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CHAPTER V

SUMMARY & CONCLUSION

5.1 INTRODUCTION

Children constitute the most important and vulnerable segment of our population. They are truly the foundation of our nation. Hence the focus of every citizen should be to promote their health and safeguard their interests. So every unborn child should be allowed to achieve his/her optimal growth and development potential so that he can effectively contribute towards nation’s productivity. The future of our nation depends on the way in which we nurture our children today.

The birth of an infant is one of the most inspiring and emotional events that can occur in one’s life time. After nine months of anticipation and preparation the neonate arrives amid a flurry of excitement. The new human being affects the lives of the parents and also other members of the family.

The neurobehavioural and physiological parameters depict a higher deviation from normal findings for those infants who are low birth weight and other high risk babies have greater than average chance of morbidity and mortality because of the conditions or circumstances superimposed on
the normal course of events associated with birth and extrauterine existence and sometimes result in lifetime of disability.

The newborn exhibits neurobehavioural and physiological characteristics that can first appear to be signs of stress. So these parameters need to be assessed so that prompt action can be taken to avoid a lifetime disability.

The more common problems related to physiologic status are closely associated with the state of maturity of the infant and usually involves chemical disturbances e.g. hypoglycemia and consequences of immature organs and systems e.g.: hyperbilirubinemia, respiratory distress and hypothermia.

The newborn should begin extrauterine life with a strong lusty cry. Variations in initial cry can indicate abnormalities like perinatal asphyxia, respiratory disturbance etc. The low birth weight babies are likely to be asphyxiated because of anatomical and functional immaturity. Even minor degree of anoxia may produce subserosal haemorrhages specially in the heart, lungs and liver. In addition, it may produce intense congestion of the choroids plexus leading to intraventricular haemorrhage (IVH) and also have problems like pulmonary oedema, intra-alveolar haemorrhage, idiopathic respiratory distress syndrome (R.D.S.). The first two are the effects of hypoxia; R.D.S. is one of the major causes of death in preterm babies born before 34 weeks. The deficient lung surfactant is the principal
factor responsible for pulmonary atelectasis leading to hypoxia and acidosis.

The physiological parameters include birth weight which is 2.5 to 3 kg but a low birth baby weighs less than 2.5 kg may be even less than 1000 gm. The lesser the weight, the more it leads to poor metabolic functioning with other high risk conditions. There are more chances of growth retardation in future if the height (length) of the baby is less than 50 cm.

The normal heart rate of the infant is between 130 to 150 beats per minute but a low birth weight babies will have faster heart rate exceeding 160 beats per minute which hampers their physiological functioning.

The normal respiratory rate is 30-40 breaths per minute but a low birth weight baby has tachypnoea and respiratory distress with cyanosis.

The major problem faced by low birth weight babies is hypothermia due to lack of subcutaneous fat. Hypothermia in a new born baby is defined as a skin temperature of <35.5 Deg C or core temperature of <36 Deg C. It is classified into mild hypothermia (<36.5 to 36.0 Deg C), moderate hypothermia (<36.0 to 32 Deg C) and severe hypothermia (<32 Deg C).

The normal newborn will have good neurobehavioural parameters including good muscle tone with all active reflexes but a low birth baby will have sluggish or delayed response to reflexes or may have continuation of primitive responses for an extended period. The normal
newborn has active leg and arm reflexes and recoil, but a low birth weight baby has flaccid arms to legs with sluggish reflexes and sometimes extended primitive reflexes which leads to mental retardation and intellectual disability.

The rooting, sucking and swallowing reflexes aid for breastfeeding activity and sustains life. A low birth weight has poor rooting, sucking and swallowing reflexes which causes poor weight gain and neurobehavioural insults.

The motor coordination and development is very poor in very low birth weight babies which causes physical disability throughout their life.

In the context of neurobehavioural parameters, the more immature the infant, the less able he or she is to cope with factors that affect sleep awake patterns variations in the initial cry can indicate abnormalities like respiratory disturbance, perinatal asphyxia etc. If the infant suffers a setback in perinatal period, he may have hyperirritability, hyporeactivity, lethargy and delirium. Stupor and coma requires prompt assessment and referral. Head lag suggests early brain damage ‘soft signs’ represent the persistence of more primitive form of behaviour or response and a failure to perform age specific activity.

So prompt physiologic and neurobehavioural assessment can make a difference to save the future hindrance from a lifetime of disability.
If the neonate is not the robust, healthy, lovable infant as expected, parents find it difficult to cope with these changes and feel varying degree of turmoil and anxiety. (Marlow 1988).

Low birth weight is defined by WHO for International comparisons as birth weight less than 2500 gm i.e. up to and including 2499 gm, irrespective of gestational age. Low birth weight is more common in developing countries than developed countries which significantly contribute to both neonatal and perinatal mortality. (K Park, 1997)

Preterm baby constitutes two-thirds of low birth weight babies. The incidence of low birth weight baby is about 20-25%. In affluent societies and in the developed countries, the incidence of the former is less than 10%.

Low birth weight continues to be a major public health problem in India. 80% of all neonatal deaths occur in low birth weight babies. The reason for this is obvious as most deliveries occur in rural areas where low birth weight babies are deprived of optimal equipment and trained personnel. Even proper referral and transport services are not available (CSSM 1998). Therefore unless some drastic measures are adopted, it is unlikely that India will achieve the committed target of 10% of low birth weight babies by 2000 AD.
The incidence of low birth weight varies between religions, countries and within areas of the same country. **WHO (1991)** estimates that 7% of all within the world are low birth weight with a contributory low birth weight rate of 19% in developing countries and 7% in developed countries. Neither the incidence of low birth weight nor the risk attached is spaced evenly around the globe. In some countries third of all babies born with low birth weight and 50% of them do not live to see their first birth day. Therefore the best way to reduce the infant mortality rate would be to reduce as many low birth weight babies as possible (**Park 1997**).

Babies who fall in category of low birth weight suffer adversely because of physiological handicaps like difficulty in maintaining temperature, respiration, inability to suck, proneness to infection due to reduced humoral and cellular immunity and consequent disorder.

**Sorino et al (2000)** in trial of 60 preterm neonates reported significantly higher gain in physiological and neurobehavioural parameters over 30 days in the oil massage group compared to those who receive routine care. **Dabi et al (2000)** also reported a higher standardized gain in all parameters in the oil massage group compared to control group. **Deorari Ashok et al (2008)** positive results are reported about long term neurobehavioural development following kangaroo mother care. A randomized control trial (RCT) from India by **Soriano, et al (2003)** has shown higher increments in weight, length and head circumference and in
neurobehavioural parameters in kangaroo mother care group than Control Group in neonatal period.

**Udani RH, (2004)** stated that preterm babies exposed to skin to skin contact showed a better mental and neurobehavioural development.

The review of literature revealed that most of the studies were conducted in western situation. It can be said that the studies pertaining to the investigation of physiological and neurobehavioural changes with the joint effect of oil massage and kangaroo mother care among low birth weight babies in Indian context is not found. Finally, keeping in mind a fact that low birth weight babies is a stage of turmoil, if oil massage and KMC training programme proves to be effective on physiological and neurobehavioural developments of low birth weight babies it can be conducted in hospitals as well as in social settings on the large basis. This training or practices can be used as an instrument to enrich the better development of new born babies.

In the light of above, therefore, it has been conceived that physiological and neurobehavioural parameters of low birth weight babies demands scientific exploration with reference to oil massage and kangaroo mother care under the caption of “**A comparative study to assess the effect of Oil Massage Vs Kangaroo Mother Care on changes in the physiological and neurobehavioural parameters among low birth weight babies**”.

5.2 **PROBLEMS & HYPOTHESES**
In the light of the above mentioned discussion, the following problems have been set forth to seek their scientific solutions:-

1) The first problem undertaken in the present study was to examine whether subjects show significant differences in their physiological and neurobehavioural parameters before and after intervention of oil massage.

2) The second problem undertaken in the present study was to examine whether subjects show significant difference in their physiological and neurobehavioural parameters before and after intervention of kangaroo mother care.

3) The third problem undertaken in the present study was to examine whether kangaroo mother care and oil massage together in a position to influence jointly or in interaction with each other in showing significant difference in physiological and neurobehavioural parameters of low birth weight babies before and after intervention.

Considering the above mentioned statements of problem, it is clear that there exist two dependent variables, i.e., physiological and neurobehavioural parameters of low birth weight babies and two independent variables namely kangaroo mother care and oil massage.

To seek the scientific solution of the problem, the following six differential hypotheses were formulated and put for the empirical verification.

**DIFFERENTIAL HYPOTHESES**
1) The group of low birth weight babies who received oil massage (Experimental Group I) would have significantly higher physiological (height, weight, head and chest circumference) and neurobehavioural parameters than the group of low birth weight babies who do not receive any intervention (Control Group- IV).

2) The group of low birth weight babies who received kangaroo mother care (Experimental Group II) would have significantly higher physiological (height, weight, head and chest circumference) and neurobehavioural parameters than the group of low birth weight babies who do not receive any intervention (Control Group- IV).

3) The group of low birth weight babies who received kangaroo mother care and oil massage both (Experimental Group-III) would have significantly higher physiological (height, weight, head and chest circumference) and neurobehavioural parameters than the group of low birth weight babies who do not receive any intervention (Control Group IV).

4) The group of low birth weight babies who received kangaroo mother care and oil massage both (Experimental Group-III) would have significantly higher physiological (height, weight, head and chest circumference) and neurobehavioural parameters than the group of low birth weight babies who received oil massage only (Experimental Group – I)
5) The group of low birth weight babies who received kangaroo mother care and oil massage both (Experimental Group-III) would have significantly higher physiological (height, weight, head and chest circumference) and neurobehavioural parameters than the group of low birth weight babies who received Kangaroo Mother Care only (Experimental Group-II).

6) The group of low birth weight babies who received kangaroo mother care and oil massage both jointly together (Experimental Group-III) would have significantly higher physiological (weight, height, head and chest circumference) and neurobehavioural parameters than the other groups i.e. Experimental Group I, II and Control Group IV.

5.3 METHODOLOGY

In the present research work, the following methodological steps have been made to seek a scientific solution of the research problems through verification of its hypothesis.

Research design

A research design is the plan, structure and strategy of investigation conceived so as to obtain answer to research question and to control variance.

The independent variables involved in the present study are oil massage and kangaroo mother care. They were manipulated by investigator such as:
Oil Massage

The massage was carried out in three phases. Phase I This was done in prone position. Phases II This was done in supine position. Phases III This was done in supine position and consisted of passive flexion and extension movement of the limbs at each large joints. In each area the massage comprised of 20 gentle strokes. The duration of each massage was ten minutes performed two times in a day for 28 days. Infants in the oil massage group received massage with 10ml/kg/day of olive oil divided equally between each of the four applications.

Kangaroo mother care: It is a universally available and biologically sound method of care for all newborns, particularly for premature and low birth weight babies with three components:

1. **Skin-to skin contact**- means it is maternal-infant skin-to skin contact i.e. between the baby’s front and mother’s chest.

2. **Exclusive breastfeeding**- the baby on kangaroo mother care is breastfed exclusively. Skin to skin contact promotes lactation and thus facilitates exclusive breastfeeding.

3. **Support to the mother infant dyad**- means emotional, psychological and physical well being of mother and baby is provided without separating them.

To examine the effectiveness of kangaroo mother care and oil massage on measures of physiological and neurobehavioural parameters among low
birth weight babies, pre-test post-test Control group design was obtained. After oil massage and KMC subjects had been measured on changes in the physiological and neurobehavioural parameters. In this design, two groups are selected (Experimental and Control Group). In this study three experimental groups and one Control group were formed. The dependent variable is measured in both the groups for an identical time period before the treatment (first day observation) pretest. The treatment is then introduced into the test area (Experimental Group) only and the dependent variable i.e. physiological and neurobehavioural variables are measured in both the groups for an identical time period (after 28 days) after the introduction of the treatment (intervention) posttest. The treatment is determined by substracting the change in the dependent variable in the Control Group from the change in the dependent variable in test or Experimental Group. If the differences are found, then they can be assumed to be attributable to the intervention because all other differences between group are controlled.

This design can be shown in the following tabular form:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Time period (1st day) Before (pre-test)</th>
<th>Intervention</th>
<th>Time period (28 days) After (post-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group or Test Group “E”</td>
<td>Level of phenomenon before treatment (X) or intervention</td>
<td>Treatment Or Intervention introduced</td>
<td>Level of phenomenon after treatment (Y) or Intervention</td>
</tr>
<tr>
<td>Control Group or No Intervention</td>
<td>Level of phenomenon without treatment</td>
<td>No treatment or Intervention</td>
<td>Level of phenomenon without treatment or Intervention (Z)</td>
</tr>
</tbody>
</table>
“C” or intervention (A)

Treatment / Intervention effect = (Y-X) – (Z-A)

Research Design Notation

<table>
<thead>
<tr>
<th>Group</th>
<th>Before (1st day) (Pre-Test)</th>
<th>Intervention</th>
<th>After (28 days) (Post-Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental I</td>
<td>O₁ (Observation)</td>
<td>Oil massage</td>
<td>O₂ (Observation)</td>
</tr>
<tr>
<td>Experimental II</td>
<td>O₃ (Observation)</td>
<td>KMC</td>
<td>O₄ (Observation)</td>
</tr>
<tr>
<td>Experimental III</td>
<td>O₅ (Observation)</td>
<td>Oil massage &amp; KMC</td>
<td>O₆ (Observation)</td>
</tr>
<tr>
<td>Control Group IV</td>
<td>O₇ (Observation)</td>
<td>No intervention</td>
<td>O₈ (Observation)</td>
</tr>
</tbody>
</table>

SAMPLE

In order to get proper estimation of physiological and neurobehavioural changes among low birth weight babies by the effect of oil massage and kangaroo mother care, it is necessary to select sample of at least moderate size. To obtain a true representative sample, the sample should be selected at random. So low birth weight babies from Jawaharlal Nehru Hospital & Research Centre, Bhilai and District Hospital, Durg were selected randomly.

The final selection of subjects for experimental and Control group was based on certain criteria for eg. availability of low birth weight babies, voluntary ness, permission of the subjects parent and availability of time.
Total 160 subjects who met the above criteria were randomly assigned to either experimental groups or Control group.

In this study three experimental groups and one Control group were formed. Each experimental group consisted of 40 subjects of low birth weight babies for intervention (kangaroo mother care and oil massage) purpose. In all 120 subjects in the experimental group and 40 subjects in Control group were randomly selected.

5.4 **TOOLS**

Tools play very important role in any research. A research cannot be conducted scientifically without proper tools. Tools in research refer to the scales or measures or questionnaires used to conduct the research. Through these tools the researcher can assess scores and can arrive at conclusions.

In the present study tools used were:

1) **Measurement of physiological parameters**

   Physiological parameters includes weight (kg), Height (cm), head and chest circumference (cm) were measured from each of the four groups.

2) **Measurement of neurobehavioural parameters**

   Neurobehavioural parameter of low birth weight baby includes habituation, motor activity, reflex were assessed by using the Neonatal Intensive Care Unit Network neurobehavioural Scale.
formulated by Brazelton, from each of the four groups. This tool is
found to be highly reliable in several research studies.

Procedures and Scoring

To verify the hypothesis and to conduct the research in a scientific way, proper procedures must be followed.

Prior permission was taken from the hospital authority and respective neonatal department and requested to extend their co-operation in this respect.

The tool has three parts, Part-I comprises of baseline data such as weight at birth, gestational age, sex, apgar score, mother’s education, socioeconomic status, enteral intake, age at enrolment and trial compliance.

Part – II includes physiological parameters of low birth weight babies such as weight (kg), Height (cm), Head circumference (cm), Chest circumference (cm)

- Weight - The weight of the baby is taken through beam balance.
- Height – The height was measured by using infantometer.
- Head & Chest Circumference – The head and chest circumference was measured by using flexible measuring tape.

Part – III include neurobehavioural parameters of low birth weight babies such as habituation (response decrement to light & sound), posture, skin colour, skin texture, movement, response decrement to tactile stimulation
of the foot, lower extremity reflexes, upper extremity and face reflex, upright responses, orientation, motor maturity, consolability with intervention with the help of neonatal intensive care unit network neurobehavioural scale formulated by Brazelton.

After establishing the rapport printed instructions given on the cover page of the questionnaire were explained to the neonate informant before administration. On an average, 45 minutes was required to complete the total assessment.

After completing the assessment, the total score of each 160 subjects were separately computed before and after intervention in each of the four groups as prescribed by scale developed by Brazelton and put up for statistical treatment.

5.5 ANALYSIS & INTERPRETATION, DISCUSSION

Present study intended to compare and investigate the effect of Oil massage and Kangaroo Mother Care on physiological and neurobehavioural parameters among low birth weight babies. For this correlated ‘t’ value, gain score, ‘t’ test (significant test) and simple one way ANOVA were constituted. The result of the statistical analysis of the data and their interpretations are summarized below:

Differential Oriented

1. In hypothesis –1, it was hypothesized that the group of low birth weight babies who received oil massage (Experimental Group I)
would have significantly higher physiological and neurobehavioural parameters than the group of low birth weight babies who do not receive any intervention (Control Group- IV). Obtained correlated ‘t’ value and gain score ‘t’ value in all physiological and neurobehavioural parameters were significant beyond 0.01 level. Thus hypothesis-1 is accepted and supported by the main effect of oil massage on improving physiological and neurobehavioural parameters of low birth weight babies.

2. **In hypothesis –2**, it was hypothesized that the group of low birth weight babies who received kangaroo mother care (Experimental Group II) would have significantly higher physiological and neurobehavioural parameters than the group of low birth weight babies who do not receive any intervention (Control Group- IV). Obtained correlated ‘t’ value and gain score ‘t’ value in all physiological and neurobehavioural parameters were significant beyond 0.01 level. Thus hypothesis-2 is accepted and supported by the main effect of kangaroo mother care on improving physiological and neurobehavioural parameters of low birth weight babies.

3. **In hypothesis –3**, it was hypothesized that the group of low birth weight babies who received kangaroo mother care & oil massage both (Experimental Group III) would have significantly higher physiological and neurobehavioural parameters than the group of low birth weight babies who do not receive any intervention (Control
Group- IV). Obtained correlated ‘t’ value and gain score ‘t’ value in all physiological and neurobehavioural parameters were significant beyond 0.01 level. Thus hypothesis-3 is accepted and supported by the joint effect of kangaroo mother care & oil massage on improving physiological and neurobehavioural parameters of low birth weight babies.

4. **In hypothesis-4**, it was hypothesized that the group of low birth weight babies who received kangaroo mother care and oil massage both (Experimental Group-III) would have significantly higher physiological and neurobehavioural parameters than the group of low birth weight babies who received oil massage only (Experimental Group – I). Obtained correlated ‘t’ value and gain score ‘t’ value in all physiological and neurobehavioural parameters were significant beyond 0.01 level. Hence, the hypothesis-4 is accepted and supported by the joint effect of kangaroo mother care and Oil massage on improving physiological and neurobehavioural parameters of low birth weight babies than the oil massage only.

5. **In hypothesis-5**, it was hypothesized that the group of low birth weight babies who received kangaroo mother care and oil massage both (Experimental Group-III) would have significantly higher physiological and neurobehavioural parameters than the group of low birth weight babies who received kangaroo mother care only (Experimental Group – II). Research findings of fifth hypothesis
shows that Experimental Group –III post-test scores on physiological and neurobehavioural parameters were higher than the Experimental Group –I, II and Control Group on physiological and neurobehavioural parameters. Obtained correlated ‘t’ value and gain score ‘t’ value in all physiological and neurobehavioural parameters were significant beyond 0.01 level. Hence, the hypothesis-5 is accepted and supported by the joint effect of kangaroo mother care and oil massage on improving physiological and neurobehavioural parameters of low birth weight babies than the kangaroo mother care only.

6. In hypothesis-6, One way ANOVA results also reveals that physiological and neurobehavioural parameters of subjects who received kangaroo mother care and oil massage both have shown significantly higher improvement as compared to other study groups i.e. low birth weight babies who received kangaroo mother care only, group of low birth weight babies who received oil massage only and group of low birth weight babies who do not receive any intervention. The order of significant improvement in physiological and neurobehavioural parameters are shown in decreasing order -

Exp. III - Exp. II - Exp. I- Control group IV.

Obtained F-ratio in all physiological and neurobehavioural parameters were significant beyond 0.01 level. Hence, the hypothesis is accepted and
has empirical support in the present study therefore, it can be stated that in the main effect of kangaroo mother care and oil massage both jointly capable to generate more significant impact on improving physiological and neurobehavioural parameters of low birth weight babies.

It means that kangaroo mother care and oil massage both is most effective in improving the physiological and neurobehavioural parameters in low birth weight babies as compared to kangaroo mother care and oil massage alone.

**DISCUSSION**

On the basis of statistical verification of the hypotheses the main findings have come to surface are as under:

1. The present study was concerned with whether or not oil massage and kangaroo mother care as an intervention is related to positive changes in the physiological and neurobehavioural parameters among low birth weight babies. Narrowing the subject population to the specific groups i.e. Experimental Group I (only oil massage) Experimental Group II (only kangaroo mother care) Experimental Group III (oil massage and kangaroo mother care both together) and Control Group IV.

   Expected changes are related with physiological parameters i.e. height, weight, head and chest circumference. In addition, effect of
oil massage and KMC was also examined in relation to neurobehavioural parameter of low birth weight babies.

Previous empirical research on oil massage as intervention has demonstrated many benefits to low birth weight babies physiological as well as neurobehavioural parameters. The main effect of oil massage has been found significant in improving physiological and neurobehavioral parameter of low birth weight babies which is supported by the Jyoti Arora et al. (2005), Soriano et al. (2003), Dabi et al. (2000) Study revealed that weight gain was greater in oil massage group than Control group due to cutaneous absorption of oil which acts as a source of energy, nutrient and improved overall growth.

Soriano et al. (2003) demonstrated a significant increment in the length triceps skin fold thickness and mid arm circumference after 30 days of oil massage in preterm neonates.

Solkoff et al. (1973) trials suggested that tactile and kinesthetic stimulation could have beneficial effect on preterm neurobehavioral. The only trial that evaluated the effect of tactile stimulation using Brazelton neurobehavioural scoring which demonstrated the beneficial role of massage in improving neurobehavioural of preterm babies. Findings of the present study was also supported by Bobby Rita Jansi. (2008), Mullany (2006), A Siddharth (2005), Soriano
Although these results are encouraging, but there has been examination of the only oil massage or only KMC examination on low birth weight babies. This seems to be the first comprehensive study in Chhattisgarh State which examines the impact of oil massage and KMC care jointly on changes in physiological and neurobehavioural parameters in low birth weight babies.

An orderly and inclusive discussion of the results of this study is presented with reference to each hypothesis tested, followed by the limitation of the study and suggestion for future research.

Oil massage as an independent variable was focused to see whether it has any positive effect on physiological and neurobehavioural parameters among low birth weight babies. Although both the groups (Experimental Group I and Control Group IV) were essentially similar prior to the start of only oil massage intervention (or treatment). The oil massage group i.e. Experimental Group I scored significantly higher at the time of post testing. In the course of 28 days intervention of oil massage this group’s mean gain scores are 0.51 for height, 0.26 for weight, 0.30 for head circumference and 0.33 for chest circumference and 0.29 for neurobehavioural parameter respectively, which are significantly higher as compared to low birth
weight babies who did not receive any intervention. However Control Group IV post test scores are also higher than pre test scores on physiological and neurobehavioural parameters as growth is a natural phenomenon Marlow (2004). So results obtained from this study clearly show the superiority of the oil massage intervention in modifying the physiological as well as neurobehavioural parameters of low birth weight babies. Since oil massage has its deep roots in ancient Indian culture but the present research follows a wide variety of good techniques to increase the physiological and neurobehavioural parameters as it is mentioned in the previous chapter oil massage intervention incorporates the following basic procedure.

**Phase I** This was done in prone position. Four firm strokes with palms of the hands of 5 seconds each, were provided in three areas (a) head, forehead, hairline, over scalp down to neck with alternate hands; (b) neck from mid line outwards with both hands simultaneously; (c) shoulders from midline outwards with both hands simultaneously; and (d) back from nape of neck down to buttocks with firm, long stroke with alternate hands.

**Phase II** This was done in the supine position. Four firm strokes with palms of the hands, of 5 seconds each, were provided in each area (a) forehead – from midline, outwards with both hands simultaneously; (b) cheeks – from side of hands with both hands simultaneously in
rotating and clockwise direction; (c) chest, “butterfly” stroking from midline upwards, outwards and inwards back to initiating point; (d) abdomen – from the appendix, in a clock wise direction around abdomen avoiding the epigastrium and probes, with gentle strokes, (e) upper limbs (each separately) – from hips to ankles using alternate hands for stroking; (g) palms from wrist to finger tips using alternate hands for stroking; and (h) soles from heel to toe tips using alternate hands for stroking.

Phase III This was done in the supine position and consisted of passive flexion and extension movement of the limbs at each large joint (shoulder, elbow, hip, knee and ankle) as 5 events of 2 seconds each in each area. The process of oil massage intervention involves exercising, motivating blood circulation which acts as a source of energy and nutrients for the body and thereby improving overall parameters of physiological and neurobehavioural parameters in low birth weight babies. There is a little in the existing research that identifies the concrete effect of oil massage intervention, however, the results of this research indicates that, low birth weight babies who get oil massage intervention evidenced increased levels of physiological as well as neurobehavioural parameters.

Second hypothesis examined the effect of KMC intervention on physiological and neurobehavioural parameters among low birth
weight babies. As it was predicted, subjects who got the KMC intervention programme had significantly higher levels of physiological and neurobehavioural parameters than the subjects who did not receive KMC intervention programme. The Experimental Group II (KMC) scored significantly higher than the Control Group on measure of physiological and neurobehavioural parameters. Thus, the low birth weight babies who received KMC intervention gained higher physiological and neurobehavioural scores than their counterparts who did not receive the KMC intervention as it is mentioned in the previous chapter KMC intervention incorporates the following basic procedure.

1. Baby is placed between the mother’s breasts in an upright position in her bare chest.
2. Head is to be turned to one side and in a slightly extended position. This slightly extended head position keeps the airway open and allows eye to eye contact between the mother and her baby.
3. Hips are to be flexed and abducted in a “frog” position; the arms should also be flexed, breathing stimulates the baby thus reducing the occurrence of apnea.
4. Supporting the baby’s bottom with a sling/ binder.

The present finding support the previous research that low birth weight babies could increase their physiological and neurobehavioural
parameters through KMC intervention (Charpak et al 2008) shows that kangaroo mother care babies achieved significantly better growth. In preterm babies, weight, length and head circumference were significantly higher in the Kangaroo Mother Care group (weight 2388 g, length 47.8 cm and head circumference 33.4 cm) than in the routine care group (weight 2065 g, length 46.4 cm and head circumference 32.1 cm) and demonstrated a significantly higher daily weight gain in infants who received the kangaroo mother care intervention. This beneficial effect was reflected in other growth parameters. The recommended weekly increment of 0.75 cm in head circumference was achieved only in the kangaroo mother care group. Head circumference has been emphasized to be one of the most important growth parameters in low birth weight babies being a reflection of the underlying brain growth. Kangaroo mother care by promoting exclusive breastfeeding, ensuring temperature maintenance, facilitating physiologic stability and decreasing neonatal morbidities could result in improved physical and cognitive growth. It is concluded from the study that kangaroo mother care improves growth in low birth weight infants and has a significant role in protecting the low birth weight infant from hypothermia, hypoglycemia and sepsis and it is definitely feasible, acceptable to mothers and can be continued at home in the Indian set up. The finding of present investigation was also supported by Deorari Ashok et al (2008),
Both the groups (Experimental Group II and Control Group) were essentially similar prior to start of treatment. Only the KMC intervention group scored significantly higher at the time of post testing. In the course of 28 days of KMC intervention group scored significantly higher at the time of post testing, and this group mean gain score for physiological parameters were 0.55 for height, 0.49 for weight, 0.38 for head circumference, 0.47 for chest circumference and 0.45 for neurobehavioural parameters. The results obtained on this outcome clearly shows the superiority of the KMC intervention group in improving or modifying the physiological and neurobehavioural parameters because kangaroo mother care is a humane, low cost method of caring of low birth weight infants particularly for those weighing less than 2000g at birth. It consists of skin-to-skin contact, exclusive breastfeeding and early discharge with an adequate follow-up.

2. Careful investigation of oil massage and KMC jointly together gives us an idea that why Experimental Group III has more positive effects
on physiological and neurobehavioural parameters of low birth weight babies.

The effect of oil massage and kangaroo mother care together (Experimental Group III) was found more significant in improving physiological and neurobehavioural parameters of low birth weight babies than as compared with only oil massage (Experimental Group I) and only kangaroo mother care (Experimental Group II). In general the effect of oil massage and KMC intervention together tends to benefit low birth weight babies in more significant ways by instilling a greater effect of well being because kangaroo mother care facilitates skin to skin contact with the mother thereby maintains the babies body temperature and encourages exclusive breast feeding and enhances the physiological and neurobehavioural development. Oil massage has a potential effect on motor maturity, improves reflexes, increases digestion leading to more intake of nutrients. The joint intervention of oil massage and kangaroo mother care creates more significant effect on physiological and neurobehavioral development of low birth weight babies in their early neonatal period (Suraj Gupta 2005, Marlow 2004). It is clear from the present study that oil massage and kangaroo mother care jointly created more significant positive effect than oil massage only (Experimental Group –I) and kangaroo mother care only (Experimental Group II). These findings have been
generated from both i.e. feed back of mothers of low birth weight babies and from present research. Lastly, this piece of research has established a strong link between oil massage, KMC intervention and physiological as well as neurobehavioural parameters of low birth weight babies particularly during the times of crisis. Each period of development of human being brings new challenges with it by coping efficiently with these challenges thereby making good adjustment with the life. In this way one conclusion can be drawn that in this piece of research work oil massage and KMC together were found to be more effective in generating positive effect on physiological and neurobehavioural parameters of low birth weight babies.

5.6 CONCLUSIONS

On the basis of present study, following conclusions can be drawn:

1. Kangaroo mother care can be proposed as an alternative to conventional neonatal care for low birth weight babies.

2. Massage has a relaxing effect which will enhance weight gain, stabilizes vital parameters and induces sleep in the baby.

3. Findings of the study have proved the positive effect of interventions like oil massage and kangaroo Mother Care on physiological and neurobehavioural parameters of low birth weight babies. It can be implemented as alternative method in the management of low birth weight babies in hospital and at home.
4. Training of the methods like oil massage and Kangaroo Mother Care can be planned and given by trained personnel for the nursing mothers. Care givers should initiate this simple culturally acceptable mother focussed and home based programme to foster low birth weight babies development.

5.7 LIMITATIONS, DELIMITATIONS & SUGGESTIONS

The following limitations of present study are kept in mind, the temptation to go for tall claims can be avoided.

Limitations:

1. The sample of the present study was drawn among the low birth weight babies from Chhattisgarh region. Therefore results cannot be generalized in general population.

2. The findings of the present study are applicable only to stable low birth weight babies for 28 days intervention. Hence it cannot be generalized.

3. Due to the practical difficulties in selection criteria, investigator could identify only 40 cases in each group. In fact, more cases in each group might have enhanced the power of generalization of the findings.
Hence, the above few issues may be registered here as the limitations of the present investigation.

**Delimitations:**

To avoid the temptation of over generalization, the following delimitation of the present investigation ought to be firmly kept in mind:

1. With regard to the population, it is important to remember that the sample of the present investigation was drawn from the population of urban areas of state of Chhattisgarh. Therefore, the results can be generalized to the low birth weight babies of urban areas of state of Chhattisgarh.

2. Findings of the present investigation are applicable only to the stable low birth weight babies of 28 days intervention (oil massage twice daily and a minimum 10 hours of KMC).

3. The present investigation studied only in the light of two independent variables such as oil massage and kangaroo mother care. It can be further explained in the light of more than two variables.

**Suggestions**

1. Since the sample of the present study has been drawn from the low birth weight babies in the urban hospitals of Chhattisgarh state and therefore, the inferences drawn in the present study are applicable only to this particular region. A broad based sample from different
geographical areas such as rural hospitals could have increased the power of generalization in the present study.

2. The findings of the present study are applicable only to urban population. It may be extended to the rural and tribal population of Chhattisgarh region as well as to other states also.

3. The findings of the present study are applicable only to stable low birth weight babies. It may also be extended to the unstable very low birth weight babies and with certain modifications.

4. The present study was conducted on 160 samples of low birth weight babies. Our sample contains 40 subjects in each group. The sample population in each group and total population may be extended to further validate the result.

5. Management of low birth weight babies is sensitive to cultural norms and a comparative intercultural study is likely to bring out new insight in the present phenomena of interest.

6. The present investigation, has been studied in the light of two dependent variable such as changes in physiological and neurobehavioral parameters of low birth weight babies. Further studies should be conducted to verify effect of other important variables.

5.8 **SOCIAL SIGNIFICANCE OF THE STUDY**
Conclusion of the present investigation explores the significant effect of oil massage and kangaroo mother care (KMC) on improvement of physiological and neurobehavioural parameters of the low birth weight babies.

The results reveal that oil application may have potential to improve weight gain among preterm very low birth weight neonates. Since this is a culturally accepted practice, it should be encouraged as a part of overall package of early neonatal intervention in a very low birth weight infant care both in hospital and at home.

Conclusion of the present investigation explores that the kangaroo mother care encourages, skin-to-skin contact to the newborn not only helps to develop mother baby bond but also facilitates growth rate of the baby.

Exclusive breast feeding helps the babies to prevent from infections. Holding her baby on her chest in kangaroo mother care helps her to feel that she is giving her child the best possible care there by mother & baby feels secured.

From the practical standpoint the beneficial effect of breast feeding for the mother helps to contract the uterus resulting in less blood loss after delivery and it reduces breast, uterine and ovarian cancer ten times than the usual incidence and acts as a natural contraception for initial six months after delivery.
Oil massage and KMC have been found as major variables capable of generating significant variance on physiological and neurobehavioural parameters among low birth weight babies.

The results reveal that KMC and oil massage both are found to be significantly better as compared to only KMC care or only oil massage on physiological and neurobehavioural parameters among low birth weight babies. Parents, educators or child care professionals and counselors are continually being encouraged to establish KMC and oil massage practices that foster healthy physiological and neurobehavioural developments of low birth weight babies. Hospitals should implement KMC and oil massage programme for positive change in low birth weight babies.

The results of this study may help parents, medical counsellors as well as nursing professionals in understanding for better physiological and neurobehavioural parameters of low birth weight babies in their proper perspectives and help in developing the strategies for encouraging the KMC and oil massage practices to be effectively, scientifically introduced for the better care of low birth weight babies for their better physiological and neurobehavioural developments.

Therefore, it is necessary that medical science (or government) should run awareness programmes at all levels for parent child care givers, either on its own or with the help of NGO’s, so that they get familiarize themselves with kangaroo mother care and oil massage for the better improvement of low birth weight babies development.
Social support programmes for low birth weight babies must be developed to ensure their well being and improvement in the development of low birth weight babies.

The findings of this study will be helpful to the great extent to the parents, medical professionals, counselors and government in formulating welfare schemes and programmes and implementing them for the improvement in the health status of low birth weight babies.