underwent caesarean section.

- H₃** : There will be a significant difference between the pretest and posttest level of wound healing among experimental group mothers who underwent caesarean section.
- H₄**: There will be a homogeneity in the pretest level of pain between experimental and control group mothers who underwent caesarean section.
- H₅** : There will be a significant difference in the post test level of pain between the experimental and control group mothers who underwent caesarean section.
- H₆** : There will be a significant difference between the pretest and posttest level of pain among experimental group mothers who underwent caesarean section.
- H₇** : There will be a significant association between the pretest level of wound healing and the selected demographic variables among mothers who underwent caesarean section.
- H₈** : There will be a significant association between the pretest level of pain and the selected demographic variables among mothers who underwent caesarean section.
- H₉** : There will be a correlation between the level of wound healing and the level of pain among mothers who underwent caesarean section.

1.6 Conceptual Framework

Conceptualization is a process of forming idea which utilizes and forms a conceptual framework for the study. It is an abstract, logical structure that enables the researcher to link the findings to the nursing body of knowledge. A framework is the abstract of logical structure of meaning that guides the development of the study and the body of knowledge.

Conceptual framework used for this study is based on general system theory. Ludwig and Bartalanffy (1980) introduced system theory as a universal theory that could be applied to many field of study. According to this theory, system is a set of interacting identifiable parts or components and it depends on the quality and quantity of its input, throughput, output and feedback. Input consists of information, material or energy that enters the system. After the input is absorbed by the system, it is processed in a way useful to the system. This information is called throughput. Output from a system is the energy, matter or information given out by the system and it is returned to the system as feedback.

Input

In the present study, input begins with establishing rapport with the mothers who underwent caesarean section. In this phase the researcher select the mothers based on the criteria and collects the necessary information based on Questionnaire.

Throughput

It is the use of input such as energy matter and information for the maintenance of the homeostasis of the system. It is a series of action by which the system converts its energy input from the environment into products and services that are usable by the system. The process can be modified in response to feedback. In this present study, researcher implemented Infrared therapy on caesarean wound with a distance of 50cm at 45 degree angle twice daily for 15 minutes from 3rd postoperative day till the day of discharge among mothers who underwent caesarean section.

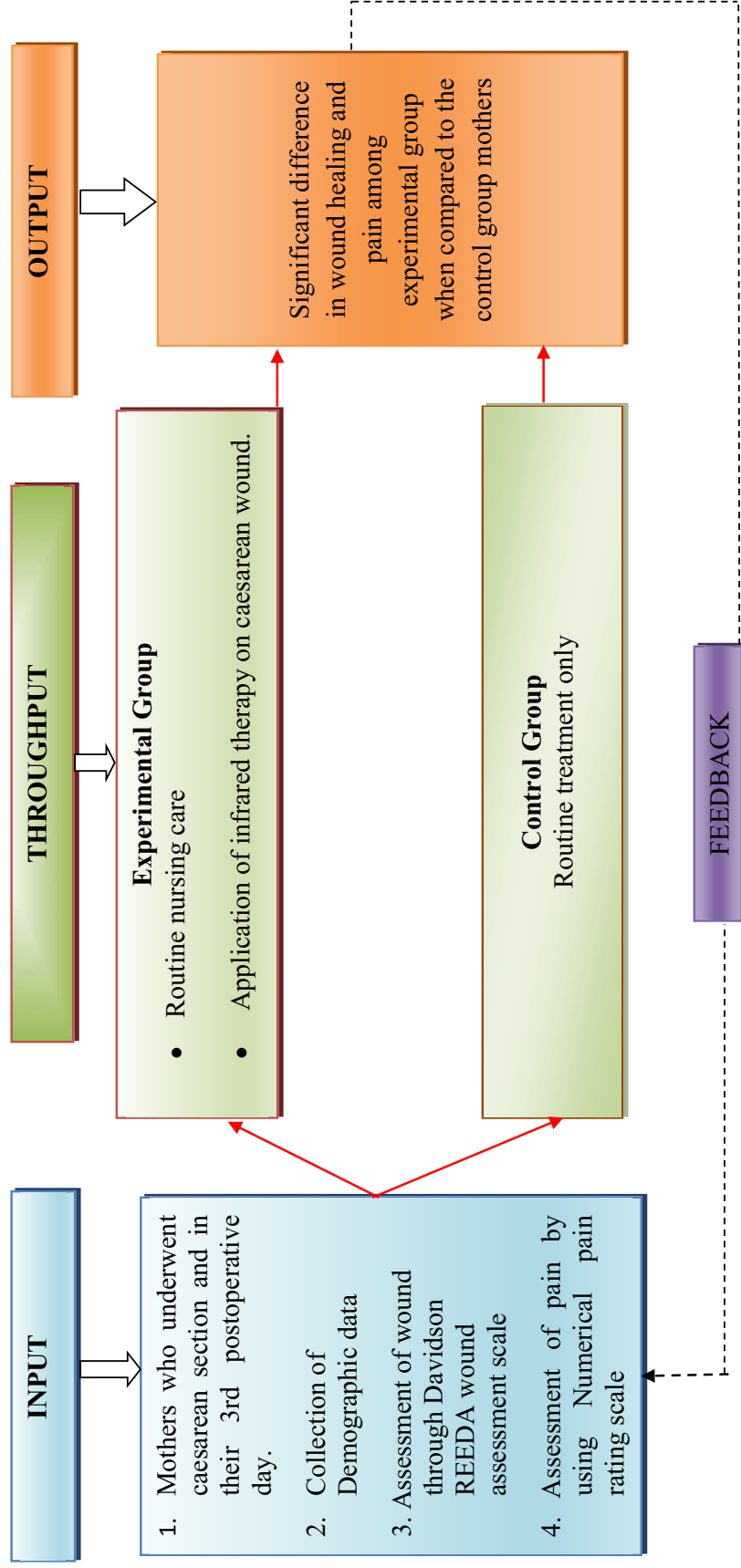
Output

It refers to the energy, information or material as a result of throughput. Matter, energy and information are continuously processed through system and released as output in the study. Output expected in this study is a significant difference in wound healing and pain after Infrared therapy among mothers who underwent caesarean section. (Figure 1.1)

1.7 Projected Outcome of the Study

Infrared therapy will enhance wound healing and reduce pain among mothers who underwent caesarean section.

Figure 1.1
Conceptual Framework Based on General System's Theory by Ludwig and Bartalanffy (1980)



Resource : Kozier & Erb's (2008)

REVIEW OF LITERATURE

Review of literature is an evaluative report of information found in the literature related to the selected area of the study. The review describes, summarizes, evaluates and clarifies a theoretical base for the research and helps to determine the nature of research.

For the present study, relevant literature were reviewed and organized in the following manner.

- 2.1 Literature related to the therapeutic effects of infrared therapy.
- 2.2 Literature related to the Effect of Infrared therapy on caesarean wound Healing.
- 2.3 Literature related to the Effect of Infrared therapy on pain.

2.1 Literature related to Therapeutic Effects of Infrared therapy.

Hopkins et al., (2000) conducted a study to assess the putative effects of low level laser therapy on healing using an experimental wound model. They used a randomized, triple-blind, placebo-controlled design with 2 within-subjects factors (wound and time) and 1 between-subjects factor (group). Data were collected in the laboratory setting. Twenty-two healthy subjects were taken. The low level laser therapy resulted in enhanced healing as measured by wound contraction. The untreated wounds in subjects treated with low level laser therapy contracted more than the wounds in the control group, so low level laser therapy may produce an indirect healing effect on surrounding tissues. These data indicate that low level laser therapy is an effective modality to facilitate wound contraction of partial-thickness wounds.

Pok Kee Min (2002) conducted a study to evaluate LED- low level laser therapy in 5 wounds of various etiologies. The result concluded that full wound healing and control of infection and discomfort were achieved in all patients. 830 nm LED- low level laser therapy successfully brought about accelerated healing in wounds of different etiologies and at different stages successfully controlled secondary infection.

Sudha A Raddi et al., (2003) conducted a study with an objective to assess the effect of infrared radiation in the healing of episiotomy wound among postnatal mothers. The research design adopted was Quasi experimental, which involves the observation on different days. The main study was conducted at Acharya Vinoba Bhave Rural Hospital, Sawangi, in Wardha district, a sample size of 50 postnatal mothers were selected by using purposive sampling technique. Demographic profile of postnatal mothers and episiotomy wound healing rating scale (REEDA) were used for data collection. The tool was validated and reliability was determined by the Guttman Split half method during pilot study. Collected data were analyzed using both descriptive and inferential statistics (percentage, mean, standard deviation, paired t-test, Chi-square and Fisher's exact test). Result shows that there was a significant improvement in wound healing among postnatal mothers.

Chukuka et al., (2004) conducted a study to determine the overall treatment effect of laser phototherapy on tissue repair and pain relief. Following a literature search, studies meeting their inclusion criteria were identified and coded. Then, the effect size of laser treatment, that is, Cohen's D, was calculated from

each study using standard meta-analysis procedure. Thirty-four peer-reviewed papers on tissue repair met their inclusion criteria and were used to calculate 46 treatment effect sizes. Nine peer-reviewed papers on pain control met the inclusion criteria and were used to calculate effect size. It was concluded that laser phototherapy was a highly effective therapeutic armamentarium for tissue repair and pain relief.

Tatiana et al., (2004) conducted a study to compare histologically the effect of laser on cutaneous wounds. The healing time of surgical wound is of extreme importance and it is usually associated with a post-operative period free of infection and with less pain and inflammation. The samples were sacrificed 3, 5, and 7 days after surgery. The result shows that low-level light therapy (LLLT) can have a positive bio modulatory effect on the repair of cutaneous wounds.

Soyun Cho et al., (2009) conducted a study to know the effect of IR radiation or heat on skin aging. Result demonstrates that IR and heat exposure each induces cutaneous angiogenesis and inflammatory cellular infiltration, disrupts the dermal extracellular matrix by inducing matrix metalloproteinase and alters dermal structural proteins, thereby adding to premature skin aging.

Carvalho et al., (2009) conducted a study to investigate the efficacy of an infrared laser operating with a wavelength of 830 nm in the postsurgical scarring process after inguinal-hernia surgery. The study result concluded that Infra-red low level laser therapy (830 nm) applied after inguinal-hernia surgery was effective in preventing the formation of keloids. In addition, low level laser therapy resulted in better scar appearance and quality in 6 months after surgery.

Elaine Caldeira de Oliveira Guirro et al., (2010) conducted a study to analyze the effects of low-level laser therapy, 670nm, with doses of 4 and 7J/cm², on the repair of surgical wounds covered by occlusive dressings. For the histologic analysis with Histopathological staining, 50 patients were submitted to surgical incisions and divided into 10 groups ($n=5$): control; stimulated with 4 and 7J/cm² daily, for 7 and 14 days, with or without occlusion. One-way analysis of variance was performed, followed by *post hoc* analysis. A Tukey test was used on the biomechanical data, and the Tamhane test on the histologic data. A significance level of 5% was chosen ($p\leq 0.05$). The result showed a greater interference of the laser-treatment procedure noted with 7 days of stimulation, and the occlusive dressing did not alter its bio-stimulatory effects.

Philip et al., (2010) conducted a study to analyze the power transmitted by low-level laser therapy into occlusive dressing using different wavelengths for the treatment of cutaneous lesions. Low level laser therapy has been largely used to treat several cutaneous lesions commonly associated with occlusive dressings to accelerate the healing process. Radiation transmission was measured by a digital power analyzer connected to a laser emitter with wavelengths of 660, 830 and 904nm and mean levels of 30, 30, 65mW respectively. Thirteen different occlusive dressings were analyzed and interposed between the laser emitter and the power analyzer sensor, with 15 measurements made for each dressing. Statistics were provided by the analysis of variance (ANOVA), followed by Student's *t*-test ($p<0.05$). The results showed that low level laser therapy transmission depends on the occlusive dressing material and the wavelength irradiated.

Nethravathi (2011) conducted a study to evaluate the effectiveness of infrared lamp therapy on healing of episiotomy wound among postnatal mothers by comparing experimental and control group scores. Simple random sampling method was used for the present study to assign the postnatal mothers. The result shows that there was a significant improvement in wound healing in experimental group as compared to control group.

Calderin (2012) conducted a study with an aim to evaluate the clinical, anti-inflammatory and osteo-immunological benefits of the single (PT) and repeated laser phototherapy (rPT) as an adjunctive treatment of inflamed periodontal tissue. The result shows that PT exerts a bio-stimulative effect on the periodontal tissue. Multiple sessions of PT showed a faster and greater tendency to reduce pro-inflammatory mediators.

Dyrkorn (2012) conducted a study with an objective to reduce the incidence of caesarean wound infection to below the Norwegian national level of 8 %. During 2006 and 2007 the rate of caesarean section wound infection was 17.4 % in Baerum Hospital. The intervention (a quality improvement project) was implemented in September 2008. A bundle of measures were introduced. Staff from all aspects of patient flow was recruited. Cochrane literature was used as gold standard. Data registration was based upon CDC criteria. The study was conducted on caesarean section patients registered in NOIS (2008-2010). From September 2009 data were harvested continuously. And the result showed that the wound healing is based on the treatment modalities used to them.

Sura et al., (2013) conducted a study to show the impact of 790-805 nm diode laser irradiations on wound healing as a supplementary treatment in women underwent episiotomies, and to assess the laser parameters that were used. The result revealed that Bio stimulation is a method that can be used to enhance wound healing if used with appropriate parameters. Diode laser (790-805) nm can be used for enhancing episiotomy healing as a supplementary therapy when used in the CW mode with 0.6 w power and 1.19 w/cm² power density for 30 seconds for each spot.

Maria Emília de Abreu Chaves et al., (2014) conducted a study to determine the biological effects that support the use of LED on wound healing. The reviewed studies show that phototherapy, either by LASER or LED, is an effective therapeutic modality to promote healing of skin wounds. The biological effects promoted by these therapeutic resources are similar and are related to the decrease in inflammatory cells, increased fibroblast proliferation, angiogenesis stimulation, formation of granulation tissue and increased collagen synthesis.

2.2 Literature related to the Effect of Infrared therapy on caesarean wound Healing

Research paper center (2007) conducted a True experimental study to observe the infrared radiation treatment on the impact of wound healing after cesarean section. 2400 cases of cesarean section were randomly divided into irradiated group and the control group. Two groups of patients were observed for wound healing. The results of study showed that the incision infection was significantly lower in experimental than the control group. The difference was statistically significant ($P \leq 0.01$). The study concluded that infrared irradiation on wound infection after cesarean section obviously has a preventive role.

Mokmeli (2007) conducted a study to evaluate the effect of low-level laser irradiation on inflammatory response of healing tissue in normal healthy subjects who underwent Cesarean surgery. 10 healthy women who underwent Cesarean operation and 7 age-matched controls ($p = 0.092$) were enrolled to the study. All cases and controls have no systemic or dermatological illness, and are generally well. Cesarean wound of cases irradiated with infrared diode laser (980 nm; power) every other day, in addition to routine dry dressing; and control group took same laser as placebo rather than true laser. On day 10 of wound healing, after removing the stitches, one tissue sample was taken from each subject's wound margin for histological evaluation. Result of the study shows that there was an improvement in wound healing among caesarean mothers.

Dash & Selvi (2013) conducted a true experimental study to evaluate the effectiveness of infrared ray on wound healing in the experimental group in comparison with control group. All subjects in the experimental group had healed caesarean wound almost on 5th & 7th postoperative day. Pre & post-test mean wound-healing scores in experimental group was 2.1 ± 1.446 & 1.26 ± 0.828 respectively with - t value $4.365(p < 0.05)$. The study result showed that infrared light application was effective in enhancing wound healing.

2.3 Literature related to the Effect of Infrared therapy on pain.

Kevin et al., (1992) conducted a study to test the hypothesis that LLLT reduces the extent and duration of postoperative pain. It was concluded that the use of LLLT following operative procedures offers a new and cost-effective method of reducing both the extent of postoperative pain severity and the analgesic requirement following surgery.

Trelles & Calderhead (2001) conducted a study to evaluate the effect of combination phototherapy in a patient with comparatively long-term post mastectomy pain. The combination of laser and LED therapy at 830 nm over three consecutive daily sessions improved post mastectomy pain and restored full ROM in the patient, with good latency which was extended with a single 'top-up' IR LED session. The result shows that both the LED and the laser had an effect on the mastectomy pain.

Dr. Bjordal et al., (2006) conducted a study to review the biological and clinical short-term effects of low-level laser therapy (LLLT) in acute pain from soft-tissue injury. Seven randomized placebo-controlled trials found no significant results after irradiating only a single point on the skin overlying the site of injury, or after using a total energy dose below 5 Joules. Nine randomized placebo-controlled trials ($n = 609$) were of acceptable methodological quality, and irradiated three or more points and/or more than 2.5 cm at the site of injury or surgical incision, with a total energy of 5.0–19.5 Joules. The result showed that LLLT can modulate inflammatory processes in a dose-dependent manner and can be titrated to significantly reduce the acute inflammatory pain in clinical settings. Further clinical trials with adequate LLLT doses are needed to precisely estimate the effect size for LLLT in acute pain.

Jaqueline de Oliveira Santos et al., (2011) conducted a study to evaluate the effect of low-level laser therapy for perineal pain and healing after episiotomy. A double-blind, randomised, controlled clinical trial comparing perineal pain scores and episiotomy healing in women treated with low-level laser therapy and with the simulation of the treatment. Fifty-two postpartum women who had

mediolateral episiotomies during their first normal delivery were randomly divided into two groups of 26, an experimental group and a control group. The LLLT was performed with diode laser, with a wavelength of 660 nm. The healing process was assessed using the REEDA scale before each laser therapy session and 15 and 20 days after the women's discharge. The study result showed that LLLT did not accelerate episiotomy healing. Although there was a reduction in perineal pain mean scores in the experimental group.

Sahoo Sucharita et al., (2013) conducted a study to determine the level of pain and wound healing in postnatal mothers after receiving infrared therapy. By using Quasi experimental design 40 Post-Natal mothers with episiotomy who are admitted in the ward for 7 days after delivery was taken as sample. On 3rd day 60% mothers of control group and 10% mothers of experimental group had mild pain. In 85% women from experimental group and 10% from control group, the wound was healed on 7th day. The socio demographic variables were not associated with level of pain & wound healing. It was identified from the study that the infrared therapy was effective in reducing episiotomy pain and promotes early wound healing and reduces the chance of infection in post-natal mother.

Herrera ,Rachel & Perez (2012) conducted a study to evaluate effect of low-level laser on post-partum pain. The study result describes the successful physical therapy treatment of a patient following surgical repair of a fourth-degree perineal tear and also demonstrated the effectiveness of a conservative treatment approach combined with LLLT for the management of pelvic pain following childbirth perineal tears in post-partum patients.

Souza (2012) conducted a study to determine the effect of infrared rays on level of pain and the degree of episiotomy wound healing among postnatal mothers in a selected hospital at Mangalore. The study result shows that infrared therapy was very effective in wound healing and relief of pain in episiotomy.

Rzakulieva et al.,(2006) conducted a study to determine the effectiveness of infrared lamp therapy on episiotomy wound healing and pain. Result revealed that the mean episiotomy pain score of the control group participants was high on all three days in comparison with the experimental group and 10% of the participants in the control group developed mild infection whereas none of the participants in the experimental group, the result was statistically significant ($p < 0.001$). The study concluded that infrared therapy is effective in managing episiotomy pain and wound healing.

A randomized, controlled trial study was done in Rothbart pain management Clinic, North York, Ontario, to assess the degree of pain relief obtained by applying infrared energy to the low back ache in patients with chronic, intractable low back pain. The results of the study were the infrared therapy group showed a progressive decline in pain levels of approximately 50%, which was greater towards the end of 7 week study period. This was highly significant both by within group comparison and compared with the placebo group. The mean score Numerical Rating Scale (NRS) scores in the treatment group fell from 6.9 of 10 to 3 of 10 at the end of the study. The mean NRS in the placebo group fell from 7.4 of 10 to 6 of 10.

Wong et al., (2012) conducted a study to investigate the analgesic effect of far infrared ray on the patients during the postoperative period of total knee arthroplasty. The study result demonstrated that the infrared can lower the pain and thus reduce the discomfort experienced by the patient. Findings indicated that effective application of infrared decreased the subjective indicator level of pain in the serum.

METHODOLOGY

This chapter deals with the description of research approach, design, setting, sampling technique, criteria for sample selection, variables of the study, tools for data collection, pilot study, procedure for data collection and techniques used for data analysis.

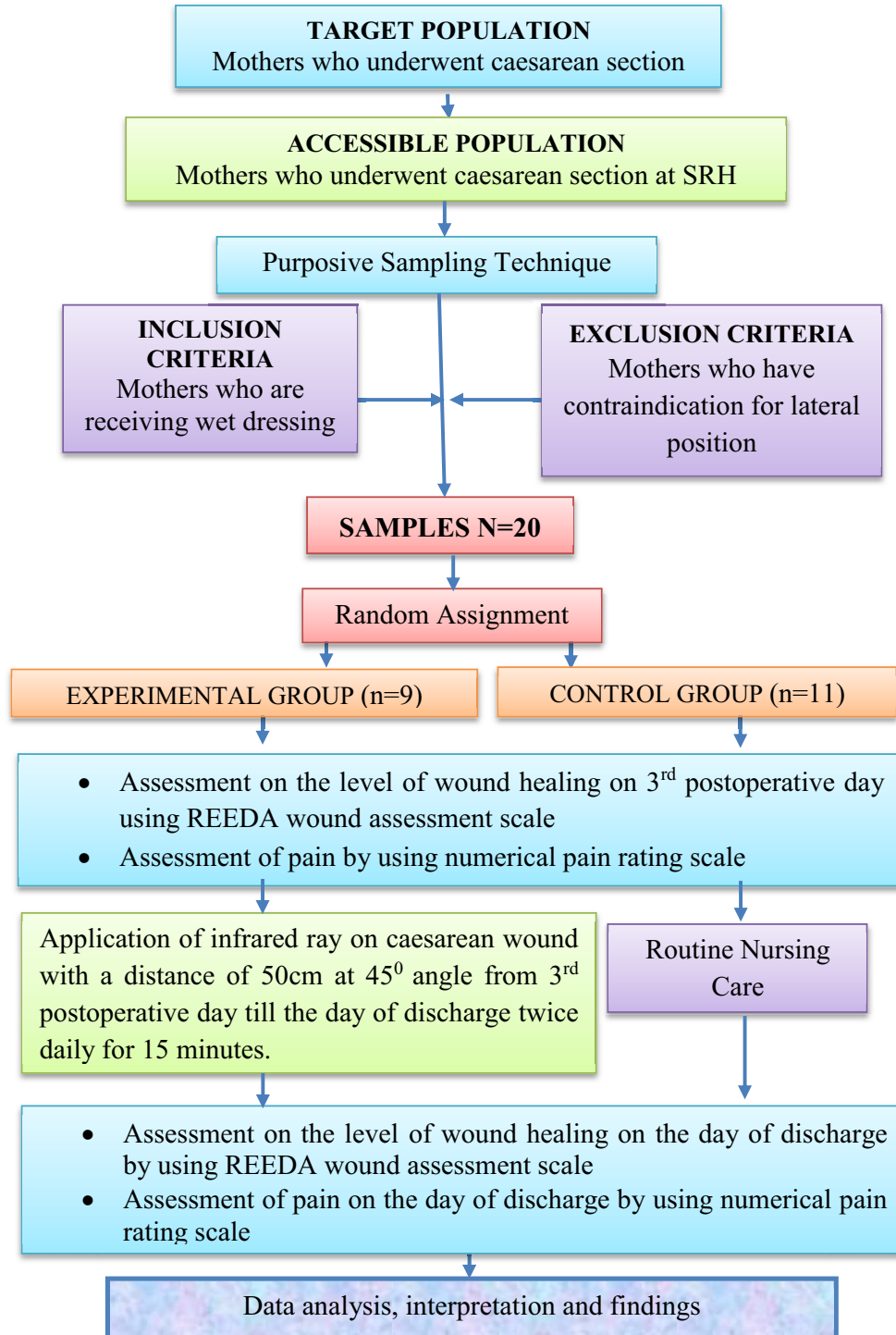
3.1 Research Approach

The present study was aimed to assess the effect of infrared therapy on wound healing and pain among Mothers who underwent caesarean section in quantitative form at a selected hospital, Coimbatore. Hence, in view of the nature of problem and to accomplish the objectives, quantitative research approach was adopted for this study. Kothari C R (2004) defines Quantitative research approach as a research that involves the generation of data in quantitative form.

3.2 Research Design

The present study was designed to assess the effect of infrared therapy on wound healing and pain among mothers who underwent caesarean section. In order to achieve the objectives, the researcher adopted True Experimental pretest-posttest with control group design. It follows the basic experimental design, where the researcher randomly assign the samples into experimental and control group, manipulates the experimental group with infrared therapy and have a control group.

Figure 3.1
Diagrammatic Representation of Research process



3.3 Setting

The study was conducted at Sri Ramakrishna Hospital, Coimbatore. This hospital is a 700 bedded super specialty hospital with various departments running under the SNR Sons Charitable Trust. The study samples were taken from the Obstetrics & Gynecology ward of Sri Ramakrishna Hospital, Coimbatore. OBG unit consist of 40 beds and among 40, twelve beds were meant for postoperative mothers.

3.4 Population

The target population for the present study was mothers who underwent caesarean section. The accessible population was the Mothers who underwent caesarean section at Sri Ramakrishna Hospital, Coimbatore during the study period.

3.5 Sampling Technique

Purposive sampling technique was used in this present study. Mothers who met the sampling criteria were selected for the study and they were randomly assigned to Experimental and Control group using lottery method.

3.6 Sample Size Determination Technique

To estimate the sample size, Mahajan's Formula was used. According to this formula,

$$\text{Sample Size } n = \frac{4pq}{L^2}$$

Where,

P = percentage of mothers getting wet dressing for Caesarean Wound

q = 1 – p

L = Allowable Error (20)

Hence,

$$n = \frac{4 \times 48 \times 52}{20 \times 20}$$

$$n = 25$$

3.7 Criteria for sample selection

3.7.1 Inclusion criteria

Mothers who are receiving wet dressing for the caesarean wound.

3.7.2 Exclusion criteria

Mothers who are contraindicated for lateral position.

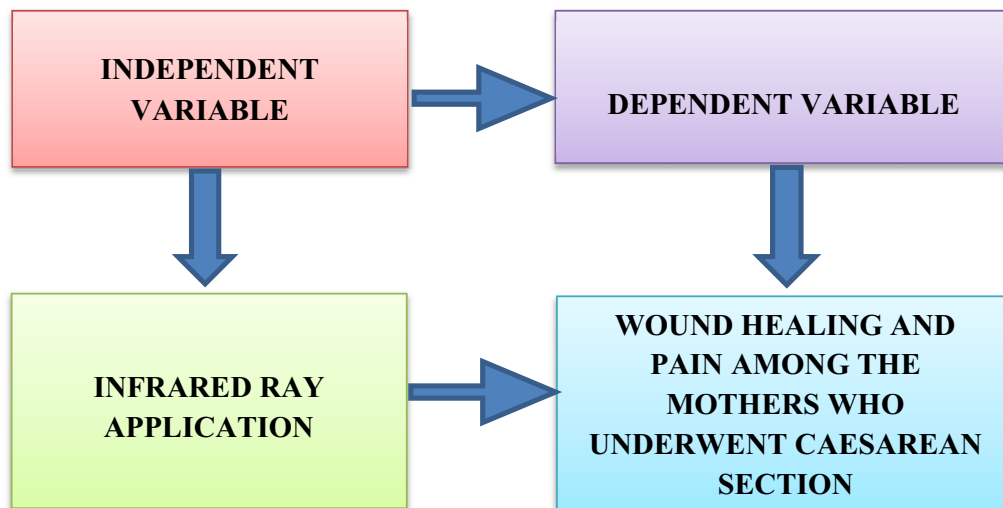
3.8 Variables of the study

The independent variable in the present study was Infrared ray application.

Dependent variables in the present study were wound healing and pain among the Mothers who underwent caesarean section.

Figure 3.2

Diagrammatic Representation of Variables



3.9 Tools of data collection`

3.9.1 Questionnaire on demographic profile

A questionnaire was used to collect the data from the Mothers who underwent caesarean section. Data comprised of demographic information like age, education and religion were collected. Data on the obstetrical score, past obstetrical history, present obstetrical history, present surgical data, present health details and clinical profile were also collected from the mothers who underwent caesarean section.

3.9.2 Davidson REEDA Wound Assessment Scale

Davidson REEDA Wound Assessment Scale given by Nancy Davidson (1972) was used to assess the level of wound healing among Mothers who underwent caesarean section.

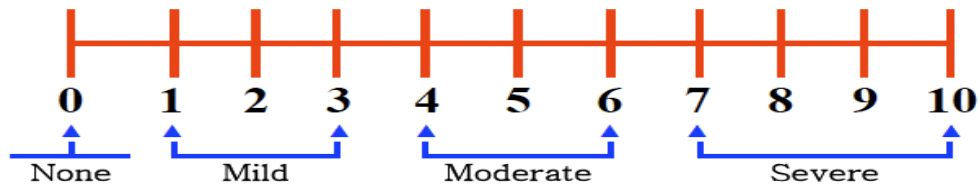
The REEDA Scale consists of five categories: Redness, Edema, Ecchymosis, Discharge and Approximation of the wound edges. Minimum score is 0 and Maximum score is 15.

The score was interpreted as

0	:	Very good wound healing.
1-5	:	Good wound healing.
6-10	:	Poor wound healing.
11-15	:	Very poor wound healing.

3.9.3 Numerical Pain Rating Scale

Numerical Pain Rating Scale given by McCaffey (1989) was used to assess the level of pain among Mothers who underwent caesarean section. There are 4 categories of pain on the scale.



The score was interpreted as

0	:	No pain
1-3	:	Mild pain
4-6	:	Moderate pain
7-10	:	Severe pain

3.10 Validity and Reliability of the tool

The tool prepared was validated by seven experts from the field of Nursing, Medicine and Physiotherapy. Experts were requested to give their opinion and suggestions regarding relevance, appropriateness, accuracy and degree of agreement in each item of the tool. Suggestions and recommendations given by the experts were accepted and necessary corrections were done. The tool was found to have high content validity for all the items in the tool with the reliability of 0.83 by using item wise analysis.

3.11 Technique of Intervention

Infrared light was discovered by Sir Frederick William Herschel in 1800. Infrared Ray has a therapeutic effect of increasing the blood supply that improves wound healing and relieves pain.

3.11.1 Pre Requisites

1. Explain the procedure to the mother.
2. Pre warm the infrared lamp for 5minutes.
3. Make the mother to empty the bladder.

3.11.2 Procedure

1. Place the mother in lateral position.
2. Place the pre warmed infrared lamp at 50 cm distance and 45 degree angle to the caesarean wound.
3. Cover the eyes of the mother with towel.
4. Expose only the wound site.
5. Switch on the lamp and let the infrared ray expose on the wound site for 15 minutes.
6. Stay with the mother during the procedure.
7. Watch for any discomfort and redness on the skin.
8. Switch off the lamp after 15 minutes.
9. Provide a comfortable position to the mother.
10. Encourage the mother to have adequate fluids.
11. Replace the lamp.
12. Record the observations.

3.12 Ethical committee clearance

Ethical clearance was obtained from the Ethical Committee Members of Sri Ramakrishna Hospital, Coimbatore. Informed consent was obtained from all the participants.

3.13 Pilot study

Pilot study was conducted at Sri Ramakrishna Hospital, Coimbatore for a period of 10 days. By using Purposive sampling technique, mothers who underwent caesarean section were selected for the study and they were randomly assigned into Experimental (n=3) and Control group (n=3). Researcher collected the demographic data by interview technique.

Infrared ray was applied on caesarean wound twice daily for 15 minutes from 3rd postoperative day till the day of discharge among experimental group mothers. The wound was observed by the researcher using REEDA Wound Assessment Scale from 3rd postoperative day till the day of discharge on alternative days. Pain was marked in Numerical Pain Rating Scale. Control group mothers received routine nursing care. The wound was assessed once daily on alternative days and pain was assessed twice daily. Descriptive and inferential statistical methods were used for data analysis.

The result showed that there was no significant difference in the level of wound healing after implementation of Infrared Therapy among mothers who underwent caesarean section ($C_V = 0, T_V = 2.12, Df = 4$). Also there was no significant difference in the level of pain after implementation of Infrared Therapy among mothers who underwent caesarean section ($C_V=0.43, T_V=2.12, Df=4$).

3.14 Changes made after Pilot Study

At SRH where the pilot study was conducted, each obstetrician suggested different dressing timings and techniques. It was identified that there was no homogeneity among mothers who underwent caesarean section. Thus as per the expert's opinion the researcher selected the mothers who were getting only wet dressing for maintaining the homogeneity.

3.15 Method of data collection

The main study was conducted to meet the objectives of the present study at Sri Ramakrishna Hospital, Coimbatore for a period of 30 days. Purposive Sampling technique was used to select the samples. Twenty mothers who underwent caesarean section were selected based on the criteria and are assigned randomly into Experimental (n = 9) and Control group (n = 11) by using lottery method. Experimental group received Infrared ray on the caesarean wound at a distance of 50cm and 45 degree angle twice daily for 15 minutes from 3rd postoperative day till the day of discharge. Mothers who were in control group received routine nursing care. The level of wound healing was assessed by the REEDA wound assessment scale from 3rd postoperative day till the day of discharge on alternative days and the type of pain was evaluated twice daily by the numerical pain rating scale.

3.16 Techniques of Data Analysis and Interpretation

Descriptive and inferential statistical methods were used for data analysis. Descriptive statistical method was applied for the analysis of demographic variables. Frequency tables were formulated for all significant information. Mean, Mean difference and Standard Deviation were calculated. Student's t- test was

used to find out the effect of infrared ray on wound healing and pain among mothers who underwent caesarean section. Paired t-test was used to test the effect of infrared therapy on level of wound healing and pain in experimental and control group mothers who underwent caesarean section respectively. Chi square test was used to check the association between the level of wound healing / pain and the selected demographic variables of the study respectively. Karl Pearson's Correlation Coefficient formula was used to check the correlation between the level of wound healing and the level of pain among mothers who underwent caesarean section.

3.16.1 Student's t- test

Student's t- test was applied to find out the effect of infrared therapy on wound healing and pain between Experimental group and Control group respectively.

$$t = \frac{\bar{x} - \bar{y}}{SE}$$

$$SE = SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$SD = \sqrt{\frac{\sum(x - \bar{x})^2 + (y - \bar{y})^2}{n_1 + n_2 - 2}}$$

Where,

- SD = Standard Deviation
- SE = Standard Error
- \bar{x} = Mean post test score of the Experimental group
- \bar{y} = Mean post test score of the Control group
- n_1 = Number of samples in Experimental group
- n_2 = Number of samples in Control group

3.16.2 Paired t- test

Paired t -test was used to analyze the difference between pre and posttest level of wound healing and pain in both groups.

$$t = \frac{\bar{d}}{SE}$$

$$SE = \frac{SD}{\sqrt{n}}$$

$$SD = \sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{n}}{n-1}}$$

where,

\bar{d} = Mean difference between test score

SE = Standard Error

$\sum D$ = Sum of mean difference between test scores

$\sum D^2$ = Sum of square of mean difference between the test scores

SD = Standard deviation of the test score

n = Number of samples

3.16.3 Chi-square (with Yates correction) test

Chi-Square (with Yates correction) test was used to find out the association between level of wound healing and selected demographic variables.

$$X^2 = \sum \frac{[(O - E) - 0.5]^2}{E}$$

Where,

O = Observed value in each category

E = Expected value in corresponding category

0.5 = Yates correction value.

3.16.4 Karl Pearson's Correlation Coefficient Analysis

Karl Pearson's Correlation Coefficient Formula was used to find out the correlation between wound healing and pain among mothers who underwent caesarean section.

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

Where

x = Wound Healing score

y = Pain score

\bar{x} = Mean post test score level of wound healing

\bar{y} = Mean post test score level of pain

DATA ANALYSIS AND INTERPRETATION

This study was aimed to assess the effect of infrared therapy on wound healing and pain among Mothers who underwent caesarean section in a selected hospital at Coimbatore. To achieve the objectives of the study, researcher selected primi and multiparous mothers who underwent caesarean section from Sri Ramakrishna Hospital, Coimbatore. Total number of 20 mothers who underwent caesarean section were selected using purposive sampling technique and by using lottery method, mothers were divided into experimental (n = 9) and control group (n = 11). Experimental group received Infrared ray on the caesarean wound with a distance of 50 cm at 45 degree angle twice daily for 15 minutes from 3rd postoperative day till the day of discharge. Mothers who underwent caesarean section who were in control group received routine nursing care. The level of wound healing was assessed by the REEDA Wound Assessment Scale from 3rd postoperative day till the day of discharge on alternative days and the type of pain was evaluated using the Numerical Pain Rating Scale twice daily. Descriptive and inferential statistical methods were employed to analyze the data.

This chapter was further classified into the following sections.

Section I

Demographic Variables of Mothers who underwent Caesarean Section.

Section II

Analysis on Level of Wound Healing among Mothers who underwent Caesarean Section.

Section III

Analysis on Level of Pain among Mothers who underwent Caesarean Section.

Section IV

Effect of Infrared Therapy on Level of Wound Healing among Mothers who underwent Caesarean Section.

Section V

Effect of Infrared Therapy on Level of Pain among Mothers who underwent Caesarean Section.

Section VI

Association between the Level of Wound Healing and selected Demographic Variables among Mothers who underwent Caesarean Section.

Section VII

Association between the Level of Pain and selected Demographic Variables among Mothers who underwent Caesarean Section.

Section VIII

Correlation between the Level of Wound Healing and the Level of Pain among Mothers who underwent Caesarean Section.

Section I

Demographic Variables of Mothers who underwent Caesarean Section

This section presents the demographic variables collected from the Mothers who underwent caesarean section. The demographic variables collected were age, education, religion, family income, obstetrical profile, present surgical data, present health status and biophysical profile.

Table 4.1
Age of the Mothers who underwent Caesarean Section

(n=20)

S.No	Age in years	Number of participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	20-25	3	33.33	2	18.18
2	26-30	5	55.56	5	45.46
3	31-35	1	11.11	4	36.36

The above table 4.1 depicts the frequency distribution of mothers who underwent caesarean section based on age. The result shows that in the Experimental group majority, 5 (55.56%) mothers were in the age group between 26-30 years, 3 (33.33%) mothers were between the age group of 20-25 years and one (11.11%) mother was in the age group of 31-35 years. In the Control group majority, 5 (45.46%) mothers were between the age group of 26-30 years, 4 (36.36%) mothers were between the age group of 31-35 years and 2 (18.18%) mothers were between the age group of 20-25 years.

The result shows that majority of the mothers who underwent caesarean section were between 26-30 years in both the groups. (Figure 4.1)

Table 4.2
Educational Status of the Mothers who underwent Caesarean Section
(n=20)

S.No	Educational Status	Number of participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	Schooling	3	33.33	6	54.54
2	UG	4	44.45	3	27.28
3	PG	2	22.22	2	18.18

The above table 4.2 depicts the frequency distribution of mothers who underwent caesarean based on their education. The result shows that in the Experimental group majority, 4 (44.45 %) mothers done UG, 3 (33.33%) mothers done schooling and 2 (22.22%) mothers were postgraduates. In the Control group majority, 6 (54.54 %) mothers done schooling, 3 (27.28%) mothers were under graduates and 2 (18.18%) mothers were postgraduates. (Figure 4.2)

Figure 4.1

Age of the Mothers who underwent Caesarean Section

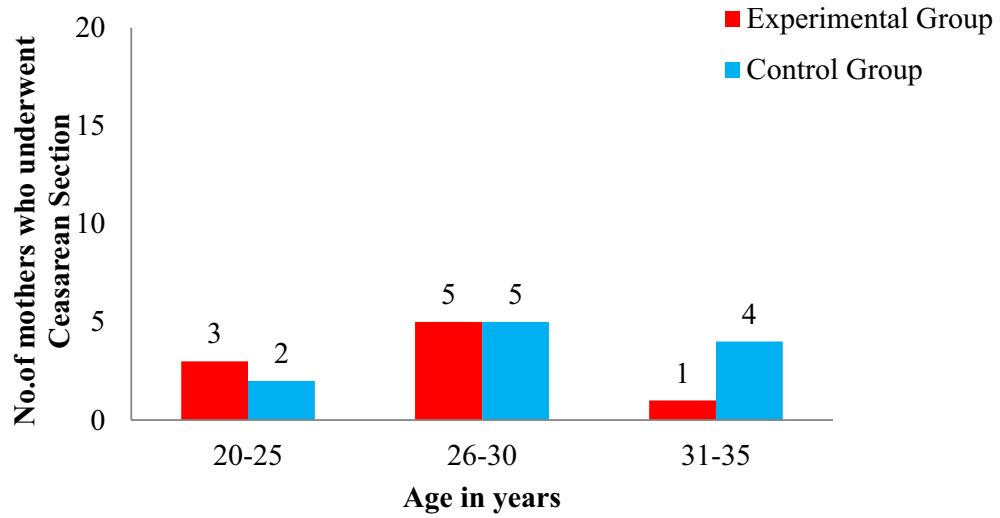


Figure 4.2

Educational Status of the Mothers who underwent Caesarean Section

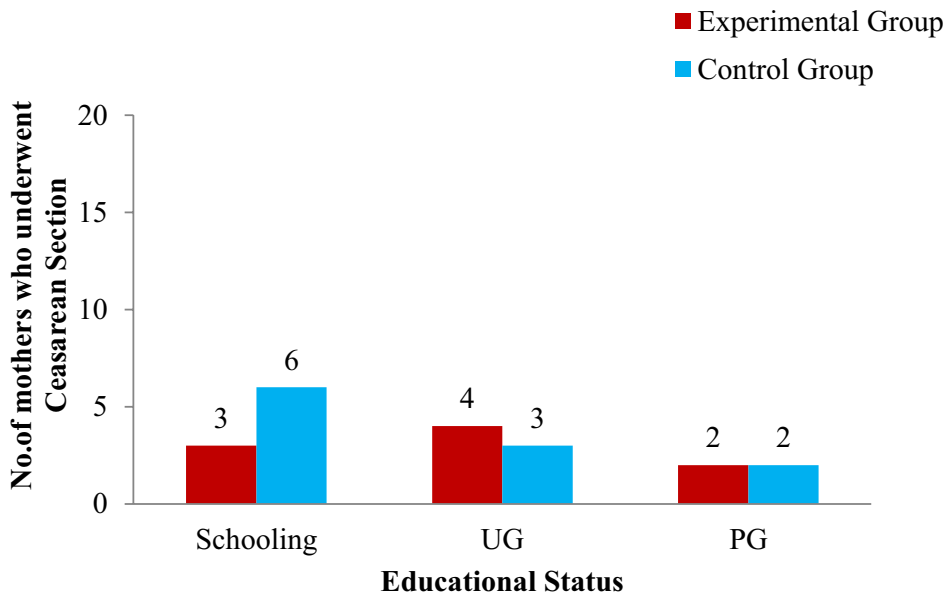


Table 4.3
Religion of the Mothers who underwent Caesarean Section

(n=20)

S.No	Religion	Number of participants			
		Experimental Group n=9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	Hindu	7	77.77	11	100
3	Muslim	2	22.23	0	0

The above table 4.3 depicts the frequency distribution of mothers who underwent caesarean section based on their Religion. The result shows that in the Experimental group majority, 7 (77.77%) mothers belong to Hindu religion and 2 (22.23%) mothers belong to Muslim religion. In the Control group all mothers belong to Hindu religion. (Figure 4.3)

Table 4.4
Gravida of the Mothers who underwent Caesarean Section

(n=20)

S.No	Gravida	Number of participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	1	4	44.44	3	27.27
2	2	3	33.34	5	45.46
3	3	1	11.11	3	27.27
4	4	1	11.11	0	0

The above table 4.4 depicts the frequency distribution of mothers who underwent caesarean section on the gravid state. The result shows that in experimental group 4 (44.44%) were primi, 3 (33.34%) were second gravida, one (11.11%) was third and fourth gravid respectively. In the control group, majority 5 (45.46%) were second gravid, 3 (27.27%) were first and third gravid respectively. (Figure 4.4)

Figure 4.3

Religion of the Mothers who underwent Caesarean Section

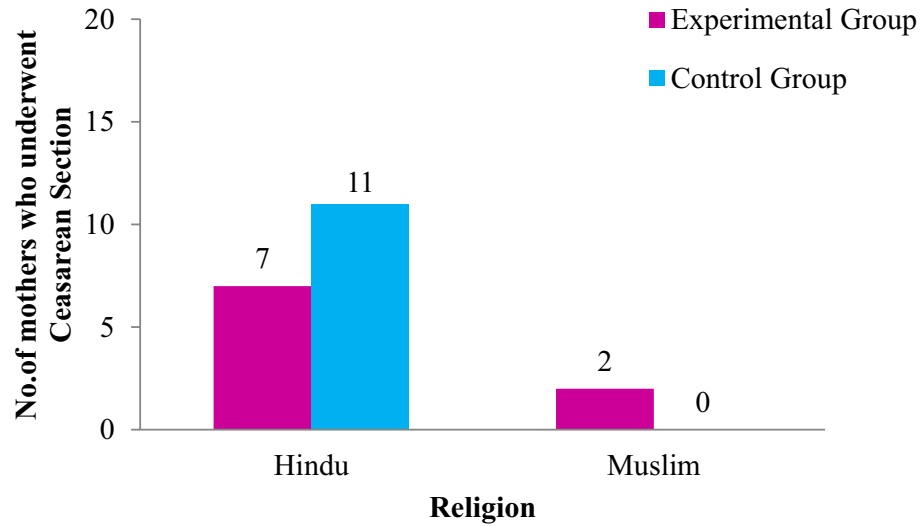


Figure 4.4

Gravida of the Mothers who underwent Caesarean Section

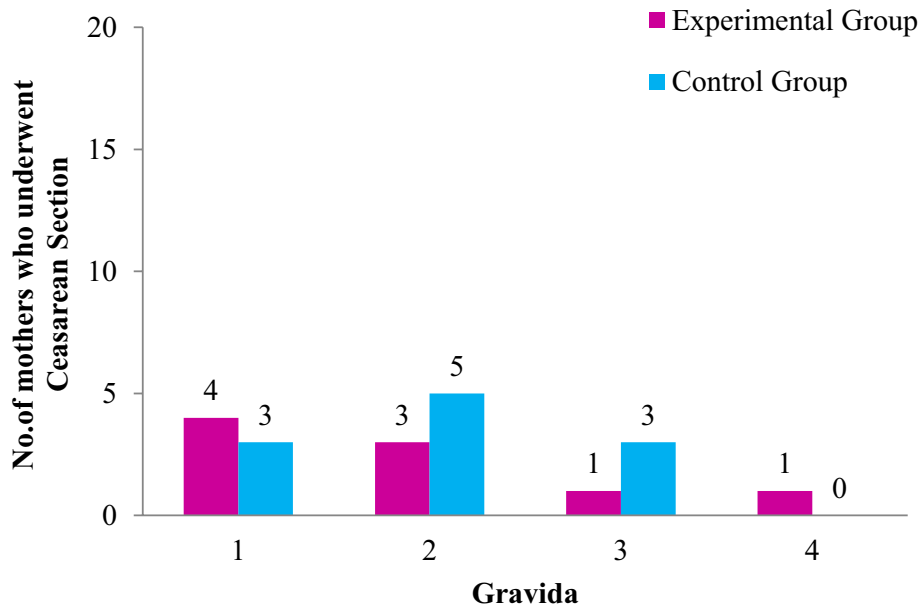


Table 4.5
Para of the Mothers who underwent Caesarean Section

(n=20)

S.No	Para	Number of Participants			
		Experimental Group n =9		Control Group n=11	
		Frequency	Percentage	Frequency	Percentage
1	Primi	4	44.44	5	45.46
2	Multi	5	55.56	6	54.54

The above table 4.5 depicts the frequency distribution of mothers who underwent caesarean section by the para state. The result shows that in experimental group 5 (55.56%) mothers were multipara and 4 (44.44%) mothers were primi para. In the control group, 6 (54.54%) mothers were multi para and 5 (45.46%) mothers were primi para. (Figure 4.5)

Table 4.6
Mode of Delivery in Previous Pregnancy
among Mothers who underwent Caesarean Section

(n=20)

S.No	Mode of delivery in previous pregnancy	Number of participants			
		Experimental group n=9		Control group n=11	
		Frequency	percentage	Frequency	Percentage
1	Caesarean section	3	33.33	5	45.45
2	Vaginal delivery	2	22.22	1	9.09
3	No previous pregnancy	4	44.44	5	45.45

The above table 4.6 depicts the frequency distribution of mothers who underwent caesarean section based on the Mode of delivery in previous pregnancy. The result shows that in Experimental group 3 (33.33%) mothers had caesarean section and 2 (22.22%) mothers had vaginal delivery. In Control group 5 (45.45%) mothers had caesarean section and 1(9.09%) mother had vaginal delivery during their previous pregnancy. In the experimental group 4 mothers (44.44%) and 5 mothers (45.45%) from control group were primi mothers. Result shows that in both the groups there is an increased rate of caesarean section in previous pregnancy. (Figure 4.6)

Figure 4.5

Para of the Mothers who underwent Caesarean Section

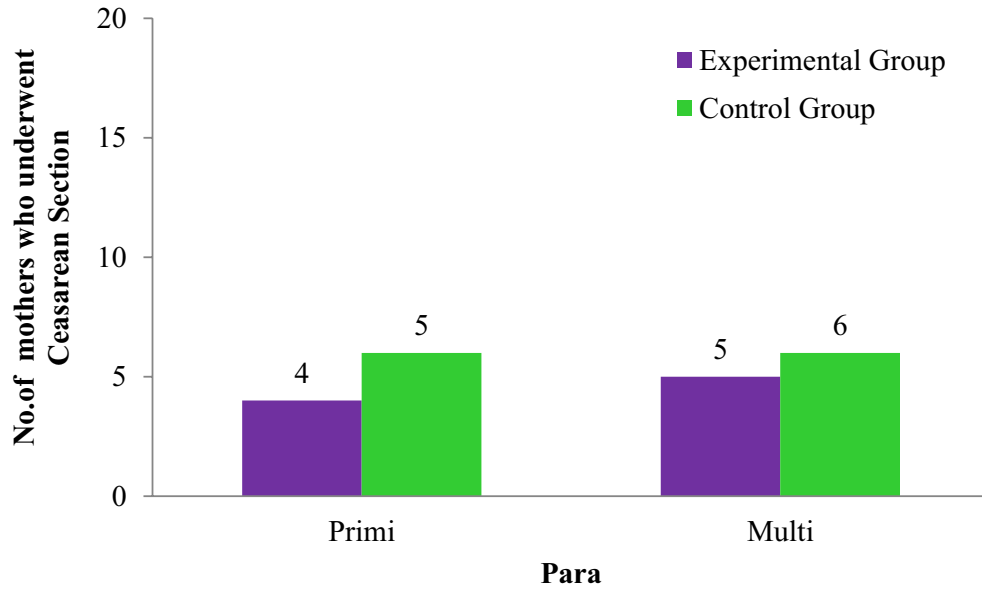


Figure 4.6

Mode of Delivery in Previous Pregnancy among Mothers who underwent Caesarean Section

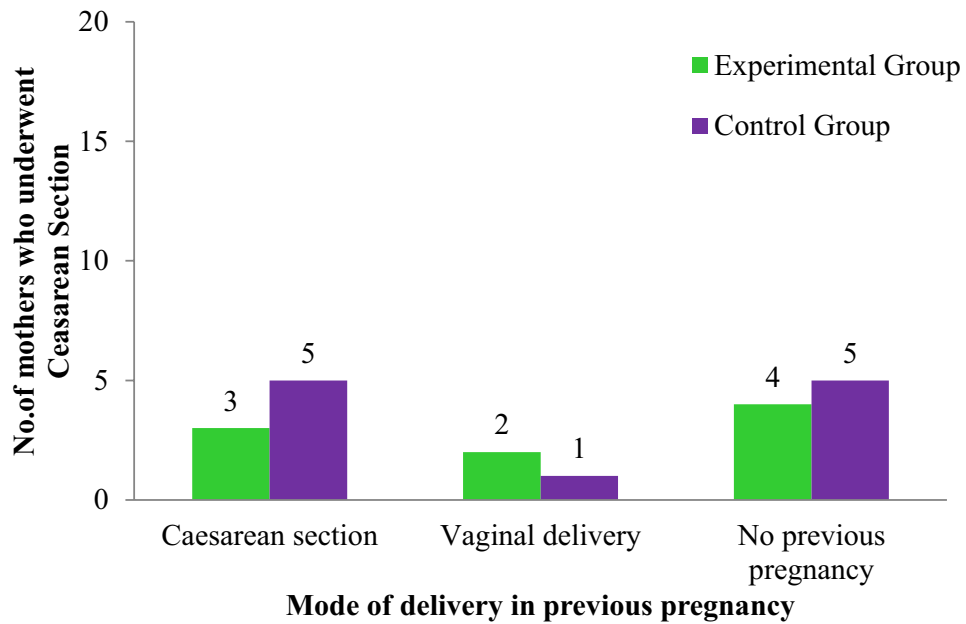


Table 4.7

**Type of Delivery during the Present Pregnancy among
Mothers who underwent Caesarean Section**

(n=20)

S.No	Type of Delivery during the Present Pregnancy	Number of Participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	Preterm	2	22.22	0	0
2	Term	7	77.78	11	100

The above table 4.7 depicts the frequency distribution of mothers who underwent caesarean section based on the type of delivery during the present pregnancy. The result shows that in the Experimental group majority 7 (77.78%) mothers had term delivery and 2 (22.22%) mothers had preterm delivery. In control group all mothers had term delivery. (Figure 4.7)

Table 4.8
Type of surgery in Present Pregnancy among Mothers who underwent
Caesarean Section

(n=20)

S.No	Type of surgery in Present Pregnancy	Number of Participants							
		Experimental Group n=9				Control Group n=11			
		Primi (n = 4)		Multi (n = 5)		Primi (n = 5)		Multi (n = 6)	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Emergency	2	50	0	0	0	0	0	0
2	Elective	2	50	5	100	5	100	6	100

The above table 4.8 depicts the frequency distribution of mothers who underwent caesarean section based on type of surgery. The result shows that in Experimental group 2 primi mothers (50 %) underwent emergency and elective surgery respectively and all the multi mothers underwent elective surgery. In control group all the primi and multi mothers underwent elective surgery. (Figure 4.8)

Figure 4.7

Type of Delivery during the Present Pregnancy among Mothers who underwent Caesarean Section

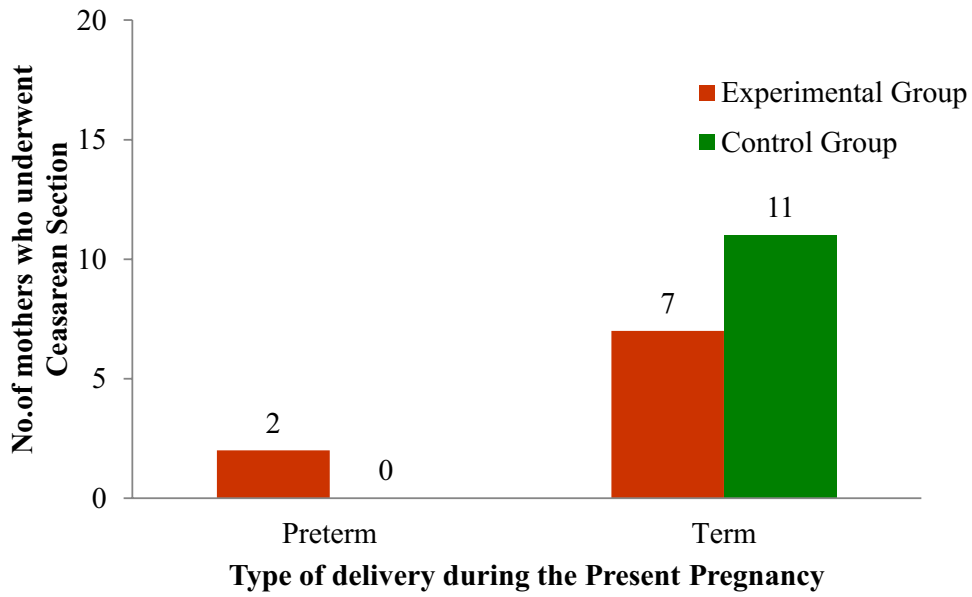


Figure 4.8

Mothers who underwent caesarean section by Type of surgery

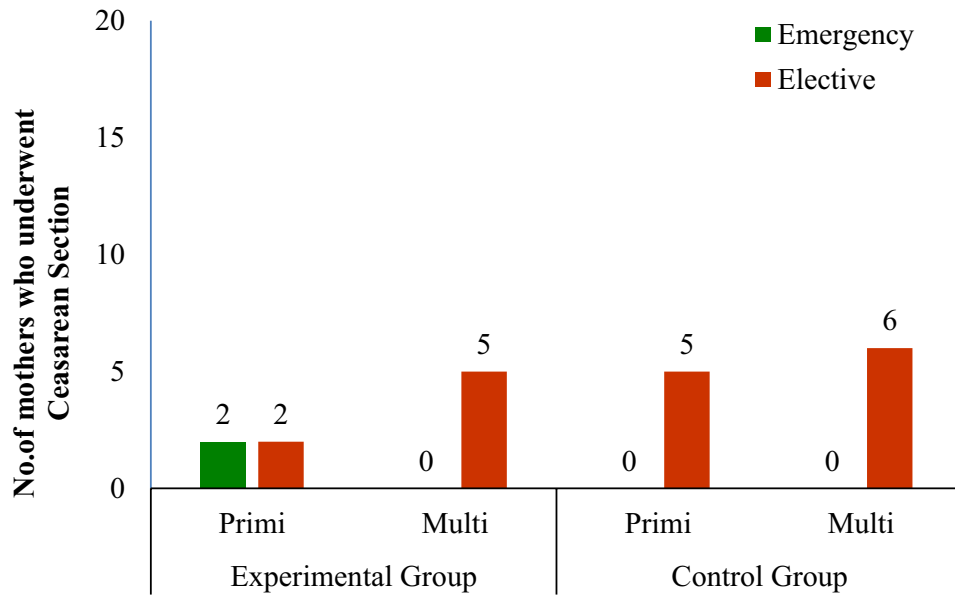


Table 4.9

Indication for Surgery among Mothers who underwent Caesarean Section

(n=20)

S.No	Indication For Caesarean section	Number of Participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	Previous LSCS	3	33.33	6	54.55
2	Oligohydramnios	1	11.11	2	18.18
3	PIH	2	22.23	1	9.09
4	Breech presentation	1	11.11	2	18.18
5	Pre eclampsia	1	11.11	0	0
6	Meconium stained liquor	1	11.11	0	0

The above table 4.9 depicts the frequency distribution of mothers who underwent caesarean section based on the indication for caesarean section. The result shows that in the experimental group majority 3 (33.33%) mothers had previous caesarean section, 2 (22.23%) mothers had PIH, one (11.11%) mother had oligohydramnios, breech presentation, pre-eclampsia and meconium stained liquor respectively.

In the control group majority 6 (54.55 %) mothers had previous caesarean section, one (9.09%) mother had PIH and 2(18.18%) mothers had oligohydramnios and breech presentation respectively.

The result shows that other than the health complications, previous caesarean section was the major indication for the surgery in multi para mothers. (Figure 4.9)

Table 4.10
History of Diabetes Mellitus among Mothers who underwent
Caesarean Section

(n=20)

S.No	History of Diabetes Mellitus	Number of Participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	Yes	1	11.11	0	0
2	No	8	88.89	11	100

The above table 4.10 depicts the frequency distribution of mothers who underwent caesarean section based on the history of diabetes mellitus. The result shows that in the Experimental group 8 (88.89%) mothers had no history of diabetes mellitus and one (11.11%) mother had history of diabetes mellitus. In the Control group none of the mothers had history of diabetes mellitus. None of the mothers in the experimental and control group had gestational diabetes. (Figure 4.10)

Figure 4.9

Indication for Surgery among Mothers who underwent Caesarean Section

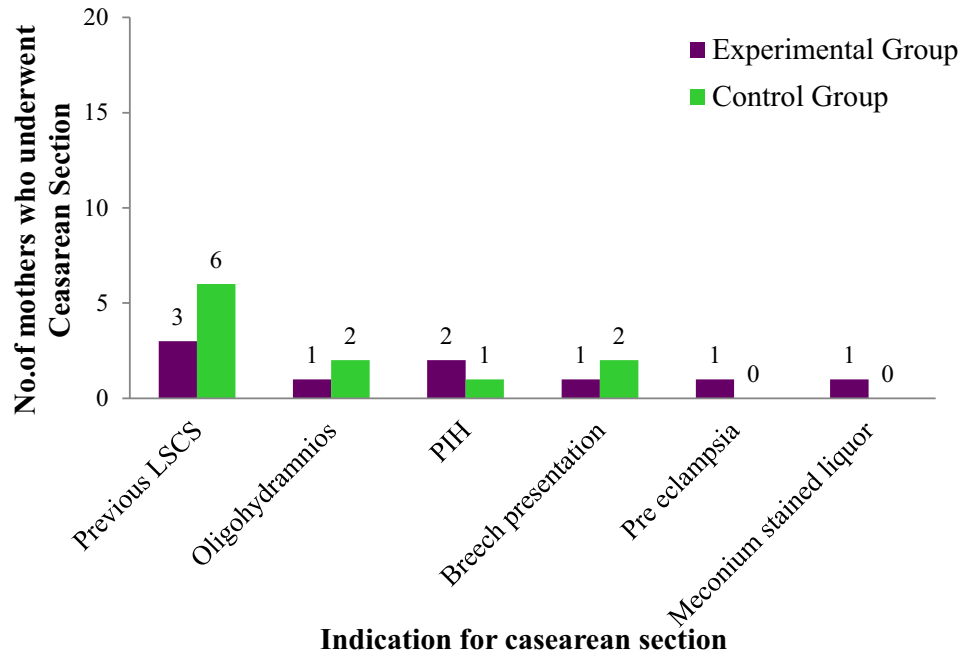


Figure 4.10

History of Diabetes Mellitus among Mothers who underwent Caesarean Section

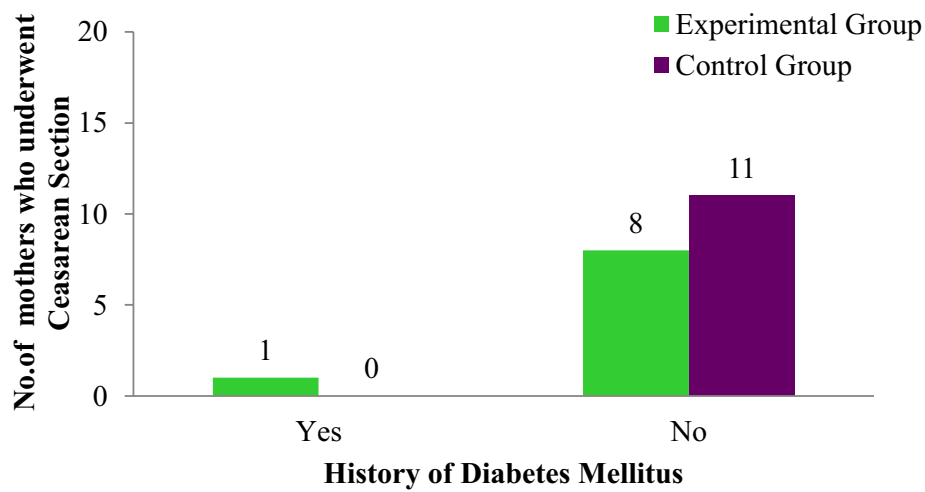


Table 4.11
Height of the Mothers who underwent Caesarean Section

(n=20)

S.No	Height (Cm)	Number of Participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	145-155	3	33.33	6	54.54
2	156-165	6	66.67	5	45.46

The above table 4.11 depicts the frequency distribution of mothers who underwent caesarean section based on the height. The result shows that in the experimental group 6 mothers (66.67%) had height ranged from 156-165cm and 3 mothers (33.33%) had height ranged from 145-155cm. In the control group 6 (54.54%) mothers had height ranged from 145-155cm and 5 (45.46%) mothers had height ranged from 156-165cm. None of the mothers were short statured. (Figure 4.11)

Table 4.12

Weight of the Mothers who underwent Caesarean Section

(n=20)

S.No	Weight (Kg)	Number of Participants			
		Experimental Group n =9		Control Group n =11	
		Frequency	Percentage	Frequency	Percentage
1	50-70	6	66.67	9	81.81
2	71-90	2	22.22	2	18.19
3	91-110	1	11.11	0	0

The above table 4.12 depicts the frequency distribution of mothers who underwent caesarean section based on body weight. The result shows that in the experimental group 6 (66.67%) mothers had bodyweight between 50-70kg and 2 mothers (22.22%) had weight ranged between 71-90kg and one mother (11.11%) had body weight range between 91-110kg. But in control group 9 (81.81%) mothers had body weight ranged between 50-70kg and 2 (18.19%) mother's weight ranged between 71-90kg. (Figure 4.12)

4.13 Clinical Profile of the Mothers who underwent Caesarean Section

The result shows that while recording, all the mothers who underwent caesarean section in both the experimental and control group had normal range of temperature, pulse, respiration and blood pressure throughout the study.

Figure 4.11

Height of the Mothers who underwent Caesarean Section

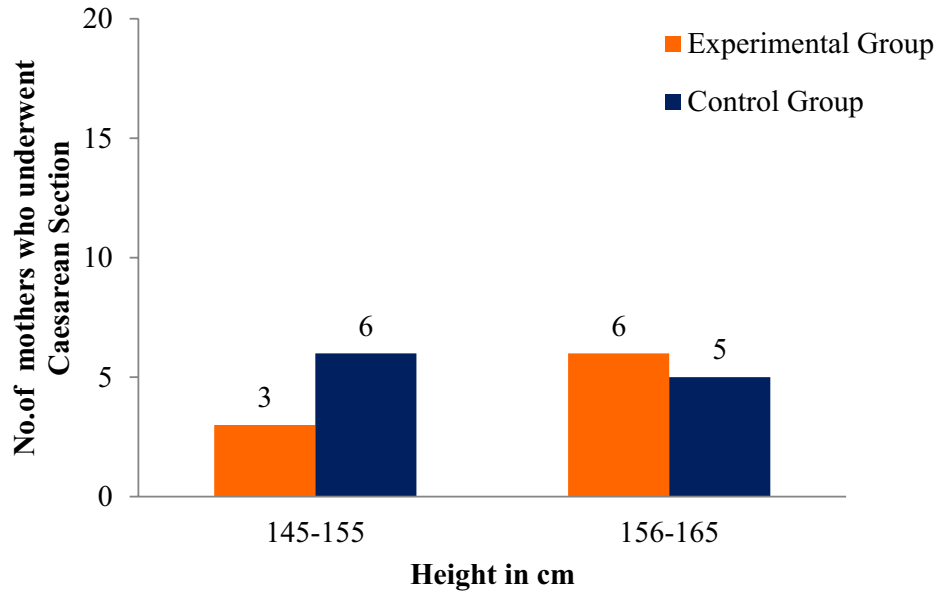
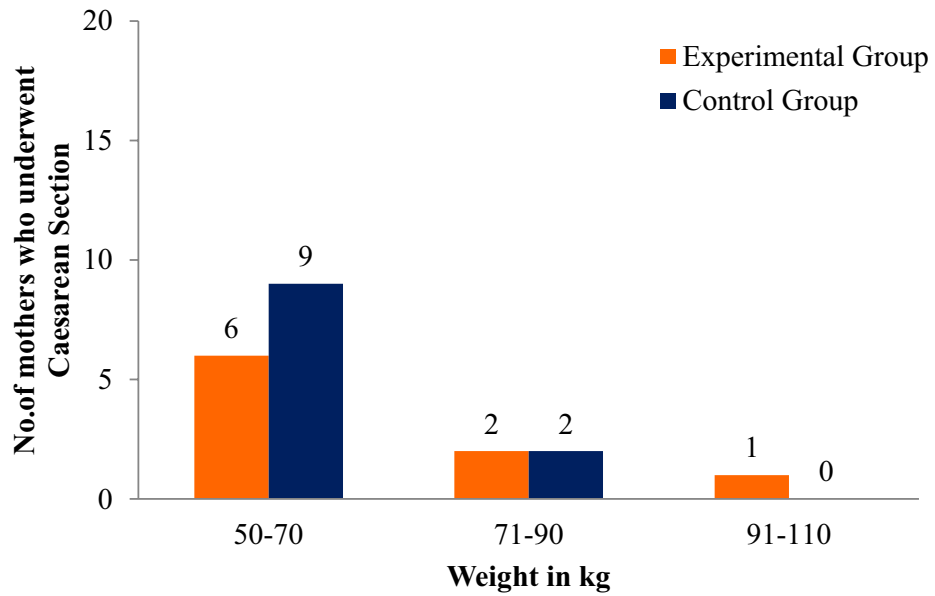


Figure 4.12

Weight of the Mothers who underwent Caesarean Section



Section II

Analysis on Level of Wound Healing among Mothers who underwent Caesarean Section

This section deals with the analysis and interpretation on the effect of infrared therapy on level of wound healing among mothers who underwent caesarean section. The level of wound healing was assessed using Davidson REEDA wound assessment scale and was categorized as very good, good, poor and very poor wound healing. Collected data were presented under the following headings.

- Assessment on the level of wound healing among Mothers who underwent caesarean section before infrared therapy.
- Assessment on the level of wound healing among Mothers who underwent caesarean section after infrared therapy.
- Comparison on level of wound healing among experimental and control group Mothers who underwent caesarean section before and after infrared therapy.
- Assessment on the wound healing score among Mothers who underwent caesarean section before infrared therapy.
- Assessment on the wound healing score among Mothers who underwent caesarean section after infrared therapy.
- Comparison on wound healing score among experimental and control group Mothers who underwent caesarean section before and after infrared therapy.

Table 4.13
Level of Wound Healing among Mothers who underwent Caesarean Section
in Experimental Group and Control Group before Infrared Therapy

S.No	Level of Wound Healing	n=20			
		Experimental group n=9		Control group n =11	
		Frequency	Percentage	Frequency	Percentage
1	Very good wound healing	5	56	6	55
2	Good wound healing	4	44	5	45
3	Poor wound healing	0	0	0	0
4	Very poor wound healing	0	0	0	0

The above table 4.13 depicts the frequency distribution of Mothers who underwent caesarean section based on the level of wound healing. The result shows that in the experimental group, 4 mothers (44%) had good wound healing and 5 mothers (56%) had very good wound healing. In the control group 5 mothers (45%) had good wound healing and 6 mothers (55%) had very good wound healing. (Figure 4.13)

Figure 4.13

Level of Wound Healing among Mothers who underwent Caesarean Section in Experimental Group and Control Group before Infrared Therapy

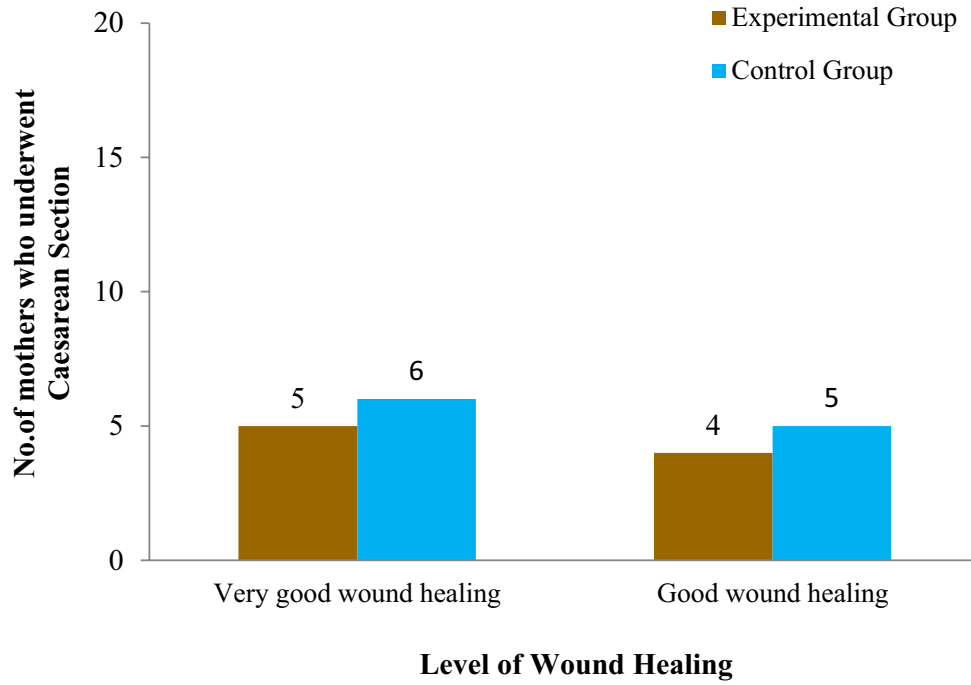


Table 4.14

**Level of Wound Healing among Mothers who underwent Caesarean Section
in Experimental Group and Control Group after Infrared Therapy**

n=20

S.No	Level of Wound Healing	No. of Participants			
		Experimental group n =9		Control group n =11	
		Frequency	Percentage	Frequency	Percentage
1	Very good wound healing	9	100	11	100
2	Good wound healing	0	0	0	0
3	Poor wound healing	0	0	0	0
4	Very poor wound healing	0	0	0	0

The above table 4.14 depicts the frequency distribution of Mothers who underwent caesarean section based on the level of wound healing. The result shows that in both experimental and control group all mothers (100%) who underwent caesarean section had very good wound healing on the day of discharge.

Table 4.15

Comparison on Level of Wound Healing between Experimental and Control Group before and after Infrared Therapy

n=20

S.No	Level of Wound Healing	Number of participants							
		Experimental group n=9				Control group n =11			
		Pre test		Post test		Pre test		Post test	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Very good wound healing	5	56	9	100	6	55	11	100
2	Good wound healing	4	44	0	0	5	45	0	0

The above table 4.15 depicts the comparison on the level of wound healing between the experimental and control group of Mothers who underwent caesarean section before and after infrared therapy. The result shows that among the experimental group mothers, during the pretest 5 mothers (56%) had very good wound healing and 4 mothers (44%) had good wound healing. Among the control group mothers during the pretest 6 mothers (56%) mothers had very good wound healing and 5 mothers (45%) had good wound healing.

But during the posttest all the mothers who underwent Caesarean Section in experimental group (n =9) and control group (n=11) had improved to very good wound healing.

Table 4.16

Assessment on the Wound Healing Score among Mothers who underwent Caesarean Section in Experimental Group and Control Group before Infrared Therapy

n=20

S.No	Wound Healing Scores	No. of participants			
		Experimental group n =9		Control group n =11	
		Frequency	Percentage	Frequency	Percentage
1	0	5	56	6	55
2	1-3	4	44	5	45
3	4-6	0	0	0	0
4	7-9	0	0	0	0
5	10-12	0	0	0	0
6	13-15	0	0	0	0

The above table 4.16 depicts the frequency distribution of Mothers who underwent caesarean section based on the level of wound healing scores. The result shows that in the experimental group 4 mothers (44%) had score between 1 and 3 and 5 mothers (56%) had 0 score. In the Control group, 5 mothers (45%) had score between 1 and 3 and 6 mothers (55%) had 0 score.

4.17 Assessment on the Wound Healing Score among Mothers who underwent Caesarean Section in Experimental Group and Control Group after Infrared Therapy

The frequency distribution of Mothers who underwent caesarean section based on the level of wound healing score shows that all the 9 mothers (100%) in experimental and all the 11 mothers (100%) in control group had 0 score which shows very good wound healing.

Table 4.17

Comparison on Wound Healing Scores between Experimental and Control Group before and after Infrared Therapy

n=20

S.No	Wound Healing Scores	Number of participants							
		Experimental group n =9				Control group n =11			
		Pre test		Post test		Pre test		Post test	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	0	5	56	9	100	6	55	11	100
2	1-3	4	44	0	0	5	45	0	0
3	4-6	0	0	0	0	0	0	0	0
4	7-9	0	0	0	0	0	0	0	0
5	10-12	0	0	0	0	0	0	0	0
6	13-15	0	0	0	0	0	0	0	0

The above table 4.17 depicts the comparison on wound healing scores between experimental and control group mothers who underwent caesarean section before and after infrared therapy. The result shows that among the experimental group during the pretest, 4 mothers (44%) scored 1-3 and 5 mothers (56%) scored 0. In the control group during the pretest 5 mothers (45%) scored 1-3 and 6 mothers (55%) scored 0.

But during the posttest all the mothers (experimental group n=9 and control group n=11) scored 0, which showed a very good wound healing.

Section III

Analysis on Level of Pain among Mothers who underwent Caesarean Section

This section deals with the analysis and interpretation on level of pain among Mothers who underwent caesarean section. Level of pain was assessed using Numerical pain rating scale and was interpreted as none, mild, moderate and severe.

Collected data were presented under the following headings.

- Assessment on the level of pain among Mothers who underwent caesarean section before infrared therapy.
- Assessment on the level of pain among Mothers who underwent caesarean section after infrared therapy.
- Comparison on level of pain between experimental and control group before and after infrared therapy.
- Assessment on the pain score among Mothers who underwent caesarean section before infrared therapy.
- Assessment on the pain score among Mothers who underwent caesarean section after infrared therapy.
- Comparison on pain scores between experimental and control group before and after infrared therapy.

Table 4.18

**Level of Pain among Mothers who underwent Caesarean Section in
Experimental Group and Control Group before Infrared Therapy**

n=20

S.No	Level of pain	Experimental group n=9		Control group n =11	
		Frequency	Percentage	Frequency	Percentage
1	None	0	0	0	0
2	Mild	3	33.33	2	18.18
3	Moderate	6	66.67	9	81.82
4	Severe	0	0	0	0

The above table 4.18 depicts the frequency distribution of Mothers who underwent caesarean section based on the level of pain. The result shows that in experimental group 3 mothers (33.33%) had mild level of pain and 6 mothers (66.67%) had moderate level of pain. In control group 9 mothers (81.82%) had moderate level of pain and 2 mothers (18.18%) had mild level of pain.

Figure 4.14

Level of pain among Mothers who underwent caesarean section in experimental group and control group before infrared therapy

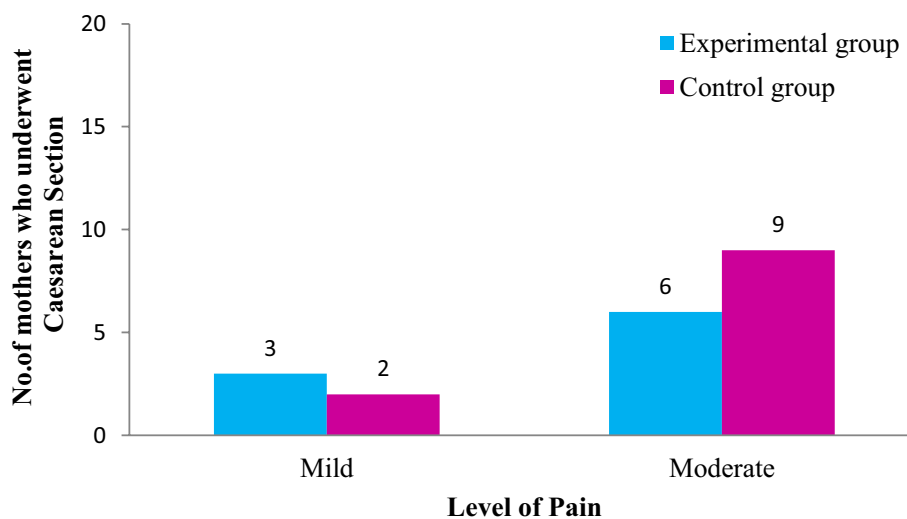


Table 4.19

Level of Pain among Mothers who underwent Caesarean Section in Experimental Group and Control Group after Infrared Therapy

n=20

S.No	Level of pain	Number of participants			
		Experimental group n =9		Control group n=11	
		Frequency	Percentage	Frequency	Percentage
1	None	5	55.56	1	9.09
2	Mild	4	44.44	10	90.91

The above table 4.19 depicts the frequency distribution of mothers who underwent caesarean section among experimental and control group based on the level of pain. The result shows that in experimental group 4 mothers (44.44%) had mild level of pain and 5 mothers (55.56%) had no pain. In the control group 10 mothers (90.91%) had mild level of pain and 1 mother (9.09%) had no pain.

Figure 4.15

Level of Pain among Mothers who underwent Caesarean Section in Experimental Group and Control Group after Infrared Therapy

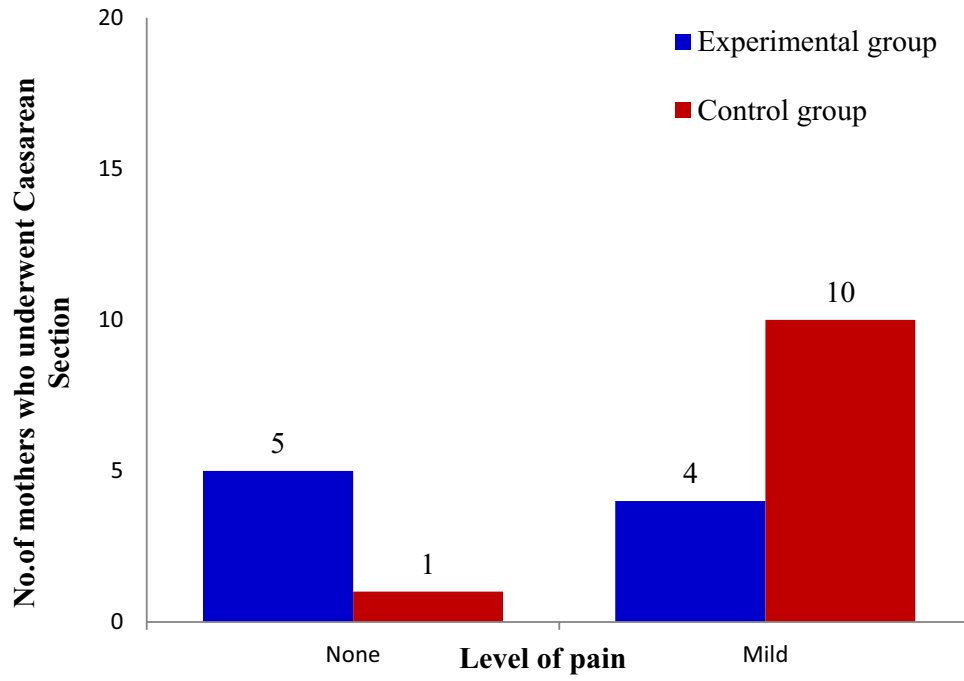


Table 4.20
Comparison on level of Pain between Experimental and Control Group
Mothers who underwent Caesarean Section before and after Infrared
Therapy

n=20

S.No	Level of Pain	Number of participants							
		Experimental group n =9				Control group n =11			
		Pre test		Post test		Pre test		Post test	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	None	0	0	5	55.56	0	0	1	9.09
2	Mild	3	33.33	4	44.44	2	18.18	10	90.91
3	Moderate	6	66.67	0	0	9	81.82	0	0

The above table 4.20 depicts the comparison on level of pain between experimental and control group mothers who underwent caesarean section before and after infrared therapy. And the result shows that in experimental group, during pretest 6 mothers (66.67%) had moderate level of pain and 3 mothers (33.33%) had mild level of pain. During posttest 5 mothers (55.56%) had no pain and 4 mothers (44.44%) had mild level of pain. In control group, during pretest 9 mothers (81.82%) had moderate level of pain and 2 mothers (18.18%) had mild level of pain. During posttest 10 mothers (90.91%) had mild level of pain and one mother (9.09%) had no pain.

Table 4.21
Assessment on Pain Scores among Mothers who underwent Caesarean
Section before Infrared Therapy

n=20

S.No	Pain Scores	Experimental group n =9		Control group n=11	
		Frequency	Percentage	Frequency	Percentage
1	2-3	1	11.11	0	0
2	3-4	2	22.22	2	18.18
3	4-5	3	33.33	4	36.36
4	5-6	3	33.33	3	27.27
5	6-7	0	0	2	18.18

The above table 4.21 depicts the frequency distribution of mothers who underwent caesarean section based on the pain scores. The result shows that in experimental group 1 mother (11.11%) had pain score between 2-3, 2 mothers (22.22%) had pain score between 3-4, 3 mothers (33.33%) had pain score between 4-5 and 5-6 respectively. In control group 4 mothers (36.36%) had pain score between 4-5, 3 mothers (27.27%) had pain score between 5-6 and two mothers (18.18%) had pain score between 3-4 and 6-7 respectively.

Table 4.22

**Assessment on Pain Scores among Mothers who underwent Caesarean
Section after Infrared Therapy**

n=20

S.No	Pain Scores	No of participants			
		Experimental group n =9		Control group n =11	
		Frequency	Percentage	Frequency	Percentage
1	0-1	5	55.56	1	9.09
2	1-2	4	44.44	6	54.54
3	2-3	0	0	4	36.36

The above table 4.22 depicts the frequency distribution of mothers who underwent caesarean section based on the level of pain scores. In experimental group 5 mothers (55.56%) had pain score between 0-1 and 4 mothers (44.44%) had pain score between 1-2. In control group 6 mothers (54.54%) had pain score between 1-2, 4 mothers (36.36%) had pain score between 2-3 and one mother (9.09%) had pain score between 0-1.

Table 4.23
Comparison of Pain Scores between Experimental and Control Group
Mothers who underwent Caesarean Section Before and after
Infrared Therapy

n=20

S.No	Pain Score	Number of participants							
		Experimental group n =9				Control group n=11			
		Pre test		Post test		Pre test		Post test	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	0-1	0	0	5	55.56	0	0	1	9.09
2	1-2	0	0	4	44.44	0	0	6	54.54
3	2-3	1	11.11	0	0	0	0	4	36.36
4	3-4	2	22.22	0	0	2	18.18	0	0
5	4-5	3	33.33	0	0	4	36.36	0	0
6	5-6	3	33.33	0	0	3	27.27	0	0
7	6-7	0	0	0	0	2	18.18	0	0

The above table 4.23 depicts the frequency distribution of Mothers who underwent caesarean section based on comparison of pain scores between experimental and control group before and after infrared therapy. The result shows that in experimental group, during pretest 3 mothers (33.33%) had pain score between 4-5 and 5-6 respectively, 2 mothers (22.22%) had pain score between 3-4 and , one mother (11.11%) had pain score between 2-3. During posttest 5 mothers (55.56%) had pain score between 0-1 and 4 mothers (44.44%) had pain score between 1-2.

In control group, during pretest 4 mothers (36.36%) had pain score between 4-5, 3 mothers (27.27%) had pain score between 5-6, 2 mothers (18.18%) had pain score between 3-4 and 6-7 respectively. During posttest 6 mothers (54.54%) had pain score between 1-2, 4 mothers (36.36%) had pain score between 2-3 and one mother (9.09%) had pain score between 0-1.

Section IV

Effect of Infrared Therapy on Level of Wound Healing among Mothers who underwent Caesarean Section

This section deals with the analysis and interpretation on the effect of infrared therapy on wound healing among mothers who underwent caesarean section. The level of wound healing was assessed using Davidson REEDA Scale and was categorized as very good, good, poor and very poor wound healing.

Collected data was presented under the following headings.

- Effect of Infrared Therapy on Wound Healing between Experimental and Control Group Mothers who underwent Caesarean Section before Infrared Therapy.
- Effect of Infrared Therapy on Wound Healing between Experimental and Control Group Mothers who underwent Caesarean Section after Infrared Therapy.
- Effect of Infrared Therapy on Wound Healing among Mothers who underwent Caesarean Section in experimental group.
- Effect of Infrared Therapy on Wound Healing among Mothers who underwent Caesarean Section in control group.

Table 4.24
Effect of Infrared Therapy on Wound Healing between
Experimental and Control Group Mothers who underwent
caesarean section before Infrared Therapy

	Group	Mean score of wound healing	Standard Deviation	Mean Difference	‘t’ value
Pre test	Experimental group	0.4	0.5	-0.1	0.04
	Control group	0.5	0.5		

Student t-test was used to test the effect of Infrared Therapy on wound healing among mothers who underwent caesarean section in both Experimental and Control group. During pretest, it was identified that in experimental group, the mean wound healing score was 0.4 and in the control group the mean wound healing score was 0.5 with the mean difference of -0.1. Calculated Standard Deviation in experimental and control group was 0.5 respectively with the ‘t’ value of 0.04. At the degree of freedom 18 ($n_1 + n_2 - 2$), the calculated ‘t’ value was lesser than the table value ($t_v = 2.10$) at 0.05 level of significance. Hence the research hypothesis “There will be homogeneity in the pretest level of wound healing between experimental and control group mothers who underwent caesarean section” was rejected.

4.25 Effect of Infrared Therapy on Wound Healing between Experimental and Control Group Mothers who underwent Caesarean Section after Infrared Therapy

Student t-test was used to test the effect of infrared therapy on wound healing among mothers who underwent caesarean section in the experimental and control group. During posttest the mean score was 0 with the mean difference of 0. Calculated standard deviation was 0 with the 't' value of 0, which was lesser than the table value. Hence the research hypothesis "There will be a significant difference in the post test level of wound healing between the experimental and control group mothers who underwent caesarean section" was rejected.

Table 4.25
Effect of Infrared Therapy on Wound Healing among Mothers who
underwent caesarean section in Experimental group

Group		Mean score	Standard Deviation	Mean Difference	't' value
Experimental group	Pre test	0.4	0.5	0.4	2.54*
	Post test	0	0		

***0.05 level of significance**

Paired t-test was used to test the effect of Infrared Therapy on wound healing among mothers who underwent caesarean section in Experimental group. During pretest, it was identified that the mean wound healing score was 0.4 and during posttest the mean wound healing score was 0 with the mean difference of 0.4. Calculated Standard Deviation was 0.5 and 0 respectively with the 't' value of 2.54. At the degree of freedom 8 (n-1), the calculated 't' value was greater than the table value ($t_v = 2.31$) at 0.05 level of significance. Hence the research hypothesis "There will be a significant difference between the pretest and posttest level of wound healing among experimental group mothers who underwent caesarean section" was accepted.

Table 4.26
Effect of Infrared Therapy on Wound Healing among Mothers who
underwent caesarean section in Control group

Group		Mean score	Standard Deviation	Mean Difference	't' value
Control group	Pre test	0.5	0.5	0.6	2.81*
	Post test	0	0		

***0.05 level of significance**

Paired t-test was used to test the effect of Infrared Therapy on wound healing among mothers who underwent caesarean section in Control group. During pretest, it was identified that the mean wound healing score was 0.5 and during posttest the mean wound healing score was 0 with the mean difference of 0.6. Calculated Standard Deviation was 0.5 and 0 respectively. At the degree of freedom 10 (n-1), the calculated 't' value 2.81 was greater than the table value ($t_v = 2.23$) at 0.05 level of significance. The result describes that the control group has also improved in the level of wound healing.

Section V

Effect of Infrared Therapy on Level of Pain among Mothers who underwent Caesarean Section

This section deals with the analysis and interpretation on the effect of infrared therapy on pain among mothers who underwent caesarean section. The level of pain was assessed using Numerical Pain Rating Scale and was categorized as none, mild, moderate and severe pain.

Collected data was presented under the following headings.

- Effect of Infrared Therapy on Level of Pain between Experimental and Control Group Mothers who underwent Caesarean Section before Infrared Therapy.
- Effect of Infrared Therapy on Level of Pain between Experimental and Control Group Mothers who underwent Caesarean Section after Infrared Therapy.
- Effect of Infrared Therapy on Level of Pain among Mothers who underwent Caesarean Section in experimental group.
- Effect of Infrared Therapy on Level of Pain among Mothers who underwent Caesarean Section in control group.

Table 4.27
Effect of Infrared Therapy on level of Pain between Experimental and Control Group Mothers who underwent caesarean section before Infrared Therapy

	Group	Mean score of pain	Standard Deviation	Mean Difference	't' value
Pretest	Experimental group	3.9	1	0.6	1.22
	Control group	4.5	1		

Student t- test was used to test the effect of Infrared Therapy on Level of pain among Mothers who underwent caesarean section in Experimental group and Control group. On 3rd postoperative day, it was identified that, the mean score before Infrared Therapy was 3.9 and 4.5 respectively with the mean difference of 0.6. Standard Deviation was 1 respectively. Calculated 't' value was 1.22, which was less than the table value ($t_v = 2.10$, $df = 18$) at 0.05 level of significance. Hence the research hypothesis "There will be homogeneity in the pretest level of pain between experimental and control group mothers who underwent caesarean section" was rejected.

Table 4.28

Effect of Infrared Therapy on Level of Pain between Experimental and Control Group Mothers who underwent Caesarean Section after Infrared Therapy

	Group	Mean score of pain	Standard Deviation	Mean Difference	't' value
Posttest	Experimental group	0.4	0.51	0.86	3.8*
	Control group	1.3	0.62		

*** 0.05 level of significance**

Student t- test was used to analyze the effect of infrared therapy on level of pain during posttest between experimental and control group mothers who underwent caesarean section. The result shows that the mean pain score of experimental and control group was 0.4 and 1.3 respectively with the standard deviation of 0.51 and 0.62 respectively. Calculated mean difference was 0.86 and the 't' value was 3.8 which was greater than the table value ($t_v = 2.10$) at 0.05 level of significance ($df = 18$). Hence the research hypothesis "There will be a significant difference in the posttest level of pain between the experimental and control group mothers who underwent caesarean section" was accepted.

Table 4.29

Effect of Infrared Therapy on Pain among Mothers who underwent caesarean section in Experimental group

Group		Mean score of pain	Standard Deviation	Mean Difference	't' value
Experimental group	Pre test	3.9	1	3.5	14.33*
	Post test	0.4	0.25		

*** 0.05 level of significance**

Paired t- test was used to test the effect of Infrared Therapy on pain among mothers who underwent caesarean section in Experimental group. During pretest, it was identified that the mean pain score was 3.9 and during posttest the mean pain score was 0.4 with the mean difference of 3.5. Calculated Standard Deviation was 1 and 0.25 respectively with the 't' value of 14.33. At the degree of freedom 8 (n-1), the calculated 't' value was greater than the table value ($t_v = 2.31$) at 0.05 level of significance. Hence the research hypothesis "There will be a significant difference between the pretest and posttest level of pain among experimental group mothers who underwent caesarean section" was accepted.

Table 4.30

Effect of Infrared Therapy on level of Pain among Mothers who underwent caesarean section in Control group

Group		Mean score of pain	Standard Deviation	Mean Difference	't' value
Control group	Pre test	4.5	1	0.6	12.23*
	Post test	1.3	0.61		

*** 0.05 level of significance**

Paired t - test was used to test the effect of Infrared Therapy on pain among mothers who underwent caesarean section in Control group. During pretest, it was identified that the mean pain score was 4.5 and during posttest the mean pain score was 1.3 with the mean difference of 0.6. Calculated Standard Deviation was 1 and 0.61 respectively with the 't' value of 12.23. At the degree of freedom 10 (n-1), the calculated 't' value was greater than the table value ($t_v = 2.23$) at 0.05 level of significance. This shows that there is a reduction in the level of pain in the control group mothers also.

Section VI

Association between the Level of Wound Healing and the Selected Demographic Variables among Mothers who underwent Caesarean Section

Chi square test (with Yates correction) was used to assess the association between level of wound healing and selected Demographic variables like age, education, religion, gravida, para, type of delivery during present pregnancy, type of surgery, indications for caesarean section, height and weight of the mothers who underwent caesarean section were chosen to analyze the association .

Table 4.31
Association between the pretest level of wound healing and Selected Demographic Variables among mothers
who underwent caesarean section

S.No	Demographic Variables	Category	Frequency	Level of wound healing		χ^2 Value	Degree of freedom	χ^2 table value
				Very good	Good			
1.	Age	20 – 25 years	5	2	3	2.22	2	5.99
		26– 30 years	10	7	3			
		31 – 35 years	5	2	3			
2.	Education	Schooling	9	5	4	0.55	2	5.99
		UG	7	4	3			
		PG	4	2	2			
3.	Religion	Hindu	18	10	8	0.54	1	3.84
		Muslim	2	1	1			
4.	Gravida	1	7	3	4	3.68	3	7.82
		2	8	4	4			
		3	4	3	1			
		4	1	1	0			

S. No	Demographic Variables	Category	Frequency	Level of wound healing		χ^2 Value	Degree of freedom	χ^2 table value
				Very good	Good			
5.	Para	Primi	9	4	5	0.92	1	3.84
		Multi	11	7	4			
6.	Type of delivery during present pregnancy	Preterm	2	1	1	0.54	1	3.84
		Term	18	10	8			
7.	Type of surgery	Emergency	2	2	0	0.54	1	3.84
		Elective	18	9	9			
8.	Indication for caesarean section	Previous LSCS	9	4	5	9.05	5	11.07
		Oligohydramnios	3	3	0			
		PIH	3	1	2			
		Breech presentation	3	1	2			
		Preeclampsia	1	1	0			
		Meconium stained liquor	1	1	0			

S. No	Demographic Variables	Category	Frequency	Level of wound healing		χ^2 Value	Degree of freedom	χ^2 table value
				Very good	Good			
9.	Height in cm	144-155	9	6	3	1.11	1	3.84
		156-165	11	5	6			
10.	Weight in kg	50-70	15	9	6	2.5	2	5.99
		71-90	4	2	2			
		91-110	1	0	1			

The chi square analysis shows that the calculated χ^2 value for level of wound healing and selected demographic variables did not show a significant association with age ($\chi^2 = 2.22$), education ($\chi^2 = 0.55$), religion ($\chi^2 = 0.54$), gravida ($\chi^2 = 3.68$), para ($\chi^2 = 0.92$), type of delivery during present pregnancy ($\chi^2 = 0.54$), type of surgery ($\chi^2 = 0.54$), indication for caesarean section ($\chi^2 = 9.05$), height ($\chi^2 = 1.11$), and weight ($\chi^2 = 2.5$).

Hence the research hypothesis, “There will be a significant association between the pretest level of wound healing and selected demographic variables among mothers who underwent caesarean section” was rejected.

Section VII

Association between the Level of Pain and the Selected Demographic

Variables among Mothers who underwent Caesarean Section.

Chi square test (with Yates correction) was used to assess the association between level of pain and selected Demographic variables like age, education, religion, gravida, para, type of delivery during present pregnancy, type of surgery, indications for caesarean section, height and weight of the mothers who underwent caesarean section were chosen to analyze the association.

Table 4.32

Association between the pretest level of Pain and Selected Demographic Variables among mothers who underwent caesarean section

S. No	Demographic Variables	Category	Frequency	Level of Pain		χ^2 Value	Degree of freedom	χ^2 table value
				Mild	Moderate			
1.	Age	20 – 25 years	5	3	2	18.93*	2	5.99
		26– 30 years	10	2	8			
		31 – 35 years	5	0	5			
2.	Education	Schooling	9	2	7	2.23	2	5.99
		UG	7	1	6			
		PG	4	2	2			
3.	Religion	Hindu	18	4	14	0.88	1	3.84
		Muslim	2	1	1			

S. No	Demographic Variables	Category	Frequency	Level of Pain		χ^2 Value	Degree of freedom	χ^2 table value
				Mild	Moderate			
4.	Gravida	1	7	3	4	4.9	3	7.82
		2	8	1	7			
		3	4	1	3			
		4	1	0	1			
5.	Para	Primi	9	3	6	1.30	1	3.84
		Multi	11	2	9			
6.	Type of delivery during present pregnancy	Preterm	2	0	2	2.07	1	3.84
		Term	18	5	13			
7.	Type of surgery	Emergency	2	0	2	2.07	1	3.84
		Elective	18	5	13			

S. No	Demographic Variables	Category	Frequency	Level of Pain		χ^2 Value	Degree of freedom	χ^2 table value
				Mild	Moderate			
8.	Indication for caesarean section	Previous LSCS	9	4	5	8.9	5	11.07
		Oligohydramnios	3	0	3			
		PIH	3	2	1			
		Breech presentation	3	2	1			
		Preeclampsia	1	0	1			
		Meconium stained liquor	1	0	1			
9.	Height in cm	144-155	9	3	6	0.64	1	3.84
		156-165	11	2	9			
10	Weight in kg	50-70	15	6	9	15.01*	2	5.99
		71-90	4	0	4			
		91-110	1	0	1			

*0.05 level of significance

The chi square analysis shows that the calculated χ^2 value for level of pain did not show a significant association with education ($\chi^2 = 2.23$), religion ($\chi^2 = 0.88$), gravida ($\chi^2 = 4.9$), para ($\chi^2 = 1.3$), type of delivery during present pregnancy ($\chi^2 = 2.07$), type of surgery ($\chi^2 = 2.07$), indication for caesarean section ($\chi^2 = 8.9$) and height ($\chi^2 = 0.64$).

Calculated χ^2 value for level of pain had a significant association with age ($\chi^2 = 18.93$) and weight ($\chi^2 = 15.01$). Both the values were higher than the table value at 0.05 level of significance (df=2) respectively.

Hence the research hypothesis, “There will be a significant association between the pretest level of pain and selected demographic variables (Age and Weight) among mothers who underwent caesarean section” was accepted.

Section VIII

Correlation between the level of Wound Healing and level of Pain among Mothers who underwent Caesarean Section

Karl Pearson Correlation coefficient formula was used to analyze the Correlation between the Level of Wound Healing and the Level of Pain among Mothers who underwent Caesarean Section.

Table 4.33

Correlation between the level of wound healing and the level of pain among Mothers who underwent caesarean section

Group	Day of observation	Mean score of wound healing	Mean score of pain	'r' value
Experimental group	Pretest	0.4	3.8	0
	Posttest	0	0.4	0
Control group	Pretest	0.5	4.5	0
	Posttest	0	1.3	0

The above table 4.33 denotes the correlation between the wound healing and the pain among experimental and control group Mothers who underwent caesarean section. The result shows that among the experimental group, mean score of wound healing and mean score of pain was 0.4 and 3.8 respectively. Calculated Karl Pearson Coefficient Correlation r was 0.

During the posttest the mean score of wound healing and mean score of pain was 0 and 0.4 respectively with the r value of 0.

Among the control group the pretest mean score of wound healing and mean score of pain was 0.5 and 4.5 respectively with the r value of 0. Likewise during the posttest mean score of wound healing and the mean score of pain was 0 and 1.3 respectively with the r value of 0.

It shows that there was no correlation found between level of wound healing and level of pain. Hence the research hypothesis “There will be a correlation between the level of wound healing and level of pain among mothers who underwent caesarean section” was rejected.

RESULTS AND DISCUSSION

This chapter deals with the results and discussion of the findings. The study was conducted in Sri Ramakrishna Hospital located at Coimbatore, with the aim of determining the effect of infrared therapy on wound healing and pain among mothers who underwent caesarean section. By using purposive sampling technique 20 mothers who underwent caesarean section were selected and were randomly allocated to Experimental and Control group. Experimental group received Infrared therapy on the caesarean wound at a distance of 50cm and 45 degree angle from 3rd postoperative day till the day of discharge twice daily for 15 minutes. To assess the level of wound healing the researcher used Davidson REEDA Scale. The tool consists of four components with the score interpretations as very good wound healing, good wound healing, poor wound healing and very poor wound healing. Along with the wound healing the researcher also assessed the level of pain observed by the mothers who underwent Caesarean Section using Numerical Pain Rating Scale. The findings were discussed as below.

5.1 Demographic profile of the mothers who underwent caesarean section

5.1.1 Age of the mothers who underwent caesarean section

In the present study it was identified that majority of the mothers, 5 (55.56%) in the Experimental group and 5 (45.46%) in the control group were between the age group of 26-30. The present study also goes in line with the study coated below, where the incidence of caesarean section is prevalent in the ages between 25 and 36 years.

Ugwu et al in year 2011 conducted a study on Survey of Caesarean Delivery at a Nigerian Tertiary Hospital. The result showed that the age range of patients who had caesarean section were between 16-48 years. Majority 395 (40.3%) were aged between 25-34 years, followed by 307 (31.3%) who aged between 30-34 years.

5.1.2 Educational Status of the Mothers who underwent caesarean section

The frequency distribution of mothers who underwent caesarean section based on their education shows that, all the 20 mothers were educated and none of them were illiterate.

5.1.3 Religion of the Mothers who underwent caesarean section

Majority of the mothers (90%) of this present study belong to Hindu religion.

5.1.4 Gravida of the Mothers who underwent caesarean section

The frequency distribution of mothers who underwent caesarean section on the gravid state shows that majority of the mothers (65%) in both experimental and control group were multi gravid mothers.

5.1.5 Para of the Mothers who underwent caesarean section

In the present study, findings show that majority of the mothers (55%) were multi para mothers.

5.1.6 Mode of delivery in previous pregnancy among Mothers who underwent caesarean section

The frequency distribution of mothers who underwent caesarean section based on the Mode of delivery shows that majority 3 (33.33%) in Experimental group and 5 (45.45%) mothers in Control group had caesarean section in their

previous pregnancy. Result shows that in both the groups there was an increased rate of caesarean section in previous pregnancy. Result of the study is parallel to the result of the study done by Habiba et al in the year 2006 where the incidence of caesarean section was high than the vaginal delivery.

5.1.7 Type of delivery during the Present Pregnancy among Mothers who underwent caesarean section

The frequency distribution of mothers who underwent caesarean section based on the type of delivery during the present pregnancy shows that majority of the mothers, 7 in the Experimental group (77.78%) and all the mothers in control group had term delivery.

5.1.8 Type of surgery among Mothers who underwent caesarean section

The findings of the study reveals that majority of mothers (75%) underwent elective surgery. Result of the study goes in line with the study done by Habiba et al in the year 2006. According to the data, in most countries, maternal request for a caesarean delivery appeared more likely to be accepted, the resulting change in attitudes was quite remarkable, suggesting that a shift from the 'normal pregnancy' paradigm moved the woman's request to a different level of consideration.

5.1.9 Indication for surgery among Mothers who underwent caesarean section

Findings of the study describes that, other than the pregnancy complications, previous caesarean section was the main indication for caesarean section. Result of the study is in line with the study done by Ugwu et al in the year 2011, where the indications for caesarean section were previous caesarean section, cephalopelvic disproportion, foetal distress, pregnancy induced hypertension, obstructed labour, antepartum haemorrhage and multiple pregnancy.

5.1.10 History of Diabetes Mellitus among Mothers who underwent

Caesarean Section

The frequency distribution of mothers who underwent caesarean section based on the history of diabetes mellitus shows that majority of the mothers (95%) had no history of diabetes mellitus and none of them had gestational diabetes mellitus.

5.1.11 Height of the Mothers who underwent caesarean section

Though the risk of caesarean section was high in a short statured women (Sheiner et al,2005), the present study demonstrates that, caesarean section was high irrespective of the height of the women.

5.1.12 Weight of the Mothers who underwent caesarean section

There is a significant association between pre-pregnancy maternal corpulence and risk of caesarean deliveries in pregnancies at term, like height, weight and body mass index (Barau, 2006). This study result is not suitable for the present study, where irrespective of the maternal anthropometric data the incidence of caesarean section was seen.

5.1.13 Clinical Profile of the Mothers who underwent Caesarean Section

The frequency distribution of mothers who underwent caesarean section by clinical profile shows that in both experimental and control group, all the mothers had normal range of temperature, pulse, respiration and the blood pressure. All the mothers had prophylactic antibiotics and similar kind of surgical history. None of them received steroidal medications.

5.2 Assess the level of wound healing among mothers who underwent caesarean section.

Result of the study shows that, during pretest, 5 mothers (56%) had very good wound healing and 4 mothers (44%) had good wound healing. Among the control group mothers, during the pretest 6 mothers (56%) had very good wound healing and 5 mothers (45%) had good wound healing. But during the posttest all the mothers (100%) had very good wound healing. It was identified that in experimental group, the pretest mean wound healing score was 0.4 and in the control group the mean wound healing score was 0.5 with the mean difference of -0.1.

5.3 Assess the level of pain among mothers who underwent caesarean section.

The study result shows that majority of the mothers had moderate level of pain in both experimental (66.67%) and control group (81.82%) during the pretest. In the posttest their pain score was reduced to a significant level.

Result of the study shows that, during pretest, it was identified that in experimental group, the mean pain score was 3.9 and in the control group 4.5 with the mean difference of 0.6. But during the posttest the mean pain score of experimental group was 0.4 and control group was 1.3 with the mean difference of 0.86.

5.4 Effect of infrared therapy on wound healing among mothers who underwent caesarean section.

Analysis on the effect of infrared therapy on wound healing shows that there was no homogeneity in the pretest level of wound healing between experimental and control group mothers. Also there was no significant difference found in the posttest level of wound healing between two groups.

While comparing the pretest and posttest level of wound healing in experimental and control group, it was identified that there was a significant difference in the wound healing in both the groups respectively.

The present study goes in line with the study done by Dash & Selvi in the year 2013. True experimental study was conducted to evaluate the effectiveness of infrared rays on wound healing in the experimental group comparison with control group. All subjects in the experimental group had healed caesarean wound almost on 5th & 7th postoperative day. The study result showed that infrared light application was effective in enhancing wound healing.

5.5 Effect of infrared therapy on pain among mothers who underwent caesarean section.

Analysis on effect of infrared therapy on pain shows that there was no homogeneity in the pretest level of pain between experimental and control group mothers, but there was a difference identified in the posttest level of pain between the groups. The result also shows that there was a significant difference between the pretest and posttest level of pain among both experimental and control group mothers respectively.

Result of the present study was parallel with the study done by Chukuka S. Enwemeka et al., (2004) about the overall treatment effect of laser phototherapy on tissue repair and pain relief. Following a literature search, studies meeting their inclusion criteria were identified and coded. Then, the effect size of laser treatment, that is, Cohen's D, was calculated from each study using standard meta-analysis procedure. Thirty-four peer-reviewed papers on tissue repair met their inclusion criteria and were used to calculate 46 treatment effect sizes. Nine peer-

reviewed papers on pain control met the inclusion criteria and were used to calculate effect size. It was concluded that laser phototherapy was a highly effective therapeutic armamentarium for tissue repair and pain relief.

5.6 Association between the pretest level of wound healing and selected demographic variables among mothers who underwent caesarean section.

Chi square analysis shows that none of the selected demographic variables such as age, education, religion, gravida, para, type of delivery during present pregnancy, type of surgery, indication for caesarean section, height and weight of the mothers had association with the pretest level of wound healing.

5.7 Association between the pretest level of pain and selected demographic variables among mothers who underwent caesarean section.

Chi square analysis shows that only age ($\chi^2=18.93$) and weight ($\chi^2 = 15.01$) of the mothers had an association with the pretest level of pain.

Rest of the demographic variables such as education, religion, gravida, para, type of delivery during present pregnancy, type of surgery, indication for caesarean section and height of the mothers had association with the pretest level of pain.

5.8 Correlation between wound healing and pain among mothers who underwent caesarean section.

There are evidences to suggest that pain delays wound healing and there are many studies that focus the impact of pain as a stress on wound healing in both

psychological and physiological ways. But these findings cannot necessarily be attributed to the healing of surgical wounds as evidence of the mechanistic underpinnings of the relations between stress and surgical wound healing is limited (Upton D & Solowiej K 2010). The present study also shows that there was no correlation between wound healing and pain among mothers who underwent caesarean section.

But a study done by Dash & Selvi in the year 2013 on effectiveness of Infrared rays on wound healing and pain level among post caesarean mothers. Quantitative approach and pre- test/ post- test control group design adopted and 100 caesarean section mothers (50 experimental & 50 control group) were selected by simple random sampling technique. Modified Southampton wound assessment scale & Numeric pain rating scale were used. Experimental group received infrared therapy whereas the control group received routine dressing for twice a day for 3 days. Result shows that the Pre& post-test mean wound healing and pain scores found statistically significant. And there was a positive correlation between the wound healing and pain level score $r = 0.22$.

SUMMARY AND CONCLUSION

This chapter summarizes the major findings, limitations and implications in the field of nursing education, nursing practice, nursing administration, nursing research and recommendations for further research.

The main aim of the study was to assess the effect of Infrared therapy on wound healing and pain among mothers who underwent caesarean section in selected hospital at Coimbatore. The setting selected for the study was Sri Ramakrishna Hospital, Coimbatore. True experimental Pretest posttest control group design was adopted for the study. Purposive Sampling Technique was used to select the samples. Total number of samples selected for the study was 20. By lottery method samples were randomly assigned to experimental and control group. The level of wound healing was assessed using Davidson REEDA wound assessment Scale. Level of pain among mothers who underwent caesarean section was assessed using Numerical Pain Rating Scale. Infrared ray was applied on the caesarean wound with a distance of 50 cm at 45 degree angle from 3rd postoperative day till the day of discharge twice daily for 15 minutes. Student t- test was used to find out the effect of infrared ray on wound healing between experimental and control group mothers who underwent caesarean section. Paired t-test was used to test the effect of Infrared Therapy on wound healing and pain among mothers who underwent caesarean section among experimental and control group mothers respectively. Association was checked between the level of wound healing and pain and the selected demographic variables respectively by using Chi Square analysis. Correlation between the wound healing and the pain among mothers who underwent caesarean section was assessed using Karl Pearson Correlation Coefficient formula.

6.1 Major Findings of the Study

- 6.1.1 In the present study it was identified that majority of the mother's age ranged between 26-30.
- 6.1.2 All the 20 mothers were educated, none of them were illiterate.
- 6.1.3 Majority of the mothers (90%) of this present study belong to hindu religion.
- 6.1.4 The frequency distribution of mothers who underwent caesarean section on the gravid state shows that majority of the mothers (65%) in both experimental and control group were multi gravid mothers.
- 6.1.5 In the present study, findings show that majority of the mothers (55%) were multi para mothers.
- 6.1.6 Result shows that in both the groups there was an increased rate of caesarean section in previous pregnancy.
- 6.1.7 Majority of the mothers in the Experimental group (77.78%) and all the mothers in control group had term delivery.
- 6.1.8 The findings of the study reveals that majority of mothers (75%) underwent elective surgery.
- 6.1.9 Finding of the study describes that, other than the pregnancy complications, previous caesarean section was the main indication for caesarean section.
- 6.1.10 Majority of the mothers (95%) had no history of diabetes mellitus and none of them had gestational diabetes mellitus.
- 6.1.11 The present study demonstrates that, caesarean section was high irrespective of the height of the women.

- 6.1.12 All the mothers had normal range of temperature, pulse, respiration and blood pressure. All the mothers had prophylactic antibiotics and similar kind of surgical history. None of them received steroidal medications.
- 6.1.13 Analysis on the effect of infrared therapy on wound healing shows that there was no homogeneity in the pretest level of wound healing between experimental and control group mothers.
- 6.1.14 There was no significant difference found in the posttest level of wound healing between two groups.
- 6.1.15 There was a significant difference in the wound healing in both the groups respectively.
- 6.1.16 There was no homogeneity in the pretest level of pain between experimental and control group mothers.
- 6.1.17 There was a difference identified in the posttest level of pain between the experimental and control group mother who underwent caesarean section.
- 6.1.18 There was a significant difference between the pretest and posttest level of pain among both experimental and control group mothers respectively.
- 6.1.19 Chi square analysis shows that none of the selected demographic variables had association with the pretest level of wound healing.
- 6.1.20 Chi square analysis shows that only age ($\chi^2 = 18.93$) and weight ($\chi^2 = 15.01$) of the mothers had an association with the pretest level of pain.
- 6.1.21 The present study also shows that there was no correlation between wound healing and pain among mothers who underwent caesarean section.

6.2 Limitation

6.2.1 Since the sample size is very less the researcher felt difficulty in generalizing the finding of the study.

6.2.2 All the mothers were discharged on 5th postoperative day. Hence the intervention was very limited.

6.3 Recommendations

6.3.1. The same study could be undertaken with large samples to show strong statistical association.

6.3.2 The same study can be replicated among mothers who underwent caesarean section irrespective of the method of dressing technique.

6.3.3 A comparative study can be done between the infrared therapy with other therapeutic methods for wound healing.

6.4 Nursing Implication

The finding of the study had several implications for nursing practice, nursing administration, nursing education and nursing research.

6.4.1 Nursing education

6.4.1.1 Nursing students should be given updated knowledge on recent practice in caesarean wound healing techniques.

6.4.1.2 Nursing curriculum should be well equipped to prepare efficient nurses in providing quality care to the mothers who underwent caesarean section.

6.4.2 Nursing administration

6.4.2.1 The nurse administrator should look into the need for organizing In-service and continuing nursing education programs for staff nurses in order to update their knowledge regarding caesarean wound healing.

6.4.2.2 Nursing administrator should formulate policies towards the wound assessment and healing methods for the mothers who underwent caesarean section.

6.4.3 Nursing practice

Nurses play a vital role in the health care delivery system and they too have a role to play in minimizing pain and promoting health. They work in the immediate environment with the patients and have all the opportunity to identify the need and problems. Successful nursing care of surgical wounds is dependent on the nurse's knowledge and understanding of normal wound healing physiology and the optimal treatment of the resultant wound. Using this knowledge, nurses can provide a systematic and holistic patient assessment and consider any potential wound-related complications.

6.4.4 Nursing research

Selected measures to improve caesarean wound healing may reduce the maternal morbidity. Hence nurse researcher should focus on well-designed clinical trials in caesarean wound healing at various conditions and settings.

6.5 Conclusion

Present study was conducted in order to find the effectiveness of infrared therapy in enhancing caesarean wound healing and reducing pain among mothers who underwent caesarean section. The result shows that there was a significant difference in wound healing between pretest and posttest among mothers who underwent caesarean section in experimental group. The result also showed that there was a significant difference in the level of pain after implementation of Infrared Therapy among mothers who underwent caesarean section during posttest. There was a significant difference in pain between pretest and posttest among mothers who underwent caesarean section. Age and weight of mothers who underwent caesarean section were associated with level of pain. The study also revealed that there was no correlation between the level of wound healing and the level of pain among mothers who underwent caesarean section.

Hence, the researcher would like to conclude that healing of caesarean wound was an important aspect of postnatal care among mothers who underwent caesarean section. Delayed healing of the wound was one of the main problem of mothers during postoperative period. The real challenge for the future is to select appropriate and at the same time cost effective interventions for each patient. This can be achieved only by developing appropriate clinical services and undertaking more high quality basic and clinical research.

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ANNEXURE I

Effect of Infrared Therapy on Wound Healing among Mothers who Underwent Caesarean Section

Student 't' test was applied to find out the effect of Infrared Therapy On Wound Healing and Pain among mothers who underwent caesarean section in experimental group and control group

$$t = \frac{\bar{x} - \bar{y}}{SE}$$

where,

$$SE \text{ (Standard error)} = SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$SD \text{ (Standard deviation)} = \sqrt{\frac{\sum (x - \bar{x})^2 + \sum (y - \bar{y})^2}{n_1 + n_2 - 2}}$$

Where

SD = Standard Deviation

SE = Standard Error

\bar{x} = Mean post test score of the Experimental group

\bar{y} = Mean post test score of the Control group

n_1 = Number of samples in Experimental group

n_2 = Number of samples in Control group

ANNEXURE I -1

Effect of Infrared Therapy on Wound Healing Between Experimental and Control Group Mothers who underwent caesarean section before infrared therapy

Sample no	Experimental Group (x)	$X - \bar{X}$	$(X - \bar{X})^2$	Sample No	Control Group (y)	$Y - \bar{Y}$	$(Y - \bar{Y})^2$
1	1	0.56	0.31	1	1	0.55	0.30
2	0	-0.44	0.19	2	0	-0.45	0.20
3	1	0.56	0.31	3	0	-0.45	0.20
4	1	0.56	0.31	4	1	0.55	0.30
5	0	-0.44	0.19	5	1	0.55	0.30
6	1	0.56	0.31	6	0	-0.45	0.20
7	0	-0.44	0.19	7	1	0.55	0.30
8	0	-0.44	0.19	8	1	0.55	0.30
9	0	-0.44	0.19	9	0	-0.45	0.20
				10	0	-0.45	0.20
				11	0	-0.45	0.20
Total	4		2.19		5		2.73

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2 + (y - \bar{y})^2}{n_1 + n_2 - 2}}$$

$$= \sqrt{\frac{2.19 + 2.73}{9 + 11 - 2}} = 0.52$$

$$SE = SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.52 \sqrt{\frac{1}{9} + \frac{1}{11}} = 0.21$$

$$t = \frac{\bar{x} - \bar{y}}{SE} = \frac{0.44 - 0.45}{0.21}$$

t = -0.04

ANNEXURE I- 2
Effect of Infrared Therapy on Wound Healing Between Experimental and Control Group Mothers who underwent caesarean section after infrared therapy

Sample no	Experimental Group (x)	$X - \bar{X}$	$(X - \bar{X})^2$	Sample No	Control Group (y)	$Y - \bar{Y}$	$(Y - \bar{Y})^2$
1	0	0	0	1	0	0	0
2	0	0	0	2	0	0	0
3	0	0	0	3	0	0	0
4	0	0	0	4	0	0	0
5	0	0	0	5	0	0	0
6	0	0	0	6	0	0	0
7	0	0	0	7	0	0	0
8	0	0	0	8	0	0	0
9	0	0	0	9	0	0	0
				10	0	0	0
				11	0	0	0
Total	0		0		0		0

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2 + (y - \bar{y})^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+0}{9+11-2}} = 0$$

$$SE = SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0 \sqrt{\frac{1}{9} + \frac{1}{11}} = 0$$

$$t = \frac{\bar{x} - \bar{y}}{SE} = \frac{0 - 0}{0}$$

t = 0

**Analysis on difference between pre test and post test level of wound healing
and pain in experimental Group**

Paired 't' test was used to analyze the difference between pre and post test level of wound healing and pain in both groups.

$$t = \frac{\bar{d}}{SE}$$

where,

$$SE = \frac{SD}{\sqrt{n}}$$

$$SD = \sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{n}}{n-1}}$$

\bar{d} = Mean of difference between test score

SE = Standard Error

$\sum D$ = Sum of mean difference between test scores

$\sum D^2$ = Sum of square of mean difference between the test scores

SD = Standard deviation of the test score

n = Number of samples

ANNEXURE I-3

Effect of Infrared therapy on wound healing among mothers who underwent caesarean section in experimental group

S.No	Pre test (x ₁)	Post test (x ₂)	X ₁ -X ₂ =D	D ²
1	1	0	1	1
2	0	0	0	0
3	1	0	1	1
4	1	0	1	1
5	0	0	0	0
6	1	0	1	1
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
Total			ΣD = 4	ΣD ² = 4

$$\text{Standard Deviation} = \sqrt{\frac{\Sigma D^2 - \frac{(\Sigma D)^2}{n}}{n-1}} = \sqrt{\frac{4 - \frac{(4)^2}{9}}{9-1}} = 0.52$$

$$\bar{d} = \frac{\Sigma D}{n} = \frac{4}{9} = 0.44$$

$$SE = \frac{SD}{\sqrt{n}} = \frac{0.52}{\sqrt{9}} = 0.173$$

$$t = \frac{\bar{d}}{SE} = \frac{0.44}{0.173} = 2.543$$

t = 2.543

ANNEXURE II -4

Effect of Infrared therapy on wound healing among mothers who underwent caesarean section in Control group

S.No	Pre test (x ₁)	Post test (x ₂)	X ₁ -X ₂ =D	D ²
1	1	0	1	1
2	0	0	0	0
3	0	0	0	0
4	1	0	1	1
5	1	0	1	1
6	0	0	0	0
7	1	0	1	1
8	1	0	1	1
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
Total			ΣD = 5	ΣD ² =5

$$\text{Standard Deviation} = \sqrt{\frac{\Sigma D^2 - \frac{(\Sigma D)^2}{n}}{n-1}} = \sqrt{\frac{5 - \frac{(5)^2}{11}}{11-1}} = 0.52$$

$$\bar{d} = \frac{\Sigma D}{n} = \frac{5}{11} = 0.45$$

$$SE = \frac{SD}{\sqrt{n}} = \frac{0.52}{\sqrt{11}} = 0.16$$

$$t = \frac{\bar{d}}{SE} = \frac{0.45}{0.16} = 2.81$$

t = 2.81

ANNEXURE II
Effect of Infrared Therapy on Pain among Mothers who underwent
caesarean section

ANNEXURE II-1
Effect of Infrared Therapy on Pain between Experimental and
Control Group Mothers who underwent caesarean section before infrared
therapy

Sample no	Experimental Group (x)	$X - \bar{X}$	$(X - \bar{X})^2$	Sample No	Control Group (y)	$Y - \bar{Y}$	$(Y - \bar{Y})^2$
1	4	0.1	0.01	1	3	-1.45	2.10
2	3	-0.9	0.81	2	4	-0.45	0.20
3	2	-1.9	3.61	3	4	-0.45	0.20
4	4	0.1	0.01	4	4	-0.45	0.20
5	3	-0.9	0.81	5	5	0.55	0.30
6	5	1.1	1.21	6	6	1.55	2.40
7	4	0.1	0.01	7	5	0.55	0.30
8	5	1.1	1.21	8	3	-1.45	2.10
9	5	1.1	1.21	9	5	0.55	0.30
				10	4	-0.45	0.20
				11	6	1.55	2.40
Total	35		8.89		49		10.73

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2 + (y - \bar{y})^2}{n_1 + n_2 - 2}} = \sqrt{\frac{8.89 + 10.73}{9 + 11 - 2}} = 1.04$$

$$SE = SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 1.04 \sqrt{\frac{1}{9} + \frac{1}{11}} = 0.45$$

$$t = \frac{\bar{x} - \bar{y}}{SE} = \frac{3.88 - 4.45}{0.45} \quad \boxed{t = -1.22}$$

ANNEXURE II-2

Effect of Infrared Therapy on Pain between Experimental and Control Group Mothers who underwent caesarean section after infrared therapy

Sample no	Experimental Group (x)	$X - \bar{X}$	$(X - \bar{X})^2$	Sample No	Control Group (y)	$Y - \bar{Y}$	$(Y - \bar{Y})^2$
1	1	0.6	0.36	1	1	-0.3	0.09
2	0	-0.44	0.19	2	2	0.73	0.49
3	0	-0.44	0.19	3	1	-0.3	0.09
4	0	-0.44	0.19	4	0	-1.3	1.69
5	0	-0.44	0.19	5	2	0.73	0.49
6	1	0.6	0.36	6	2	0.73	0.49
7	0	-0.44	0.19	7	1	-0.3	0.09
8	1	0.6	0.36	8	1	-0.3	0.09
9	1	0.6	0.36	9	1	-0.3	0.09
				10	1	-0.3	0.09
				11	2	0.73	0.49
Total	4		2.29		14		4.19

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2 + (y - \bar{y})^2}{n_1 + n_2 - 2}} = \sqrt{\frac{2.29 + 4.19}{9 + 11 - 2}} = 0.61$$

$$SE = SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.61 \sqrt{\frac{1}{9} + \frac{1}{11}} = 0.24$$

$$t = \frac{\bar{x} - \bar{y}}{SE} = \frac{0.4 - 1.3}{0.24} = -3.8$$

t = -3.8

ANNEXURE II -3

Effect of Infrared therapy on Pain among mothers who underwent caesarean section in experimental group

S.No	Pre test (x ₁)	Post test (x ₂)	X ₁ -X ₂ =D	D ²
1	4	1	3	9
2	3	0	3	9
3	2	0	2	4
4	4	0	4	16
5	3	0	3	9
6	5	1	4	16
7	4	0	4	16
8	5	1	4	16
9	5	1	4	16
			ΣD = 31	ΣD ² = 111

$$\text{Standard Deviation} = \sqrt{\frac{\Sigma D^2 - \frac{(\Sigma D)^2}{n}}{n-1}} = \sqrt{\frac{111 - \frac{(31)^2}{9}}{9-1}} = 0.73$$

$$\bar{d} = \frac{\Sigma D}{n} = \frac{31}{9} = 3.44$$

$$SE = \frac{SD}{\sqrt{n}} = \frac{0.73}{\sqrt{9}} = 0.24$$

$$t = \frac{\bar{d}}{SE} = \frac{3.44}{0.24} = 14.33$$

t = 14.33

ANNEXURE II -4

Effect of Infrared therapy on Pain among mothers who underwent caesarean section in Control group

S.No	Pre test (x ₁)	Post test (x ₂)	X ₁ -X ₂ =D	D ²
1	3	1	2	4
2	4	2	2	4
3	4	1	3	9
4	4	0	4	16
5	5	2	3	9
6	6	2	4	16
7	5	1	4	16
8	3	1	2	4
9	5	1	4	16
10	4	1	3	9
11	6	2	4	16
			ΣD = 35	ΣD ² = 119

$$\text{Standard Deviation} = \sqrt{\frac{\Sigma D^2 - \frac{(\Sigma D)^2}{n}}{n-1}} = \sqrt{\frac{119 - \frac{(35)^2}{11}}{11-1}} = 0.87$$

$$\bar{d} = \frac{\Sigma D}{n} = \frac{35}{11} = 3.18$$

$$SE = \frac{SD}{\sqrt{n}} = \frac{0.87}{\sqrt{11}} = 0.26$$

$$t = \frac{\bar{d}}{SE} = \frac{3.18}{0.26} = 12.23$$

t = 12.23

ANNEXURE III

Association between wound healing and pain with selected demographic variables

Chi-Square (with Yates correction) test was used to find out the association between level of wound healing and pain with selected demographic variables.

$$X^2 = \sum \frac{[(O - E) - 0.5]^2}{E}$$

Where,

O = Observed value in each category

E = Expected value in corresponding category

0.5 = Yates correction value.

ANNEXURE III-1

Chi Square analysis between age and the level of wound healing among mothers who underwent caesarean section

Age in years	Frequency	Very good wound healing	Good wound healing	Total
20-25	5	2	3	5
26-30	10	7	3	10
31-35	5	2	3	5
Total	20	11	9	20

$$E2 = \frac{11 \times 5}{20} = 2.75$$

$$E7 = \frac{11 \times 5}{20} = 5.5$$

$$E2 = \frac{11 \times 5}{20} = 2.75$$

$$E3 = \frac{11 \times 5}{20} = 2.25$$

$$E3 = \frac{11 \times 5}{20} = 4.5$$

$$E3 = \frac{11 \times 5}{20} = 2.25$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
2	2.75	-0.75	-1.25	01.56	0.56
7	5.5	1.5	1	1	0.18
2	2.75	-0.75	-1.25	1.56	0.56
3	2.25	0.75	0.25	0.06	0.02
3	4.5	-0.5	2	4	0.88
3	2.25	0.75	0.25	0.06	0.02
X²					2.22

ANNEXURE III-2

Chi Square analysis between education and the level of wound healing among mothers who underwent caesarean section

Education	Frequency	Very good wound healing	Good wound healing	Total
Schooling	9	5	4	9
UG	7	4	3	7
PG	4	2	2	4
Total	20	11	9	20

$$E5 = \frac{11 \times 9}{20} = 4.95$$

$$E4 = \frac{11 \times 7}{20} = 3.85$$

$$E2 = \frac{11 \times 4}{20} = 2.2$$

$$E4 = \frac{9 \times 9}{20} = 3.15$$

$$E3 = \frac{9 \times 7}{20} = 3.15$$

$$E2 = \frac{9 \times 4}{20} = 1.8$$

Observed Value (o)	Expected Value (E)	O-E	$\frac{(O-E)-0.5}{0.5}$	$\frac{((O-E)-0.5)^2}{0.5}$	$\frac{((O-E)-0.5)^2}{E}$
5	4.95	0.05	-0.45	0.2	0.04
4	3.85	0.15	-0.35	0.12	0.03
2	2.2	-0.2	-0.7	0.5	0.22
4	4.05	-0.05	-0.55	0.3	0.0
3	3.15	-0.15	-0.65	0.42	0.13
2	1.8	0.2	-0.3	0.09	0.05
X^2					0.55

ANNEXURE III-3

Chi Square analysis between religion and the level of wound healing among mothers who underwent caesarean section

Religion	Frequency	Very good wound healing	Good wound healing	Total
Hindu	18	10	8	18
Muslim	2	1	1	2
Total	20	11	9	20

$$E_{10} = \frac{11 \times 18}{20} = 9.9$$

$$E_1 = \frac{11 \times 2}{20} = 1.1$$

$$E_8 = \frac{9 \times 18}{20} = 8.1$$

$$E_1 = \frac{9 \times 2}{20} = 0.9$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	$((O-E)-0.5)^2$	$\frac{((O-E)-0.5)^2}{E}$
10	9.9	0.1	-0.4	0.16	0.01
1	1.1	-0.1	-0.6	0.36	0.32
8	8.1	-0.1	-0.6	0.36	0.04
1	0.9	0.1	-0.4	0.16	0.17
χ^2					0.54

ANNEXURE III-4

Chi Square analysis between gravida and the level of wound healing among mothers who underwent caesarean section

Gravida	Frequency	Very good wound healing	Good wound healing	Total
1	7	3	4	7
2	8	4	4	8
3	4	3	1	4
4	1	1	0	1
Total	20	11	9	20

$$E3 = \frac{11 \times 7}{20} = 3.85$$

$$E4 = \frac{11 \times 8}{20} = 4.4$$

$$E3 = \frac{11 \times 4}{20} = 2.2$$

$$E1 = \frac{11 \times 1}{20} = 0.55$$

$$E4 = \frac{9 \times 7}{20} = 3.15$$

$$E4 = \frac{9 \times 8}{20} = 3.6$$

$$E1 = \frac{9 \times 4}{20} = 1.8$$

$$E0 = \frac{9 \times 1}{20} = 0.45$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
3	3.85	-0.85	-1.35	1.82	0.47
4	4.4	-0.4	-0.9	0.81	0.18
3	2.2	0.8	0.3	0.09	0.04
1	0.55	0.45	-0.05	0.0025	0.004
4	3.15	0.85	0.35	0.12	0.03
4	3.6	0.4	-0.1	0.01	0.002
1	1.8	-0.8	-1.3	1.69	0.93
0	0.45	-0.45	-0.95	0.9	2
X²					3.689

ANNEXURE III-5

Chi Square analysis between para and the level of wound healing among mothers who underwent caesarean section

Para	Frequency	Very good wound healing	Good wound healing	Total
Primi	9	4	5	9
multi	11	7	4	11
Total	20	11	9	20

$$E4 = \frac{11 \times 9}{20} = 4.95$$

$$E7 = \frac{11 \times 11}{20} = 6.05$$

$$E5 = \frac{9 \times 9}{20} = 4.05$$

$$E4 = \frac{9 \times 11}{20} = 4.95$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
4	4.95	-0.95	-1.45	2.1	0.42
7	6.05	0.95	0.45	0.2	0.03
5	4.05	0.95	0.45	0.2	0.05
4	4.95	-0.95	-1.45	2.1	0.42
χ^2					0.92

ANNEXURE III-6

Chi Square analysis between type of delivery during present pregnancy and the level of wound healing among mothers who underwent caesarean section

Type of delivery	Frequency	Very good wound healing	Good wound healing	Total
Preterm	2	1	1	2
term	18	10	8	18
Total	20	11	9	20

$$E_{11} = \frac{11 \times 2}{20} = 1.1$$

$$E_{10} = \frac{11 \times 18}{20} = 9.9$$

$$E_{21} = \frac{9 \times 2}{20} = 0.9$$

$$E_{20} = \frac{9 \times 18}{20} = 8.1$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
1	1.1	-0.1	-0.6	0.36	0.32
10	9.9	0.1	-0.4	0.16	0.01
1	0.9	0.1	-0.4	0.16	0.17
8	8.1	-0.1	-0.6	0.36	0.04
X²					0.54

ANNEXURE III-7

**Chi Square analysis between type of surgery and the level of wound healing
among mothers who underwent caesarean section**

Type of surgery	Frequency	Very good wound healing	Good wound healing	Total
Emergency	2	2	0	2
elective	18	9	9	18
Total	20	11	9	20

$$E2 = \frac{11 \times 2}{20} = 1.1$$

$$E9 = \frac{11 \times 18}{20} = 9.9$$

$$E1 = \frac{9 \times 2}{20} = 0.9$$

$$E8 = \frac{9 \times 18}{20} = 8.1$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
1.1	1.1	0.9	0.4	0.16	0.14
9.9	9.9	-0.9	1.4	1.96	0.19
0.9	0.9	0.1	-0.4	0.16	0.17
8.1	8.1	-0.1	0.6	0.36	0.04
χ^2					0.54

ANNEXURE III-8

Chi Square analysis between indication for caesarean section and the level of wound healing among mothers who underwent caesarean section

Para	Frequency	Very good wound healing	Good wound healing	Total
Previous LSCS	9	4	5	9
Oligohydramnios	3	3	0	3
PIH	3	1	2	3
Breech presentation	3	1	2	3
Preeclampsia	1	1	0	1
Meconium stained liquor	1	1	0	1
Total	20	11	9	20

$$E4 = \frac{11 \times 9}{20} = 4.95$$

$$E3 = \frac{11 \times 3}{20} = 1.65$$

$$E1 = \frac{11 \times 3}{20} = 1.65$$

$$E1 = \frac{11 \times 3}{20} = 1.65$$

$$E1 = \frac{11 \times 1}{20} = 0.55$$

$$E1 = \frac{11 \times 1}{20} = 0.55$$

$$E5 = \frac{9 \times 9}{20} = 4.05$$

$$E0 = \frac{9 \times 3}{20} = 1.35$$

$$E2 = \frac{9 \times 3}{20} = 1.35$$

$$E2 = \frac{9 \times 3}{20} = 1.35$$

$$E0 = \frac{9 \times 1}{20} = 0.45$$

$$E0 = \frac{9 \times 1}{20} = 0.45$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	$\frac{((O-E)-0.5)^2}{E}$	$\frac{((O - E) - 0.5)^2}{E}$
4	4.95	-0.95	-1.45	2.1	0.42
3	1.65	-1.35	0.85	0.72	0.43
1	1.65	-0.65	-1.15	1.32	0.8
1	1.65	-0.65	-1.15	1.32	0.8
1	0.55	0.45	-0.05	0.0025	0.0045
1	0.55	0.45	-0.05	0.0025	0.0045
5	4.05	0.95	0.45	0.2	0.05
0	1.35	-1.35	-1.85	3.42	2.53
2	1.35	0.65	0.15	0.02	0.01
2	1.35	0.65	0.15	0.02	0.01
0	0.45	-0.45	-0.95	0.9	2
0	0.45	-0.45	-0.95	0.9	2
X^2					9.05

ANNEXURE III-9

**Chi Square analysis between height and the level of wound healing among
mothers who underwent caesarean section**

Height	Frequency	Very good wound healing	Good wound healing	Total
144-155	9	6	3	9
156-165	11	5	6	11
Total	20	11	9	20

$$E6 = \frac{11 \times 9}{20} = 4.95$$

$$E5 = \frac{11 \times 11}{20} = 6.05$$

$$E3 = \frac{9 \times 9}{20} = 4.05$$

$$E6 = \frac{9 \times 11}{20} = 4.95$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
6	4.95	1.05	0.55	0.3	0.06
5	6.05	-1.05	-1.55	2.4	0.39
3	4.05	-1.05	-1.55	2.4	0.59
6	4.95	1.05	0.55	0.3	0.06
					1.11

ANNEXURE III-10

Chi Square analysis between weight and the level of wound healing among mothers who underwent caesarean section

Weight	Frequency	Very good wound healing	Good wound healing	Total
50-70	15	9	6	15
71-90	4	2	2	4
91-110	1	0	1	1
Total	20	11	9	20

$$E9 = \frac{11 \times 15}{20} = 8.25$$

$$E2 = \frac{11 \times 4}{20} = 2.2$$

$$E0 = \frac{11 \times 1}{20} = 0.55$$

$$E6 = \frac{9 \times 15}{20} = 6.75$$

$$E2 = \frac{9 \times 4}{20} = 1.8$$

$$E1 = \frac{9 \times 1}{20} = 0.45$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	$((O-E)-0.5)^2$	$\frac{((O-E)-0.5)^2}{E}$
9	8.25	0.75	0.25	0.06	0.007
2	2.2	-0.2	0.7	0.49	0.22
0	0.55	-0.55	-1.05	1.10	2
6	6.75	-0.75	-1.25	1.56	0.23
2	1.8	0.2	-0.3	0.09	0.05
1	0.45	0.55	0.05	0.0025	0.005
X^2					2.512

ANNEXURE III-11

**Chi Square analysis between age and the level of pain among mothers who
underwent caesarean section**

Age	Frequency	Mild	Moderate	Total
20-25	5	3	2	5
26-30	10	2	18	10
31-35	5	0	5	5
Total	20	5	15	20

$$E_3 = \frac{5 \times 5}{20} = 1.25$$

$$E_2 = \frac{5 \times 10}{20} = 2.5$$

$$E_0 = \frac{5 \times 5}{20} = 1.25$$

$$E_2 = \frac{15 \times 5}{20} = 3.75$$

$$E_{18} = \frac{15 \times 10}{20} = 7.5$$

$$E_5 = \frac{15 \times 5}{20} = 3.75$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	$\frac{((O-E)-0.5)^2}{E}$	$\frac{((O - E) - 0.5)^2}{E}$
3	1.25	1.75	1.25	1.56	1.25
2	2.5	-0.5	-1	1	0.4
0	1.25	-1.25	-1.75	3.06	2.45
2	3.75	-1.75	-2.25	5.06	1.35
18	7.5	10.5	10	100	13.33
5	3.75	1.25	0.75	0.56	0.15
X^2					18.93

ANNEXURE III-12

**Chi Square analysis between education and the level of pain among mothers
who underwent caesarean section**

Education	Frequency	Mild	Moderate	Total
Schooling	9	2	8	9
UG	7	1	6	7
PG	4	2	2	4
Total	20	5	15	20

$$E2 = \frac{5 \times 9}{20} = 2.25$$

$$E1 = \frac{5 \times 7}{20} = 1.75$$

$$E2 = \frac{5 \times 4}{20} = 1$$

$$E8 = \frac{15 \times 9}{20} = 6.75$$

$$E6 = \frac{15 \times 7}{20} = 5.25$$

$$E2 = \frac{15 \times 4}{20} = 3$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	$\frac{((O-E)-0.5)^2}{E}$	$\frac{((O - E) - 0.5)^2}{E}$
2	2.25	-0.25	-0.75	0.56	0.25
1	1.75	-0.75	-1.25	1.56	0.89
2	1	1	0.5	0.25	0.25
8	6.75	1.25	0.75	0.56	0.08
6	5.25	0.75	0.25	0.06	0.01
2	3	-1	-1.5	2.25	0.75
X²					2.23

ANNEXURE III-13

**Chi Square analysis between religion and the level of pain among mothers
who underwent caesarean section**

Religion	Frequency	Mild	Moderate	Total
Hindu	18	4	14	18
Muslim	2	1	1	2
Total	20	5	15	20

$$E_4 = \frac{5 \times 18}{20} = 4.5$$

$$E_1 = \frac{5 \times 2}{20} = 0.5$$

$$E_{14} = \frac{15 \times 18}{20} = 13.5$$

$$E_1 = \frac{15 \times 2}{20} = 1.5$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
4	4.5	-0.5	-1	1	0.22
1	0.5	0.5	0	0	0
14	13.5	0.5	0	0	0
1	1.5	-0.5	-1	1	0.66
X²					0.88

ANNEXURE III-14

**Chi Square analysis between gravida and the level of pain among mothers
who underwent caesarean section**

Gravida	Frequency	Mild	Moderate	Total
1	7	3	4	7
2	8	1	7	8
3	4	1	3	4
4	1	0	1	1
Total	20	5	15	20

$$E3 = \frac{5 \times 7}{20} = 1.75$$

$$E1 = \frac{5 \times 8}{20} = 2$$

$$E1 = \frac{5 \times 4}{20} = 1$$

$$E0 = \frac{5 \times 1}{20} = 0.25$$

$$E4 = \frac{15 \times 7}{20} = 5.25$$

$$E7 = \frac{15 \times 8}{20} = 6$$

$$E3 = \frac{15 \times 4}{20} = 3$$

$$E1 = \frac{15 \times 1}{20} = 0.75$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
3	1.75	1.25	0.75	0.56	0.32
1	2	-1	-1.5	2.25	1.12
1	1	0	-0.5	0.25	0.25
0	0.25	-0.25	-0.75	0.56	2.24
4	5.25	-1.25	-1.75	3.06	0.58
7	6	1	0.5	0.25	0.04
3	3	0	-0.5	0.25	0.08
1	0.75	0.25	-0.25	0.06	0.08
X²					4.91

ANNEXURE III-15

Chi Square analysis between para and the level of wound healing among mothers who underwent caesarean section

Para	Frequency	Mild	Moderate	Total
Primi	9	3	6	9
multi	11	2	9	11
Total	20	5	15	20

$$E3 = \frac{5 \times 9}{20} = 3.9$$

$$E2 = \frac{5 \times 11}{20} = 2.75$$

$$E6 = \frac{15 \times 9}{20} = 6.75$$

$$E9 = \frac{15 \times 11}{20} = 8.25$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
3	3.9	-0.9	-1.4	1.96	0.5
2	2.75	-0.75	-1.25	1.56	0.56
6	6.75	-0.75	-1.25	1.56	0.23
9	8.25	0.75	0.25	0.06	0.007
X ²					1.30

ANNEXURE III-16

**Chi Square analysis between type of delivery during present pregnancy and
the level of pain among mothers who underwent caesarean section**

Type of delivery	Frequency	Mild	Moderate	Total
Preterm	2	0	2	2
Term	18	5	13	18
Total	20	5	15	20

$$E_0 = \frac{5 \times 2}{20} = 0.5$$

$$E_5 = \frac{5 \times 18}{20} = 4.5$$

$$E_2 = \frac{15 \times 2}{20} = 1.5$$

$$E_{13} = \frac{15 \times 18}{20} = 13.5$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
0	0.5	-0.5	-1	1	2
5	4.5	0.5	0	0	0
2	1.5	0.5	0	0	0
13	13.5	-0.5	-1	1	0.07
				X ²	2.07

ANNEXURE III-17

Chi Square analysis between type of surgery and the level of pain among mothers who underwent caesarean section

Type of surgery	Frequency	Mild	Moderate	Total
Emergency	2	0	2	2
Elective	18	5	13	18
Total	20	5	15	20

$$E_0 = \frac{5 \times 2}{20} = 0.5$$

$$E_5 = \frac{5 \times 18}{20} = 4.5$$

$$E_2 = \frac{15 \times 2}{20} = 1.5$$

$$E_{13} = \frac{15 \times 18}{20} = 13.5$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
0	0.5	-0.5	-1	1	2
5	4.5	0.5	0	0	0
2	1.5	0.5	0	0	0
13	13.5	-0.5	-1	1	0.07
X²					2.07

ANNEXURE III-18

**Chi Square analysis between indication and the level of pain among mothers
who underwent caesarean section**

Indication	Frequency	Mild	Moderate	Total
Previous LSCS	9	4	5	9
Oligohydramnios	3	0	3	3
PIH	3	2	1	3
Breech presentation	3	2	1	3
Preeclampsia	1	0	1	1
Meconium stained liquor	1	0	1	1
Total	20	8	12	20

$$E4 = \frac{8 \times 9}{20} = 3.6$$

$$E0 = \frac{8 \times 3}{20} = 1.2$$

$$E2 = \frac{8 \times 3}{20} = 1.2$$

$$E2 = \frac{8 \times 3}{20} = 1.2$$

$$E0 = \frac{8 \times 1}{20} = 0.4$$

$$E0 = \frac{8 \times 1}{20} = 0.4$$

$$E5 = \frac{12 \times 9}{20} = 5.4$$

$$E3 = \frac{12 \times 3}{20} = 1.8$$

$$E1 = \frac{12 \times 3}{20} = 1.8$$

$$E1 = \frac{12 \times 3}{20} = 1.8$$

$$E1 = \frac{12 \times 1}{20} = 0.6$$

$$E1 = \frac{12 \times 1}{20} = 0.6$$

Observed Value (O)	Expected Value (E)	O-E	(O-E)-0.5	((O-E)-0.5) ²	$\frac{((O - E) - 0.5)^2}{E}$
4	3.6	0.4	-0.1	0.01	0.002
0	1.2	-1.2	-1.7	2.89	2.4
2	1.2	0.8	0.3	0.09	0.075
2	1.2	0.8	0.3	0.09	0.075
0	0.4	-0.4	-0.9	0.81	2
0	0.4	-0.4	-0.9	0.81	2
5	5.4	-0.4	-0.9	0.81	0.15
3	1.8	1.2	0.7	0.49	0.27
1	1.8	-0.8	-1.3	1.69	0.93
1	1.8	-0.8	-1.3	1.69	0.93
1	0.6	0.4	-0.1	0.01	0.01
1	0.6	0.4	-0.1	0.01	0.01
X^2					8.88

ANNEXURE III-19

**Chi Square analysis between height and the level of pain among mothers who
underwent caesarean section**

Height	Frequency	Mild	Moderate	Total
144-155	9	3	6	9
156-165	11	2	9	11
Total	20	5	15	20

$$E3 = \frac{5 \times 9}{20} = 2.25$$

$$E2 = \frac{5 \times 11}{20} = 2.75$$

$$E7 = \frac{15 \times 9}{20} = 6.75$$

$$E8 = \frac{15 \times 11}{20} = 8.25$$

Observed Value (o)	Expected Value (E)	O-E	(O-E)-0.5	$((O-E)-0.5)^2$	$\frac{((O - E) - 0.5)^2}{E}$
3	2.25	0.75	0.25	0.06	0.02
2	2.75	-0.75	-1.25	1.56	0.56
7	6.75	0.25	0.05	0.0025	0
8	8.25	-0.25	-0.75	0.56	0.06
X²					0.64

ANNEXURE III-20

Chi Square analysis between weight and the level of wound healing among mothers who underwent caesarean section

weight	Frequency	Mild	Moderate	Total
50-70	15	6	9	15
71-90	4	0	4	4
91-110	1	0	1	1
Total	20	6	14	20

$$E6 = \frac{6 \times 15}{20} = 1.53$$

$$E0 = \frac{6 \times 4}{20} = 1.2$$

$$E0 = \frac{6 \times 1}{20} = 0.3$$

$$E9 = \frac{14 \times 15}{20} = 10.5$$

$$E4 = \frac{14 \times 4}{20} = 2.8$$

$$E1 = \frac{14 \times 1}{20} = 0.7$$

Observed Value (o)	Expected Value (E)	O-E	$\frac{(O-E)-0.5}{0.5}$	$\frac{((O-E)-0.5)^2}{0.5}$	$\frac{((O - E) - 0.5)^2}{E}$
6	1.53	4.47	3.97	15.76	10.3
0	1.2	-1.2	-1.7	2.38	1.98
0	0.3	-0.3	-0.8	0.64	2.13
9	10.5	-1.5	-2	4	0.38
4	2.8	1.2	0.7	0.49	0.17
1	0.7	0.3	-0.2	0.04	0.05
X²					15.01

ANNEXURE IV

Correlation between the Wound Healing and Pain among mothers who underwent caesarean section.

Karl Pearson's Correlation Coefficient Formula was used to find out the correlation between the wound healing and pain among mothers who underwent caesarean section.

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

Where

- x = Wound Healing score
- y = Pain score
- \bar{x} = Mean score of the wound healing
- \bar{y} = Mean post test score of the pain

ANNEXURE IV - 1

Analysis on Correlation between the Wound Healing and Pain among mothers who underwent caesarean section in Experimental Group during Pretest

Sample No	Wound healing (x)	Pain (y)	$x - \bar{x}$	$(x - \bar{x})^2$	$y - \bar{y}$	$(y - \bar{y})^2$
1	1	4	0.56	0.31	0.1	0.01
2	0	3	-0.44	0.19	-0.9	0.81
3	1	2	0.56	0.31	-1.9	3.61
4	1	4	0.56	0.31	0.1	0.01
5	0	3	-0.44	0.19	-0.9	0.81
6	1	5	0.56	0.31	1.1	1.21
7	0	4	-0.44	0.19	0.1	0.01
8	0	5	-0.44	0.19	1.1	1.21
9	0	5	-0.44	0.19	1.1	1.21
Total	4	35	0.04	2.19	-0.1	8.89

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

$$= \frac{0.04 - 0.1}{\sqrt{2.19 \times 8.89}}$$

$$= \frac{0.004}{4.44}$$

$$r = 0$$

ANNEXURE IV-2
Analysis on Correlation between the Wound Healing and Pain among
mothers who underwent caesarean section among Control Group during
Pretest

Sample No	Wound healing (x)	Pain (y)	$x - \bar{x}$	$(x - \bar{x})^2$	$y - \bar{y}$	$(y - \bar{y})^2$
1	1	3	0.55	0.30	-1.45	2.10
2	0	4	-0.45	0.20	-0.45	0.20
3	0	4	-0.45	0.20	-0.45	0.20
4	1	4	0.55	0.30	-0.45	0.20
5	1	5	0.55	0.30	0.55	0.30
6	0	6	-0.45	0.20	1.55	2.40
7	1	5	0.55	0.30	0.55	0.30
8	1	3	0.55	0.30	-1.45	2.10
9	0	5	-0.45	0.20	0.55	0.30
10	0	4	-0.45	0.20	-0.45	0.20
11	0	6	-0.45	0.20	1.55	2.40
Total	5	49	0.05	2.73	0.05	10.73

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

$$= \frac{0.05 \times 0.05}{\sqrt{2.73 \times 10.73}}$$

$$r = 0$$

ANNEXURE IV - 3

Analysis on Correlation between the Wound Healing and Pain among Mothers who underwent caesarean section in Experimental Group during Posttest

Sample No	Wound healing (x)	Pain (y)	$x - \bar{x}$	$(x - \bar{x})^2$	$y - \bar{y}$	$(y - \bar{y})^2$
1	0	1	0	0	0.6	0.36
2	0	0	0	0	-0.44	0.19
3	0	0	0	0	-0.44	0.19
4	0	0	0	0	-0.44	0.19
5	0	0	0	0	-0.44	0.19
6	0	1	0	0	0.6	0.36
7	0	0	0	0	-0.44	0.19
8	0	1	0	0	0.6	0.36
9	0	1	0	0	0.6	0.36
Total	0	4	0	0	0.02	2.39

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

$$= \frac{0 \times 0.04}{\sqrt{0 \times 2.39}}$$

$$r = 0$$

ANNEXURE IV - 4

Analysis on Correlation between the Wound Healing and Pain among Mothers who underwent caesarean section in Control Group during Posttest

Sample No.	Wound healing (x)	Pain (y)	$x - \bar{x}$	$(x - \bar{x})^2$	$y - \bar{y}$	$(y - \bar{y})^2$
1	0	1	0	0	-0.3	0.09
2	0	2	0	0	0.73	0.49
3	0	1	0	0	-0.3	0.09
4	0	0	0	0	-1.3	1.69
5	0	2	0	0	0.73	0.49
6	0	2	0	0	0.73	0.49
7	0	1	0	0	-0.3	0.09
8	0	1	0	0	-0.3	0.09
9	0	1	0	0	-0.3	0.09
10	0	1	0	0	-0.3	0.09
11	0	2	0	0	0.73	0.49
Total	0	14	0	0	0.2	4.19

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

$$= \frac{0 \times 0.02}{\sqrt{0(4.19)}}$$

$$r = 0$$

CONSENT FORM

I Ms.Aswathy.M doing M.Sc(N)IIyr in SRIPMS, College of Nursing, Coimbatore is inviting you to participate in a study on “Effect of Infrared Therapy on Wound Healing and Pain among Mothers Who Underwent Caesarean Section”. The study focuses on enhancing wound healing, reducing pain & provide comfort to post caesarean mothers.

If you decide to participate, you will be provided Infrared therapy from 3rd post-operative day till the day of discharge twice daily and you are asked to locate the level of pain on Numerical pain Rating Scale. Each intervention will take 15mins.

Participation in the study is completely voluntary. Refusal to participate or withdrawal of your consent or discontinued participation in the study will not result in any penalty or loss of benefits.

Your confidentiality will be protected throughout the study. There is no risk to you as a participant.

Thanking You

If you wish to participate in the study please sign in this form.

Date:

Signature of participant

**EFFECT OF INFRARED THERAPY ON WOUND HEALING
AND PAIN AMONG MOTHERS WHO UNDERWENT
CAESAREAN SECTION AT SELECTED HOSPITAL,
COIMBATORE.**

CONTENT VALIDITY INDEX

Item No.	E₁	Wise	E₃	E₄	E₅	E₆	No. of agreements	Item wise content validity index
I								
1.1	1	1	1	1	1	1	6	1.02
1.2	1	1	1	1	2	1	6	1.02
1.3	1	3	2	1	2	1	2	0.83
1.4	1	2	2	1	1	1	6	1.02
II								
2.1.1	1	1	1	1	1	1	6	1.02
2.1.2	1	1	1	1	1	1	6	10.2
2.1.3	1	1	1	1	1	3	5	0.83
2.1.4	1	1	1	3	1	1	6	1.02
2.1.5	1	1	1	1	1	1	5	0.83
2.1.6	1	1	1	1	1	1	6	1.02
2.1.7	1	1	1	2	2	1	6	1.02
2.1.8	1	1	1	1	1	1	6	1.02
2.1.9	3	1	1	1	1	1	5	0.83
2.2.1	1	1	1	1	1	1	6	1.02
2.2.2	1	1	1	1	1	1	6	1.02
2.2.3	1	1	1	1	1	1	6	1.02
2.2.4	1	1	1	1	1	1	6	1.02
III								
3.1	1	1	1	1	1	1	6	1.02
3.2	3	1	2	1	1	1	5	0.83
3.3	3	1	1	1	1	1	5	0.83
3.4	1	1	1	1	1	1	6	1.02
IV	1	1	1	3	2	1	5	0.83
V	1	1	1	1	1	1	6	1.02
VI	4	1	1	1	2	1	5	0.83

ஆய்வில் பங்கேற்பதற்கான ஒப்புதல் படிவம்

M. அஸ்வதி ஆகிய நான் ஸ்ரீ இராமகிருஷ்ணா செவிலியர் கல்லூரியில் M.Sc. (N) II-ம் ஆண்டு பயின்று வருகிறேன். எனது கல்விப் படிப்பின் ஒரு பகுதியாக 'சிசேரியன் அறுவை சிகிச்சை காயங்களை ஆற்றுவதில் அகச்சிவப்புக் கதிர்களின் பங்கு' எனும் தலைப்பில் ஆய்வு செய்ய உள்ளேன்.

இந்த முயற்சியில் தங்களின் மேலான பங்களிப்பினை வேண்டுகிறேன். இதில் பங்கேற்பது முழுக்க முழுக்க உங்களின் சம்மதத்தின் பேரிலேயே நடைபெறும். இந்த ஆய்வில் பங்கு பெறாமல் இருப்பதும், இடையில் விலகிக் கொள்வதும் உங்களின் விருப்பம்.

இந்த ஆய்வில் பங்கேற்கும் உங்களின் விவரங்கள் அனைத்தும் இரகசியமாக பாதுகாக்கப்படும் என உறுதி அளிக்கிறேன்.

நன்றி!

இதில் நீங்கள் பங்கேற்க விரும்பினால் தயை கூர்ந்து தங்கள் கையொப்பத்தினை தருமாறு வேண்டிக் கொள்கிறேன்.

தேதி

(கையொப்பம்)

**EFFECT OF INFRARED THERAPY ON WOUND HEALING
AND PAIN AMONG MOTHERS WHO UNDERWENT
CAESAREAN SECTION AT SELECTED HOSPITAL,
COIMBATORE.**

Sample No:

SECTION I- DEMOGRAPHIC PROFILE

- 1.1 Age :
1.2 Education :
1.3 Religion :
1.4 Obstetrical score : G P L A

SECTION II- OBSTETRICAL PROFILE

2.1 Past obstetrical history (In case of multiparous mother)

- 2.1.1 Type of delivery : Preterm / Term / Post term
2.1.2 Mode of delivery : Caesarean section / Vaginal delivery/
Assisted vaginal delivery
2.1.3 History of wound infection : Present / Absent
2.1.4 Obstetrical complications : Present / Absent

If present -----

2.2 Present obstetrical history

- 2.2.1 Type of delivery : Preterm / Term / Post term
2.2.2 Type of surgery : Emergency / Elective
2.2.3 Indication :

2.2.4 Obstetrical Complication : Present / Absent

If present -----

2.3 Present surgical data

2.3.1 Type of anesthesia : General / Spinal

2.3.2 Type of incision :

2.3.3 Method of suturing :

2.3.4 Suture material used :

2.3.5 Topical medication used for dressing :

2.3.6 Frequency of dressing :

SECTION III- PRESENT HEALTH DETAILS

3.1 Known diabetic/ GDM : Yes / No

3.2 Signs of infection : Present / Absent

If present-----

3.3 Steroids : Taking / Not taking

3.4 Antibiotics : Taking / Not taking

SECTION IV - CLINICAL PROFILE

Height:		Weight:			BMI:
		Temperature	Pulse	Respiration	B.P
Day 1 (3 rd POD)	FN				
	AN				
Day 2 (4 th POD)	FN				
	AN				
Day 3 (5 th POD)	FN				
	AN				

Key:

FN: Forenoon

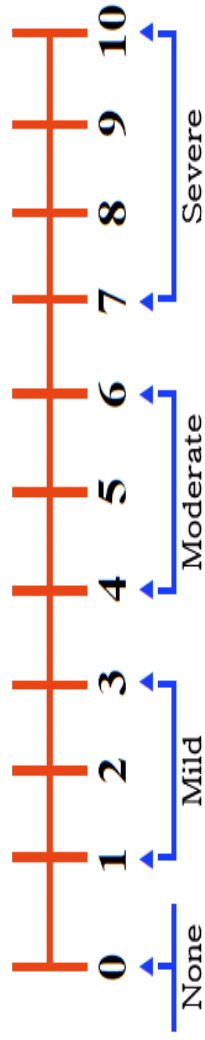
AN: Afternoon

SECTION V - DAVIDSON REEDA WOUND ASSESSMENT SCALE

POINTS	REDNESS	EDEMA	ECCHYMOSIS	DISCHARGE	APPROXIMATION		TOTAL SCORE
						Closed	
0	None	None	None	None		Closed	
1	Within 0.25cm of incision bilaterally	Less than 1cm of incision	Within 0.25cm bilaterally or 0.5cm unilaterally	Serum	Skin separation 3mm or less		
2	Within 0.5cm of incision bilaterally	1-2cm from incision	0.25cm-1cm bilaterally or 0.5-2cm bilaterally	Serasanguinous	Skin & subcutaneous fat separation beyond 0.5cm of incision bilaterally		
3	Beyond 0.25cm of incision bilaterally	Greater than 2cm from incision	Greater than 1cm bilaterally or 2cm unilaterally	Bloody, purulent	Skin & subcutaneous fat and facial seperation		
3 rd POD Score							
5 th POD Score							

SECTION VI- NUMERICAL PAIN RATING SCALE

Mother is asked to locate her level of pain on numerical pain rating scale.



DAYS	TIMINGS	PAIN LEVEL
Day 1 (3 rd POD)	FN	
	AN	
Day 2 (5 th POD)	FN	
	AN	