

Comparison of Reaction Time in Post Partum LSCS Primiparous and Multiparous Females: A Pilot Study

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ABSTRACT

Background: The visual pathway is a complex multi-synaptic neuronal circuit prone to alteration in conductivity under the influence of various neuro-hormonal modulators. The female sex steroids have shown significant effect on these circuits during different phases of menstrual cycle and pregnancy. The reaction time is the elapsed time between the presentation of a stimulus and the subsequent behavioral response i.e. time required for an observer to react to a stimulus. Various studies have shown changes in reaction time during pregnancy but there are no studies that show changes in reaction time and its effect on the woman in the postpartum stage. Deary-Liewald reaction time tester was used in this study to calculate the simple and choice reaction time and a total of 30 subjects were included in this study which were divided into 2 groups i.e. primiparous LSCS and multiparous LSCS and they were screened on 4th and 14th day postpartum

Aim: To compare reaction time in post-partum LSCS primi parous and multi parous females on 4th and 14th day. **Objectives:** To assess and compare reaction time in post-partum primiparous and multi parous LSCS females on 4th and 14th day. **Material and Methods:** A total of 30 females were selected as per the inclusion and exclusion criteria. The subjects were allocated in 2 groups of 15 females in each group. Group A consisted of postpartum primiparous females and group B consisted of postpartum multi parous females. Reaction time was assessed using Deary-Liewald Reaction time tester software.

Result: The study result show that significant difference was found in the simple and choice reaction time on 4th and 14th day when a comparison is made in the same group i.e. within Group A and within Group B.

Conclusion: The study concludes that there is a significant difference in the reaction time when a comparison is made in the same group. But there is no significant difference in the reaction time when an inter-group comparison is made between primiparous and multiparous females.

Keywords: Reaction time, LSCS females, Postpartum, Deary-Liewald reaction time tester

INTRODUCTION

Primiparous woman is a woman who has given birth for the first time.

Multiparous woman is a woman who has given birth more than once.

The types of delivery are:

1. FULL TERM NORMAL DELIVERY:
The delivery of a full-term newborn

refers to delivery at a gestational age of 36-38 weeks, as determined by the last menstrual period or via ultrasonographic evaluation. [1]

2. LOWER SEGMENT CESAREAN SECTION: It is an operative procedure whereby the foetus after the end of 28th week are delivered through an incision

made in the lower segment through a transperitoneal approach. [1]

STEROIDAL HORMONES: The two main steroidal hormones are oestrogen and progesterone.

Together these two hormones play an important role in maintenance of pregnancy. They are required for the adaptation of maternal organs to constantly increasing demands of the growing foetus. [1][4][5]

PROTEIN HORMONE: Human chorionic gonadotropin is the most important protein hormone

A glycoprotein which helps in maintenance of corpus luteum till 6 weeks of pregnancy and promotes secretion of relaxin from corpus luteum. It disappears from circulation within 2 weeks following delivery. [1][4][5]

REACTION TIME: It is a measure of how quickly an individual can respond to a particular stimulus. [2]

Simple reaction time: There is only one stimulus and one response.

Choice reaction time: There are multiple stimuli and multiple responses. The reaction must correspond to correct stimuli. [2][3]

Normal reaction time 350-450ms. [2][3]

The model for information flow within an organism, in vertebrates can be represented in this way: Stimulus Sensory Neuron Spinal Cord or Brain Motor Neuron Response- sensory neurons convert a stimulus into an electro-chemical signal, which flows the length of the sensory neurons, then through a neuron or neurons of the central nervous system, and then through the length of the motor neuron. Generally, motor neurons will cause a muscle to contract or a gland to secrete a substance. Reactions which only travel to, through, and from the spinal cord are often called spinal reflexes or cord mediated reflexes; withdrawing one's hand from hot stove is an example of such reflex.

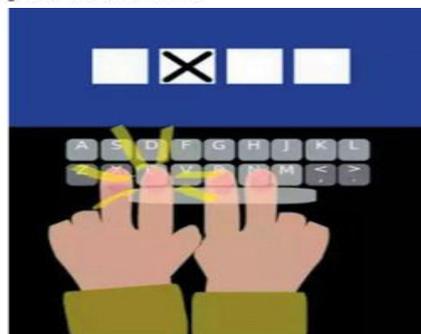
MATERIALS AND METHODS

This study was a comparative study. In this study, 15 postpartum primi parous

LSCS females and 15 post partum multiparous LSCS females between 21-31 years of age were chosen by convenient sampling technique after taking permission from ethical committee and the subjects who were willing to participate in the study and subjects who were medically not fit and with any musculoskeletal, neurological and cardiovascular disease, improper vision and FTND females were excluded from the study. Written consent was taken. Materials required for study were Pen, Book, Pencil, Deary-Liewald reaction time tester software, Laptop.



(Fig 1) Simple reaction time



(fig 2) Choice reaction time

All subjects were screened as per the inclusion and exclusion criteria. Purpose of the study and procedure were explained to the subjects. A written informed consent was taken from all the subjects prior to participation in the language best understood by them. Each subject's simple and choice reaction time was screened by Deary-Liewald reaction time test (reaction time software) on 4th and 14th day post partum. The participants were tested in a room with no distractions. For simple

reaction time, the participants were asked to press a key in response to a stimulus. For choice reaction time, there were four stimulus and participants had to press the key corresponding to the particular stimuli. In the simple reaction time task, you need to wait until you see a black cross on the white square. When that happens, you press as soon as you can the space bar. Thus, there is one stimulus (black cross) and one response (pressing the space bar). [3] In `choice reaction time (Fig 2)` experiments, there are multiple stimuli and multiple responses. The reaction must correspond to the correct stimulus. Typing a letter which matches a printed letter prompt is an example of this type of experiment. [8] In the choice reaction time task, you need to wait until you see a black cross on one of the four white squares (e.g. there are four different black cross position, which counts as four different stimuli). When that happens, you press as soon as you can the corresponding key (Z,X,.or.). Thus, there are four stimulus response associations. In the above example trial, you need to press the "X" key. [9]

When there is just one stimulus and one response, well below 200ms, that is less than 1/5th of a second! In choice response time tasks with 2 stimuli and 2 responses (that is the simplest possible choice respond time task) responding within 250 ms is probably the fastest you can do, but more typically people have an average response somewhere between 350 and 450 ms. Again, a multitude of factors can influence this, including the exact type of stimulus and response mode. [10]

Five practice trials, 10 test trials for simple reaction and 20 test trials for choice reaction were taken. The data was recorded and mean value of the test trials were taken and statistically analyzed by using GraphPad prism 8.3.1.

RESULT

The results from the study are mentioned below

- COMPARISON BETWEEN CHOICE REACTION TIME IN PRIMIPAROUS

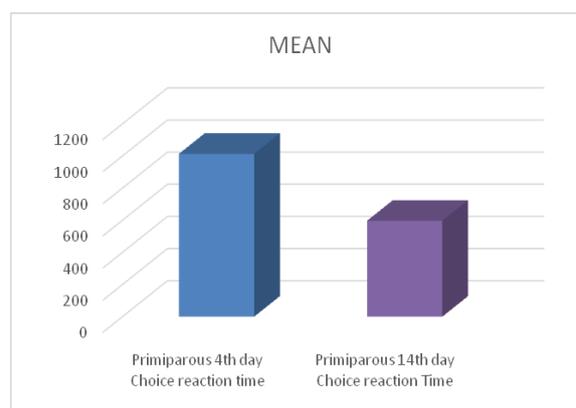
FEMALES ON 4TH AND 14TH DAY POSTPARTUM:

Statistical analysis was performed using Wilcoxon signed rank test.

Choice reaction time: P value <0.0001

The difference is considered statistically significant.

| Choice reaction time | Primiparous 4 th day | Primiparous 14 th day |
|----------------------|---------------------------------|----------------------------------|
| MEAN | 1013.08 | 596.88 |
| STANDARD DEVIATION | 329.25 | 112.11 |
| STANDARD ERROR | 85.01 | 28.95 |



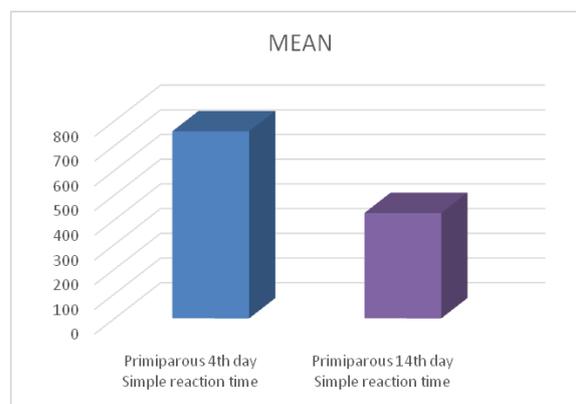
- COMPARISON BETWEEN SIMPLE REACTION TIME IN PRIMIPAROUS FEMALES ON 4TH AND 14TH DAY POSTPARTUM:

Statistical analysis was performed using Paired t-test.

Simple reaction time: P value 0.0009

The difference is considered statistically significant.

| Simple reaction time | Primiparous 4 th day | Primiparous 14 th day |
|----------------------|---------------------------------|----------------------------------|
| MEAN | 757.56 | 426.83 |
| STANDARD DEVIATION | 304.39 | 111.09 |
| STANDARD ERROR | 78.59 | 28.68 |



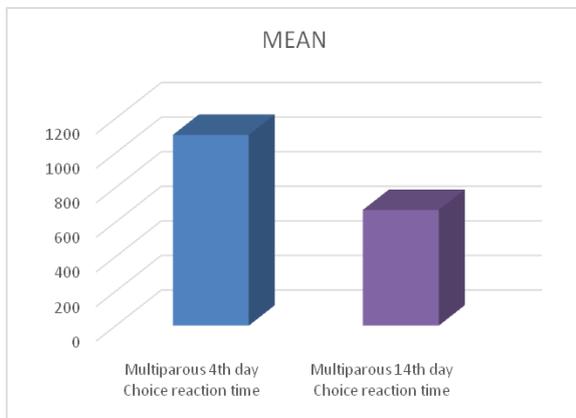
- COMPARISON BETWEEN CHOICE REACTION TIME IN MULTIPAROUS FEMALES ON 4TH AND 14TH DAY POSTPARTUM:

Statistical analysis was performed using Paired t-test.

Choice reaction time: P value <0.0001

The difference is considered statistically significant.

| Choice reaction time | Multiparous 4 th day | Multiparous 14 th day |
|----------------------|---------------------------------|----------------------------------|
| MEAN | 1103.65 | 669.20 |
| STANDARD DEVIATION | 212.08 | 124.99 |
| STANDARD ERROR | 54.76 | 32.77 |



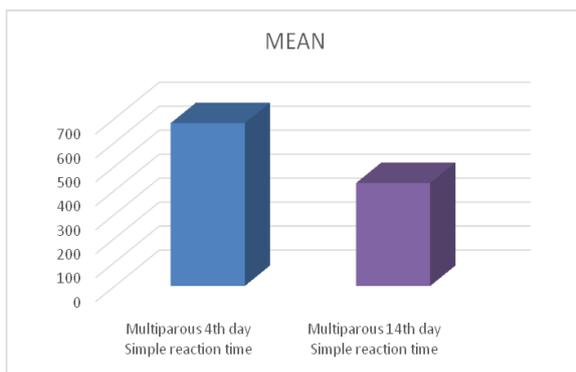
- COMPARISON BETWEEN SIMPLE REACTION TIME IN MULTIPAROUS FEMALES ON 4TH AND 14TH DAY POSTPARTUM:

Statistical analysis was performed using Paired t-test.

Simple reaction time: P value 0.0024

The difference is considered statistically significant.

| Simple reaction time | Multiparous 4 th day | Multiparous 14 th day |
|----------------------|---------------------------------|----------------------------------|
| MEAN | 679.41 | 429.69 |
| STANDARD DEVIATION | 254.07 | 79.17 |
| STANDARD ERROR | 65.60 | 20.44 |



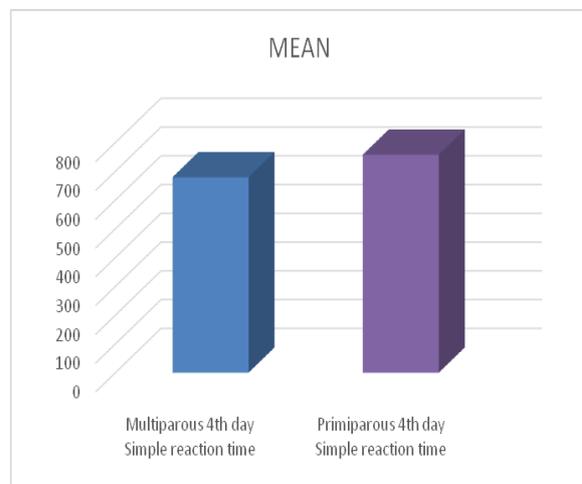
- COMPARISON BETWEEN SIMPLE REACTION TIME IN MULTIPAROUS AND PRIMIPAROUS FEMALES ON 4TH DAY POSTPARTUM:

Statistical analysis was performed using Unpaired t-test.

Simple reaction time: P value 0.4516

The difference is considered statistically not significant.

| Simple reaction time | Multiparous 4 th day | Primiparous 4 th day |
|----------------------|---------------------------------|---------------------------------|
| MEAN | 679.41 | 757.56 |
| STANDARD DEVIATION | 254.07 | 304.39 |
| STANDARD ERROR | 65.60 | 78.59 |



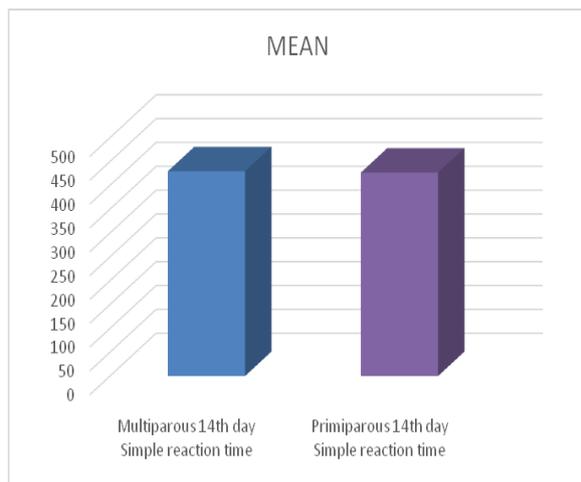
- COMPARISON BETWEEN SIMPLE REACTION TIME IN MULTIPAROUS AND PRIMIPAROUS FEMALES ON 14TH DAY POSTPARTUM:

Statistical analysis was performed using Unpaired t-test.

Simple reaction time: P value 0.9359

The difference is considered statistically not significant.

| Simple reaction time | Multiparous 14 th day | Primiparous 14 th day |
|----------------------|----------------------------------|----------------------------------|
| MEAN | 429.69 | 426.83 |
| STANDARD DEVIATION | 79.17 | 111.09 |
| STANDARD ERROR | 20.44 | 28.68 |



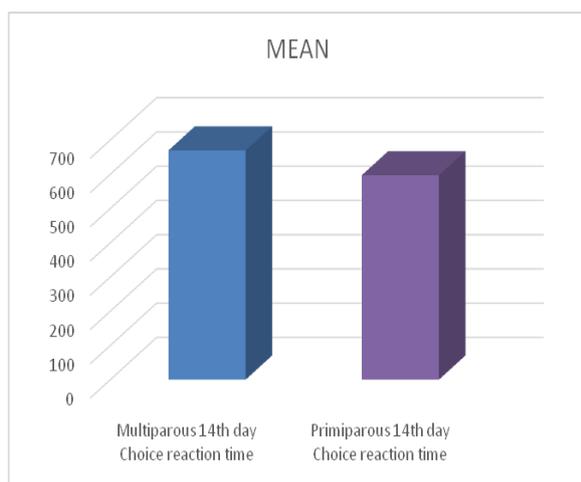
- COMPARISON BETWEEN CHOICE REACTION TIME IN MULTIPAROUS AND PRIMIPAROUS FEMALES ON 14TH DAY POSTPARTUM:**

Statistical analysis was performed using Mann Whitney test.

Choice reaction time: P value 0.1485

The difference is considered statistically not significant.

| Choice reaction time | Multiparous 14 th day | Primiparous 14 th day |
|----------------------|----------------------------------|----------------------------------|
| MEAN | 669.20 | 596.68 |
| STANDARD DEVIATION | 124.99 | 112.11 |
| STANDARD ERROR | 32.27 | 28.95 |



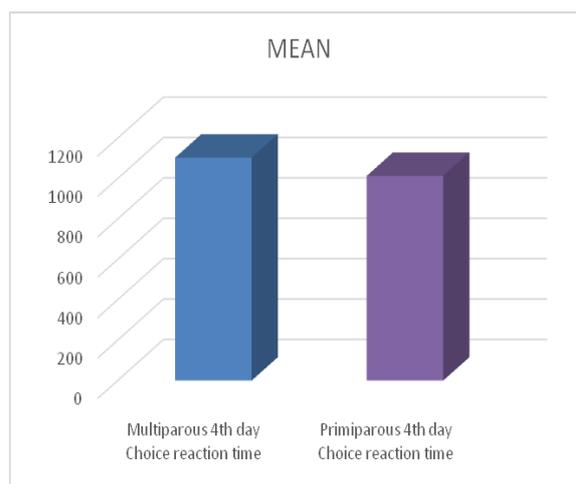
- COMPARISON BETWEEN CHOICE REACTION TIME IN MULTIPAROUS AND PRIMIPAROUS FEMALES ON 4TH DAY POSTPARTUM:**

Statistical analysis was performed using Mann Whitney test.

Choice reaction time: P value 0.6827

The difference is considered statistically not significant.

| Choice reaction time | Multiparous 4 th day | Primiparous 4 th day |
|----------------------|---------------------------------|---------------------------------|
| MEAN | 1103.65 | 1013.08 |
| STANDARD DEVIATION | 201.08 | 329.25 |
| STANDARD ERROR | 54.76 | 85.01 |



DISCUSSION

Several studies have been done on changes in reaction time on different trimesters during pregnancy. No study has been done on post partum population with regards to changes in reaction time. The purpose of this study was to assess and compare simple reaction time and choice reaction time in postpartum LSCS primiparous and multiparous females on 4th and 14th day postpartum. The numbers of working women are increasing day by day and it has been found that some women could not get back to their working environment after delivery as efficiently as before and hence suffered from postpartum depression eventually. This study helps us to early detect the changes in performance of daily activities of females and plan an intervention for the betterment of the female.

The study was planned to see if there is a difference in the reaction time postpartum on 4th day when human chorionic gonadotropin hormone is at its peak and on 14th day when human chorionic

gonadotropin is no longer present in the body for which 15 postpartum primi parous and 15 postpartum multiparous LSCS females in the age group of 21-31 years were tested.

When the data was collected, it was analyzed using :

1. Wilcoxon signed rank test for comparison between 4th and 14th day choice reaction time in postpartum primiparous females.
2. Paired t-test for comparison between 4th day and 14th day simple reaction time in multi parous females, 4th and 14th simple reaction time in primiparous females.
3. Unpaired t-test for comparison between 4th day simple reaction time in primiparous and multiparous females 14th day simple reaction time in primiparous and multiparous females.
4. Mann- Whitney test for comparison between 14th day choice reaction time in multiparous and primiparous females, 4th day choice reaction time in multiparous and primiparous females.

The following was observed:

1. In comparison between 4th day postpartum primiparous choice reaction time and 14th day postpartum primiparous choice reaction time, there is a significant difference that is P value is <0.0001.
2. In comparison between 14th day postpartum multiparous simple reaction time and 4th day postpartum multiparous simple reaction, there is significant difference that is P value is 0.0024.
3. In comparison between 14th day postpartum primiparous simple reaction time and 4th day postpartum primiparous simple reaction time, there is significant difference that is P value is 0.0009.
4. In comparison between 14th day postpartum multiparous choice reaction time and 4th day postpartum multiparous choice reaction time, there is significant difference that is P value is <0.0001.
5. In comparison between 4th day postpartum multiparous simple reaction time and 4th day postpartum primiparous

simple reaction time, there is no significant difference that is P value is 0.4516.

6. In comparison between 14th day postpartum postpartum multiparous simple reaction time and 14th day postpartum primiparous simple reaction time, there is no significant difference that is P value is 0.9359.
7. In comparison between 14th day postpartum multiparous choice reaction time and 14th day postpartum primiparous choice reaction time, there is no significant difference that is P value is 0.1485.
8. In comparison between 4th day postpartum multiparous choice reaction time and 4th day postpartum primiparous choice reaction time, there is no significant difference that is P value is 0.6827.

This shows that there is significant difference in the simple reaction time and choice reaction time of the same group but no significant difference in the values are found when intergroup comparison is done.

It is known that the level of Human Chorionic Gonadotropin is at its peak on 3-4th day postpartum and Human Chorionic Gonadotropin level completely declines the end of 2nd week postpartum. [1] The reaction time on 4th day postpartum was more than the reaction time on 14th day in most of the subjects, which shows that Human Chorionic Gonadotropin hormone levels slower down the reaction time of a person.

Suggestions:

1. Further study can be done by giving Frenkel's exercise during antenatal classes and assessing the reaction time postpartum.
2. Further studies can be done to find relationship between affected reaction time and postpartum depression.
3. Further studies should divide the subjects keeping in mind their comfort and ease in using computers or laptops. People who are not used to using computers or laptops on a daily basis

will take longer duration to press the associated keys as compared to those who use computers or laptops on daily basis.

CONCLUSION

There is a significant difference in the reaction time when a comparison is made in the same group. But there is no significant difference in the reaction time when an inter-group comparison is made between primiparous and multiparous females.

Competing interest:

The author declares no conflicts of work.

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