METHODS OF INVESTIGATION

Infancy is a period which demands great responsibilities out of parents. Infants born into the world are helpless and are fully dependent on their parents. Therefore the researcher who is dealing with the period of infancy is left with no choice but to lean heavily on the information given by the caregivers.

In order to obtain adequate information regarding fathers’ involvement in baby care especially on the chosen areas—behavioural profile, attachment patterns of infants and mothers’ behaviour patterns, observation of fathers, mothers and infants are necessary during their natural course of development. But it is not possible for a single investigator to do round-the-clock observation of many infants in their natural course of development in the short period of time available. Since the parents are in constant observational contact and in continuous interaction with their babies, it was decided that carefully conducted interviews with the fathers and mothers or the principal caregivers was the most feasible approach to collect necessary observational data. This approach was advocated by Thomas, Chess et al. (1964, 1971).

The authors report on agreement at 0.01 level of confidence between direct observation and parental interview in their New York Longitudinal
Study of infant temperament. So for the collection of data with regard to fathers' involvement in baby care, behavioural profile, attachment patterns of infants and mothers' behaviour patterns, interview schedule was the method chosen as the tool and face-to-face interview was conducted.

Sadhu and Singh (1985) state interview schedule as the name applied is a set of questions which are asked or filled in by an interviewer in a face-to-face situation with another person. The tool was also chosen as it is possible to repeat or rephrase the questions in order to ensure that they are understood or to ask further questions to clarify the meaning of a response.

3.1 Design of the Study

Table 3.1 Design of the study

<table>
<thead>
<tr>
<th>Variables</th>
<th>Aspect of measurement</th>
<th>Criteria of measurement</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fathers' involvement in baby care</td>
<td>33 items of fathers' involvement in baby care activities; 9 of which are general questions</td>
<td>Intensity and quality of fathers' involvement with the baby</td>
<td>Structured interview schedule constructed by the investigator</td>
</tr>
<tr>
<td>2. Attachment patterns</td>
<td>16 items of attachment patterns of infants</td>
<td>Describing 2 patterns of attachment towards the caregiver: (1) securely attached; (2) insecurely attached</td>
<td>Structured interview schedule constructed by the investigator</td>
</tr>
<tr>
<td>3. Behavioural profile</td>
<td>9 dimensions of infant behaviour expressed in 37 items</td>
<td>Positive or negative and intense or mild patterns of infant behaviour which measures easy or difficult temperamental traits</td>
<td>Structured interview schedule constructed by Indulekha (1977)</td>
</tr>
<tr>
<td>4. Mothers' behaviour patterns</td>
<td>20 items of mothers' behaviour</td>
<td>The type of behaviour initiated by the mother in terms of the frequency and intensity of their occurrence</td>
<td>Structured interview schedule constructed by Indulekha (1977)</td>
</tr>
</tbody>
</table>
The above research design clearly shows the various aspects, criteria of measurement and the tools used for the measurement of each variable.

3.2 Type of Study

The study was confined to a cross-sectional approach in order to make it as extensive as possible. Longitudinal study restricts the sample size because it would be beyond the scope of any individual research work as that of the present one to attempt on a large sample. Time factor was another aspect which led to the choice of a cross-sectional approach.

The present study is a comparative and correlational study. Bajpai (1985) states comparative method as a scientific method in which comparative data is collected with specific purpose, analysed and specific conclusions derived from the results.

In this study a comparison is made between 10 variables, namely

1) groups based on parental age;
2) groups based on parents’ educational status;
3) groups based on status of income;
4) groups based on number of years between marriage and birth of the child under study;
5) groups based on the nature of infant care provided;
6) groups based on the gender of the infant;
7) groups based on the ordinal position of the infant;
8) groups based on the type of family;
9) groups based on the working status;
10) groups based on number of years between the child under study and the younger or older sibling.
in the case of

a) Fathers' involvement in baby care
b) Behavioural profile of infants
c) Attachment patterns of infants and
d) Mothers' behaviour patterns.

The study aims at correlating different variables thereby bringing out the relationship between the variables under study. Correlation brings out the relationship between two or more paired variables or two or more sets of data. The degree of relationship is measured and represented by the coefficient of correlation.

The present study correlates fathers' involvement in baby care with baby's behavioural profile, reaction pattern, intensity of reaction, attachment patterns of infants and mothers' behaviour patterns. Baby's behavioural profile is correlated with attachment patterns and mother's behaviour patterns. The relationship between attachment patterns, reaction pattern, intensity of reaction and mothers' behaviour patterns and the correlation between mothers' behaviour patterns, reaction pattern, intensity of reaction are also taken into account.

3.3 Sample

One hundred and fifty infants in the age group of 6 months–18 months (1½ years) belonging to the urban middle class families of Thiruvananthapuram, Kottayam, Kochi and Kozhikode districts of Kerala state formed the sample.
Seven hospitals were visited. The days of the visit were confined to the
days of immunization. With the prior sanction of the hospital authorities, a
list of infants with their age and sex, working status and address of the parents
who come for immunization were collected. From this, a list of infants
belonging to the age group of 6 months–18 months of both the sexes having
families, in which both the parents were working and those in which only one
parent is working, were selected on a purposive basis. Thus a proportionate
number was drawn from the strata on a purposive basis amounting to a total
of 150 infants.

For studying fathers’ involvement in baby care, all the fathers were
taken as the subjects with whom a face-to-face interview was conducted. But
for the study of behavioural profile, attachment patterns and mothers’
behaviour patterns, the mothers or the caregivers who take care of the infant
most of the time formed the sample.

3.4 Tools of Measurement

Four interview schedules were used in order to obtain the data
regarding the four variables, namely, fathers’ involvement in baby care,
attachment patterns, behavioural profile of infants and mothers’ behaviour
patterns.

The four interview schedules used include

3.4.1 interview schedule for assessing fathers’ involvement in baby care;
3.4.2 interview schedule for assessing infants’ behavioural profile;
3.4.3 interview schedule for assessing attachment patterns of infants; and
3.4.4 interview schedule for assessing mothers’ behaviour patterns.
3.5 Description of the Inventories

Among the four interview schedules, two of the tools had been constructed by the investigator which include (1) schedule for assessing fathers’ involvement in baby care and (2) attachment patterns of infants. The other two interview schedules used had been constructed and standardised by Indulekha (1977). The tools include (3) interview schedule for assessing behavioural profile of infants and (4) interview schedule for eliciting information regarding mothers’ behaviour patterns.

3.5.1 Inventory for studying fathers’ involvement in baby care

The inventory had a total of 33 questions arranged under six sections. The first section was that of general information which had 9 items intended to gain personal information regarding the infant’s sex, age, ordinal position, father’s age, educational status, mother’s educational status, working status of the parents, income, number of years of gap between marriage and birth of the child.

The second section baby’s arrival had four questions, third section bringing the baby to paternal house also had four questions. There were four general questions, seven questions for baby care activities and five questions for attitudes, beliefs, all of which helped in studying fathers’ involvement in baby care.

3.5.2 Inventory for studying attachment patterns of infants

The 15 patterns of attachment behaviour collected from the review of literature include

1) differential crying,
2) smiling.
3) vocalisation,
4) visual motor orientation,
5) greeting responses,
6) lifting arms in greeting,
7) clapping hands in greeting,
8) crying when the mother leaves,
9) scrambling over the mother,
10) following,
11) burying face in mother's lap,
12) clinging,
13) approach through locomotion,
14) embracing, hugging, kissing and
15) flight to the mother as a haven of safety.

All these patterns of attachment behaviour collected from the review were taken into consideration while constructing the inventory. A situation was created for each and was provided with three choices to indicate the patterns of attachment.

3.5.3 Rating

Each item of both the schedules were provided with choices so that it was easy for the rate to choose from the alternatives given.

3.6 Preliminary Processing

A series of discussions and consultations with a few mothers of infants below 18 months of age was made by the investigator. In the course of discussion, information was drawn from each mother regarding her baby's
general behaviour pattern at the same time giving importance to fathers' involvement, attachment patterns of infants and mothers' behaviour patterns while dealing with the baby.

While constructing the tools the investigator kept in mind the above points and also the guidelines based on the studies of Seipt (1961) and Spock (1979) for fathers' involvement in baby care and Ainsworth (1963, 1967) for attachment patterns of infants.

Information collected from the mothers and the available literature was processed to identify various baby care activities for which mothers would prefer to get a helping hand of their spouses and also various behavioural responses for assessing attachment patterns of infants.

3.6.1 Collection of data for the preliminary processing

Both the inventories were distributed to 10 fathers and mothers of infants of 6-18 months of age. Instructions were attached to each schedule and care was taken to convince them that there was no good or bad and right or wrong answers.

3.6.2 Scoring

For the schedule fathers' involvement in baby care, four-point, three-point and two-point scales had been used. In the four-point scale, the highest score was treated as four and the lowest as one. In the three-point scale, 'always' responses were given a score of three, 'sometimes' responses a score of two and 'never' responses a score of one. In the two-point scale, all the 'yes' responses were given a score of two and 'no' responses a score of one.
For the schedule attachment patterns of infants, three-point scale was used throughout. All the ‘always’ responses were given a score of three, ‘sometimes’, a score of two and ‘never’, a score of one.

3.7 Secondary Processing

A few changes had to be made in accordance with the suggestions given by the parents and information obtained from the review. Thus both the inventories were reshaped after the preliminary processing and were subjected to secondary processing to confirm applicability of each item. Reshaped interview schedules are described herewith.

3.7.1 Reshaped interview schedule for measuring fathers’ involvement in baby care

Six areas retained include: (1) general information, (2) baby’s arrival, (3) bringing the baby to paternal house, (4) general questions, (5) baby care activities and (6) attitudes/beliefs.

The wordings of a few items had to be changed in accordance with the suggestions given by the fathers. The question regarding the ordinal position had to be given choices as first, second or third child thus making it more self-explanatory. The question on number of hours spent for your baby which was also an open-ended question had to be given choices like 3–4 hours, 2–3 hours, 1–2 hours and 0–1 hours.

3.7.2 Reshaped interview schedule for measuring attachment patterns of infants

Based on the information obtained from the review of related literature, interview schedule for measuring attachment patterns of infants was reshaped.
In the interview schedule, one more question was added in accordance with the review. From the review, it was revealed that mothers of insecurely avoidant infants were the least helpful in preparing their children for separation. Hence based on the same, one more question was included.

3.7.3 Rating

For fathers’ involvement in baby care four, three and two point scales were used and for measuring attachment patterns of infants three point scale was used.

3.7.4 Collection of data for secondary processing

Ten fathers and mothers of infants of 6-18 months of age constituted the sample. As in the case of preliminary processing subjects were convinced that there were no good or bad and right or wrong answers. Face-to-face interview was conducted with each parent and investigator ticked the answers as given by the parent.

3.8 Item Analysis

Item analysis is conducted to find out the acceptance of each item of the schedule by analyzing the difference in the mean response to an attitude statement by a high and a low group. The purpose of doing item analysis is to select from a pool of items the ones which most effectively obtain the information one wants and to eliminate the less effective items from the draft scale.

In the present study, item analyses of the inventories were done using Likert’s method as detailed by Edwards. For this purpose, a pilot study was
conducted in which the two interview schedules, namely (1) schedule to assess fathers’ involvement in baby care and (2) attachment patterns of infants, were administered to a representative sample of 100 subjects. The scores obtained were rank ordered in ascending order. The upper and lower one-fourths of the subjects were selected as the high and the low scoring groups respectively. It was assumed that those two groups serve as criterion groups in terms of which individual statements were evaluated.

The ‘t’ values of the items in the schedule for the high scoring and low scoring groups were computed and ranked using the formula

\[
 t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\sum (X_H^2 / \bar{X}_H^2) + \sum (X_L - \bar{X}_L)^2}{n(n-1)}}}
\]

where \(\sum (X_H - \bar{X}_H)^2 = \frac{\sum X_H^2 - (\sum X_H)^2}{n}\)

and \(\sum (X_L - \bar{X}_L)^2 = \frac{\sum X_L^2 - (\sum X_L)^2}{n}\)

\(\bar{X}_H\) is the mean score on a given statement for the high group

\(\bar{X}_L\) is the mean score on the same statement for the low group

The ‘t’ values serve as a measure of the extent to which a given statement differentiates between the high and low groups. Those items which showed significant difference between high and low groups were retained in the final form of inventories.

For the schedule, fathers’ involvement in baby care, twenty-four items underwent item analysis and it was shown that five of the questions which did not show much degree of differentiation were to be deleted. The questions which had to be deleted include that of 1, 9, 14, 21 and 23. These
correspond to the question numbers 10, 18, 23, 30 and 32 respectively in the interview schedule. The ‘t’ values obtained for each item of the inventory are given in Appendix I. For the schedule attachment patterns of infants the ‘t’ values for 15 statements were high enough to be accepted thus deleting only one question, i.e. question number 13 in the schedule. Thus from a pool of 16 items, 15 items were retained in the final inventory. The ‘t’ values are given in Appendix II.

3.9 Final Form of the Tools

The final form of the interview schedules used by the investigator is as follows.

3.9.1 Interview schedule for assessing father’s involvement in baby care (Final form)

It consists of 28 items distributed under six areas of study. The areas include

1) General information (9 questions);
2) Baby’s arrival (3 questions);
3) Bringing the baby to paternal house (4 questions);
4) General questions (3 questions);
5) Baby care activities (6 questions); and
6) Attitudes and beliefs (3 questions).

Intensity and quality of father’s involvement with the baby is to be measured using the schedule.
The section on general information revealed the necessary data about the infants’ age, sex, ordinal position, working status of the spouse, type of family, gap between marriage and birth of the child etc. The section on baby’s arrival has four questions regarding the initial activities the father got into with the baby’s arrival. Bringing the baby to paternal house too had four questions as to whether any arrangements had been made by the father for the baby’s arrival. The section on general questions has four questions regarding the amount of time that the father spends for work and for caring of the baby.

To find out the father’s availability, that is, extensiveness and exclusiveness of his participation in handling the baby, number of people in charge of routine care, the proportion of time the baby is left with and taken care of by the father and other members in the family are taken into account.

The section on baby care activities has seven questions as to whether the father participates in any of the listed baby care activities starting right from waking up the baby to putting him to sleep in the night. The last section on attitudes, beliefs has five questions regarding the father’s attitude, beliefs about his own role in baby care activities.

3.9.1.1 Scoring

Four, three and two-point scales are to be used to rate the interview schedule on fathers’ involvement in baby care. Four-point scale has a maximum score of four and a minimum of one. The three-point scale has two, one and zero as its scores. The two-point scale has one and zero as its scores. A slight change in the scoring pattern is made during the secondary processing, that is the minimum scores of the three point and two point scales
have been made 'zero' instead of 'one'. The change was made to make the calculation work simpler.

The ratings of the items are made in terms of the intensity and frequency with which the contacts are made. The intensity which include the frequency and the quality which embody the consistency of the fathers getting involved in the day-to-day baby care activities are taken into consideration in the present study. The sum of all the scores given the total scores of fathers' involvement in baby care. The maximum score a person could get is 95 and the lowest or the minimum score is 5. The higher scores obtained show maximum involvement of fathers in the baby care activities and lower scores obtained show minimum involvement of fathers in the baby care activities (vide, Appendix III).

3.9.2 Interview schedule for assessing attachment patterns of infants (Final form)

It consists of 15 items with three ratings for each indicating baby's attachment patterns defining them as securely attached and insecurely attached.

Final set of behaviours chosen to measure attachment patterns are signalling behaviours, namely

1) crying,
2) smiling,
3) vocalization,
4) orienting behaviour,
5) locomotion,
6) active physical contact,
7) preparing children for the process of separation,
8) object play,
9) confidence in mother’s availability,
10) wandering aimlessly or crying helplessly during separation,
11) preferring mothers to strangers,
12) sociability with strangers,
13) Mothers being more affectionate and responsive,
14) Amount of physical contact, and
15) Mothers feeding the baby.

The two patterns of attachment which include securely attached and insecurely attached could be brought out through the administration of the interview schedule.

The three patterns of attachment formulated by Ainsworth (1972) are taken into consideration in the present study. These include: (1) Securely attached are those infants who accept and initiate interaction with the mother during play. They show approach or greeting behaviour during re-union and prefer mother to a stranger. (2) Insecurely resistant infants are those who tend to couple their desire for proximity to the mother with anger towards her and (3) Insecurely avoidant infants are those who do not solicit interaction with the mother during play. They show little or no separation distress and tend to avoid mothers during re-union.

In the present investigation, two patterns of attachment were identified—securely attached infants and insecurely attached (resistant) children. All the insecurely attached children studied showed some amount of desire for proximity combined with anger towards the mother. Lack of separation distress and avoidance of mothers were not found in any of the
sample studied. Hence the interview schedule chosen to measure attachment patterns identified:

1) **securely attached infants** who accept and initiate interaction with the mother during play and who show approach or greeting behaviour during reunion and prefer mother to a stranger and

2) **insecurely attached infants/resistant infants** who tend to be distressed and show protest following mothers' departure and couple their desire for proximity to the mother with anger towards her when she returns.

### 3.9.2.1 Scoring

A three-point scale is used with a maximum score of two and a minimum score of 'zero'. 'Always' responses are given a score of two, 'sometimes', a score of one and 'never' a score of 'zero'. The sum of all the scores gives the total score of attachment patterns of infants. The maximum score the person could get is 30 and the minimum score is 'zero'. The high scores of attachment patterns indicate security in the infants' attachment relationships and low scores reveal insecurity in their attachment relationship (vide, Appendix IV).

### 3.9.3 Interview schedule for assessing infants' behavioural profile (Constructed and standardized by Indulekha, 1977)

The tool is constructed by Indulekha (1977) keeping in reference the New York Longitudinal Study of Thomas, Chess and Birch (1964, 1971). Thirty-seven items are assigned to nine dimensions with three ratings. The first six dimensions that is quality of mood (five items), rhythmicity (four items), approach-withdrawal (four items), adaptability (five items),
distractibility (four items) and resistance (four items) describe the infants as positive or negative termed as reaction pattern and the next three that is activity level (three items) threshold of responsiveness (four items) and vigour of activity (four items) help to describe the infants’ behaviour as intense or mild termed as intensity of reaction. Under reaction pattern, regularity in routine activities, fluctuation of mood towards the positive side, positive approach to new objects, persons or surroundings, easily distractible and low persistence are considered positive reactions and the opposite reactions to these as negative reactions. Under intensity of reaction, higher activity level, vigorous responses and low threshold of responsiveness are considered intense reactions and those opposite to the above are considered as mild reactions.

3.9.3.1 Scoring

The total positive ratings of each subset of reaction pattern are to be multiplied by two and negative ratings by ‘zero’. The total number of variable items (having both positive and negative characteristics are to be multiplied by one. Maximum possible score is 52 and minimum possible score is 0).

For intensity of reaction total number of intense ratings are to be multiplied by two. The number of mild ratings multiplied by zero and variable items, showing both the characteristics multiplied by one. The total sum of scores obtained for the three subsets is the total score of intensity of reaction for each infant. Maximum possible score is 24 and minimum is 0. A combination of the scores obtained for reaction pattern and intensity of reaction gives the total score an infant could get. The maximum possible total score is 76 and the minimum is 0 (vide, Appendix V)
3.9.4 Interview schedule for assessing mothers’ behaviour patterns (Constructed and standardised by Indulekha, 1977)

Mothers’ behaviour patterns are the type of behaviours directed by mothers towards the infants. The items for mothers’ behaviour patterns are arranged under three spectra, namely, (1) the contacts (visual, tactual and vocal) initiated by the mother (caregiver) during caregiving; (2) stimulating and entertaining activities conducted by the mother (caregiver) and (3) availability of mother or any other person to the infant.

The items chosen for measuring visual, tactual and vocal contacts initiated by the mother are drawn from her behaviour pattern during caregiving activities such as feeding, bathing, dressing, toileting and putting to sleep.

For measuring stimulation and entertaining activities the areas chosen include mothers’ behaviour during dressing the baby, carrying the baby, being near the baby, keeping the baby busy, entertaining the baby by bodily activities and giving objects.

To find out the mothers’ (caregivers’) availability that is extensiveness and exclusiveness of her participation in handling the baby, number of people in charge of routine care, the proportion of time the baby is kept with and taken care of by the mother and other members in the family were taken into account.

The schedule consists of 20 items, 10 of which are to measure visual, tactual and verbal contacts initiated by the mother during caregiving activities. The next five help to measure stimulating activities conducted by the mother (caregiver) and the last five are meant to measure mothers’ (caregivers’)
availability to the baby. The ratings of the items are to be made in terms of the intensity and frequency with which the contacts are made.

3.9.4.1 Scoring

The total number of intense as well as frequent (as the case may be) ratings are to be multiplied by two, at times intense at times mild by one, and the mild or rare (as the case may be) by zero. The sum of these scores gives the total behavioural score of each mother. The maximum possible score is 40 and the minimum possible score is 0 (vide, Appendix VI).

3.10 Reliability and Validity

The reliability of the interview schedules constructed by the investigator was estimated using the method of internal consistency reliability analysis. The reliability coefficients were calculated for both the interview schedules using split half method applying Spearman Brown Prophecy formulae. For the other two interview schedules the reliability coefficients had already been found out by Indulekha (1977). The reliability coefficients obtained are significantly high for both the behavioural profile of infants \((r = 0.80, P<0.001)\) and mothers' behaviour patterns \((r = 0.70, P<0.001)\).

Reliability coefficients obtained for the tests constructed by the investigator using a sample of 100 infants are shown in Table 3.2.
Table 3.2  Reliability coefficients of the interview schedules used

<table>
<thead>
<tr>
<th>Inventories</th>
<th>Method</th>
<th>Coefficient obtained</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interview schedule for fathers' involvement in baby care</td>
<td>Split half method</td>
<td>0.86</td>
<td>0.001</td>
</tr>
<tr>
<td>2. Interview schedule for attachment patterns of infants</td>
<td>Split half method</td>
<td>0.81</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 3.2 indicates that for all the interview schedules, the reliability coefficients obtained are significant at .01 level. From this it may be clear that all the inventories are highly reliable.

The items in both the inventories constructed by the investigator were prepared after a thorough review of literature on related topics. A first hand knowledge about the problem was acquired by the investigator by making informal interviews with fathers and mothers. The investigator discussed the various aspects of the problems with paediatricians and psychiatrists. Child development experts were also consulted to scrutinise the selected items. Therefore content validity was taken into account in the present study as all the relevant content areas were adequately represented in the inventories constructed.

3.11 **Main Study**

After establishing the reliability and validity of the tools, the main study was conducted. As the results confirm test reliability and meet the criteria of content validity the same tests were replicated for the main study.
3.12 Measurement

Face-to-face interview was conducted with each father and mother while keeping the baby either on the lap of the father, mother or next to them. As the interview was being conducted the investigator was observant of the movements of the infant and these observations helped to have an objective check on their answers.

Before commencing the interview it was made explicitly clear to every parent that there was no right or wrong and good or bad answer. Since each item was a description of a behaviour in a specific situation with alternatives to choose from the investigator had just to circle or tick the appropriate answer obtained from the parents.

A set of questions attached to the interview schedule for fathers' involvement in baby care helped in drawing all possible information regarding the family composition, number of people taking part in the care of the infant, type of family, working status of both the parents. The information was filled up by the investigator before starting on with further questions of the schedule.

The interview with the parents was a timely process stretching upto one hour in some cases because it was conducted only when the baby was quiet and awake. A few interruptions would not be avoided in between the interview because routine care as feeding, putting to sleep and the like were allowed to be carried out in the normal course of time. Total time spent for the collection of data varied from 60 minutes to 90 minutes.
3.13 Treatment of the Data

The collected data was treated statistically using simple correlation, analysis of variance, multiple correlation and tests of significance for difference between means in terms of grading of treatment.

3.13.1 Simple correlation

Simple correlation method was used to assess the relationship between the variables. The relationship between fathers’ involvement in baby care, infants’ behavioural profile, reaction patterns, intensity of reaction, attachment patterns of infants and mothers’ behaviour patterns were found out using the product moment correlation method. The formula used is

\[ r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}} \]

3.13.2 Analysis of variance (ANOVA)

One way analysis (ANOVA) was chosen as the statistical tool for finding out the effect of (1) paternal and maternal age; (2) paternal and maternal educational status; (3) interval between marriage and birth of the child under study; (4) nature of infant care provided; and (5) ordinal position of the child in the family; (6) working status of the mother and (7) interval between baby under study and the younger or older sibling on all the study variables, namely (a) fathers’ involvement in baby care, (b) baby’s behavioural profile, (c) attachment patterns of infants and (d) mothers’ behaviour patterns.
One way analysis of variance (F) was computed using the additive model

\[ Y_{ij} = \mu + t_i + e_{ij} \]

where \( Y_{ij} \) is the value of the variate in the \( j \)-th replicate of the \( i \)-th treatment (\( i = 1, 2, \ldots, t; j = 1, 2, \ldots, r_i \)).

\( \mu \) is the general mean effect.

\( t_i \) is the effect due to \( i \)-th treatment.

\( e_{ij} \) is random error which is assumed to be independently and normally distributed with mean zero and variance \( \sigma^2_e \).

Let there be \( t \) treatments and the \( i \)-th treatment be replicated \( r_i \) times.

Let \( y_i \) be the total of the \( i \)-th treatment and be the Grand Total (GT) where

\[ Y_i = \sum_i Y_{ij} \]

and \( GT = \sum_i \sum Y_{ij} \)

Total number of observations, \( n = \sum r_i \)

The following formulae can be employed for the analysis of variance:

Correction Factor (CF) = \( (GT)^2 / \sum r_i \)

Total SS = \( \sum \sum Y_{ij}^2 - CF \)

Treatment SS = \( \sum Y_i^2 / r_i - CF \)

Error SS = Total SS - Treatment SS

We are interested in testing the hypothesis,

\( H_0 = T_1 = T_2 = \ldots, T_t \) against the alternative that \( T \)'s are not all equal.

For testing this hypothesis, we set-up the following analysis of variance.
If the calculated value of $F$ exceeds 0.05 df, the table value, it is concluded that the difference in sample means is significant at 5% level. If the calculated value of $F$ exceeds 0.01 df, the table value, the difference is significant at 1% level.

### 3.13.3 t-test

T-test for samples was chosen as one of the statistical methods. The philosophy underlying this method is that significant differences rarely exist between every pair of treatment. In the present investigation, t-value was computed to assess the effect of (1) status of income, (2) gender of the infant and (3) type of family on all the study variables, namely (a) fathers’ involvement in baby care, (b) baby’s behavioural profile, (c) attachment patterns of infants and (d) mothers’ behaviour patterns. 

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}}$$

where $X_1$ and $X_2$ are the mean scores;

$S^2$ is the error mean square of ANOVA;

and $n_1$ and $n_2$ are the number of observations of the two groups.
If the calculated value of 't' exceeds to 0.05, the difference is significant at 5% level, if it exceeds to 0.01, the difference is said to be significant at 1% level.

3.13.4 Multiple regression analysis

Multiple regression analysis may be useful in situations where the investigator has to evaluate the relative importance of a number of independent variables in determining the dependent variable. A univariate analysis using Pearson's correlation coefficient 'r' reveals the nature and extent of relationships between two variables, when they are taken in pairs, but it fails to take into account both the multiplicity of the independent variables and also the inter-relationship among them. Analysis using multiple correlation and regression may be particularly suited in such situations when the intention is to determine the extent to which one variable (dependent variable) is jointly influenced by group of other variables (independent or predictor variables). Among the different methods of multiple correlation available, the step-wise method was used in the present study as it enabled the estimation of sequential contribution of independent variables in the prediction of the dependent variable. The model employed was

\[ y = a_0 + a_1x_1 + a_2x_2 + \ldots + a_kx_k \]

where \( a \) is a constant, \( x \) values are predictor variables and \( y \) values are the predicted variables.

In the present investigation, the influence of fathers' involvement in baby care, attachment patterns of infants and mothers' behaviour patterns on baby's behavioural profile is assessed using the multiple regression analysis.
3.13.5 Grading of treatment

One way analysis of variance was shown as the statistical tool for finding out the overall difference between the means of different age groups. On obtaining the significant results the data was further analyzed by tests of significance applied for the method of ‘grading of treatment’ to find out the significant difference between individual treatment means (age groups) and formation of clusters among the treatment (age groups).

In the present study, the method helps in identifying the exact age at which conspicuous changes take place and to find out the age groups having similar characteristics with regard to attachment patterns of infants.

The philosophy underlying the method is that significant differences rarely exist between every pair of treatment. Treatment A may not differ significantly from treatment B, but may be significantly different from treatment C. So treatment A and B form one cluster (A, B) and C indicates the point at which significant difference occurs.

For the application of this method, the treatment means (of age groups) are to be arranged or graded in the order of performance that is the lowest mean taking number one position and highest the last (number 13 in this case). This difference between the lowest and the next treatment can be calculated applying the formula

\[
t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{S^2(\frac{1}{n_1} + \frac{1}{n_2})}}
\]

where \( \bar{x}_1 \) and \( \bar{x}_2 \) are the mean scores;

\( n_1 \) and \( n_2 \) are the sample sizes of the two treatments concerned;

\( S^2 \) is the error mean square of ANOVA.
If the obtained result is significant the next 't' is to be run between second and third mean treatment scores. If the difference in the mean scores of one and two treatments fail to obtain a significant value 't' should be calculated between one and three treatments and continue the calculation till a significant 't' is obtained. So the treatment having failed to obtain a significant difference between themselves form one cluster. The calculation continues with the treatments at which a significant 't' is obtained and the next treatment of the gradation. The process will continue in the same manner resulting in the formation of different clusters of treatment within which the constituents do not differ significantly from one another. But there will be a significant difference between these clusters.

The results are presented in the following chapter.