



# THE IMPACT OF COVID-19 1<sup>ST</sup> AND 2<sup>ND</sup> WAVE ON THE RATE OF CESAREAN DELIVERIES IN LOW- RISK PREGNANCIES

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**Abstract:** The report discusses the causes of increased rate of C-section in low-risk pregnancies at the time of covid 19. This research is concerned with understanding the impact of covid-19 1<sup>st</sup> and 2<sup>nd</sup> wave on the rate of cesarean section deliveries in low-risk pregnancies. We have discussed about childbirth procedure, global birth rate, complications of pregnancies, data of the centers for disease control and prevention, provisional data of cesarean delivery rate in the years 2019, 2017, 2016, the rate of c-sections at both national and international levels during high risk and low risk pregnancies.

**Aim:** To analyze the impact of covid-19 1<sup>st</sup> and 2<sup>nd</sup> wave on the rate of cesarean deliveries in low-risk pregnancies at Tertiary Care Hospital.

**Material and methods:** It was a descriptive study carried out in Obstetrics and Gynaecology Department of a Tertiary Care Hospital, New Delhi. The duration of study was (1 Month) 17th June to 17 July 2021. The Retrospective study was done on secondary data taken from CPRS Software (Computerized Patient Record System) and the sample size comprised the total of 493 deliveries from which 336 deliveries happened in (Jan-May) 2020 and 157 new-borns were delivered in the year 2021 (Jan-May) during the inception and peak level of covid-19. The study population comprised of cases (caesareans performed) vs. controls (caesareans performed as per the wish over natural birthing option), from the division of obstetrics and gynaecology in tertiary care hospital, new Delhi. Stratified Sampling Technique was used for this research. Exclusion criteria was High risk and Low risk pregnancies delivery cases – Vaginal delivery and the Inclusion Criteria was High risk and Low risk pregnancies delivery cases – C-section.

**Results:** **Fig.1:** The total no. of deliveries performed in tertiary care hospital in the months of Jan-May 2020 were 336 and in 2021 Jan-May were 157. **Fig. 2.1 and 2.2:** The total no. of deliveries performed in the year 2020 are as follows: Jan-114, Feb-106, March-116, April-0 and in May- 0 and In the year 2021 are as follows: Jan-0, Feb-33, March-41, April-35 and in May-38. **Fig 3:** The impact of covid-19 1<sup>st</sup> and 2<sup>nd</sup> wave at tertiary care hospital – 271 high-risk pregnancies were performed in the year 2020 whereas in 2021 high risk pregnancies performed were 108 (more than 50 % were rapidly decreased). And 65 of low-risk pregnancies delivered in the year of 2020 and the no. of low-risk pregnancy deliveries also decreased in the year of 2021 at the time of the 2<sup>nd</sup> wave of covid-19 i.e., 49. **Fig 4:** In year 2020, 34 C-sections, 27 normal vaginal deliveries and 4 vacuum deliveries happened. On the other hand, in year 2021, 38 C-sections, 11 normal vaginal deliveries and 0 vacuum deliveries happened at tertiary care hospital. **Fig 5:** The rate of total no. of C-section deliveries in low-risk pregnancies happened in tertiary care hospital in year 2020 was 34/65 (52.30%) and in year of 2021 it was 38/49 (77.55%). **Fig 6:** Most of the C-section deliveries in low-risk pregnancies were performed in the following maternal age group - In 2020: age group – 32 year old – 7 C-

sections. In 2021: age group – 30 year old - 8 C-sections. **Fig 7:** Most of the C-section deliveries in low-risk pregnancies happened in the following BMI group - In 2020: BMI group - 32 BMI - 7 C-sections. In 2021: BMI group - 31 BMI - 10 C-sections. **Fig 8:** Most of the C-section deliveries in low-risk pregnancies happened in the following Parity group - In 2020: Parity group - G1 - 29 C-sections. In 2021, Parity group: PRIMI - 19 C-section. **Fig 9:** Most of the C-section deliveries in low-risk pregnancies were performed in the following Baby's Weight group - In 2020: Baby's Weight group - 2.9kg – 6 C-sections and 3.2 kg- 5 C-sections. In 2021:Baby's Weight group - 2.7 kg C-sections and 3.2 kg- 5 C-sections. **Fig 10.1:** In year 2020, there were 4 main risk factors that are shown in the graph which are highly responsible for c-section delivery in low-risk pregnancies: CPD Cephalopelvic disproportion – 4 C-sections, Fetal distress – 3 C-sections, GDM (gestational diabetes) insulin -4 C-sections, Meconium -Stained Liquor - 4 C-sections. **Fig 10.2:** In year 2021, 3 main risk factors were shown in the graph which are highly responsible for performed c-section delivery in low-risk pregnancies: CDMR (C-section on maternal request) - 4 C-sections, Fetal distress – 5 C-sections, GDM (gestational diabetes)- 5 C-sections. **Fig 11:** The cases of CDMR, failed induction, failure to progress in labor, fetal distress, GDM on insulin, IVF pregnancy has increased in year 2021 as compared to 2020. On other hand the cases of CPD, Meconium stain liquor, fibroid uterus is higher in year 2020 as compared to the year 2021.

**Conclusion:** COVID-19 1st and 2nd wave status alone became a common indication for cesarean delivery early in the pandemic. The increase in cesarean rate in this data specially in low-risk pregnancies may reflect obstetricians attempting to serve their patients in the best way possible according to the constantly evolving guidelines on safest mode of delivery for the mother, infant and provider. The rate of C-section deliveries was badly affected by covid 19 pandemic in year 2020 and in 2021 at tertiary care hospital, Delhi. However, the 2nd wave of covid 19 in 2021 affected the rate of c section deliveries in low-risk pregnancies at higher level as compared to the 1st wave of covid 19. Due to covid-19, it was an emergency condition where less staff was available in the hospitals and not only in the case of pregnancies, even in other departments there was a shortage of staff, people were not able to get proper treatment and healthcare services, at the time of the 2nd wave of covid-19 in the year 2021 more no. of emergency deliveries happened where C-section deliveries were required in high no. of pregnancy cases, due to shortage of staff and higher no. of complications present in low-risk pregnancies.

**Index Terms - COVID-19, low-risk pregnancy, cesarean section, tertiary care hospital, obstetrics, maternal outcomes.**

## I. INTRODUCTION

The report discusses the causes of increased rate of C-section in low-risk pregnancies. This research is concerned with understanding the impact of covid-19 1<sup>st</sup> and 2<sup>nd</sup> wave on the rate of cesarean section deliveries in low-risk pregnancies. Since 1985, the international healthcare community has considered the ideal rate of cesarean sections to be between 10-15%. When medically necessary, a cesarean section can effectively prevent maternal and newborn mortality. So, to conduct the study of cesarean delivery rate in low-risk pregnancies at the time of covid-19 1<sup>st</sup> and 2<sup>nd</sup> wave, we have collected the data of number of new-borns delivered at the time of covid-19 in a tertiary care hospital in the Obstetrics and gynaecology department, where we have focused on different kind of observations- The various risk factors that are responsible for cesarean delivery in low-risk pregnancies. The different signs for cesarean sections in low-risk pregnancies which included fetal distress, repeat caesarean section, failed induction, and arrest of labor, multiple gestation, malpresentation, cephalopelvic disproportion, fetal signs, maternal signs and obstetric signs. Fetal signs included development of hindered babies, rashness, enormous infant >3.8 kg and innate deformities in which vaginal birth was unrealistic. Rate of cesarean delivery in low-risk pregnancies increased at the time of covid-19 1st and 2nd wave. There was a significant difference between the rate of cesarean delivery in low-risk pregnancies in covid-19 1st wave and 2<sup>nd</sup> wave.

Globally- In 2015, there were about 135 million births. About 15 million of which were born before 37 weeks of gestation, while between 3 and 12% were born after 42 weeks. In the developed countries, most deliveries occur in hospitals, while in the developing countries, most deliveries take place at home with the support of a traditional birth attendant. Complications from pregnancy and childbirth result in roughly 500,000 maternal

deaths each year, 7 million women with major long-term issues, and 50 million women with bad health outcomes after delivery. Obstructed labor, postpartum bleeding, eclampsia, and postpartum infection are examples of specific problems. Complications in the baby may include lack of oxygen at birth, birth trauma, prematurity, and infections. ("Childbirth" 2022)

Centres for Disease Control and Prevention provisional data from 2019 (released May 20, 2020) shows that 31.7% of all births were by cesarean and 25.6% of the NTSV ("low-risk") population had cesarean births. And, according to 2017 Consumer Reports study, about 26 % of healthy women with low-risk pregnancies and full-term babies positioned head first were typically considered to deliver vaginally but ended up undergoing c-sections. ("What Is the Rate of C Sections in the US? – Richardvigilantebooks.Com" n.d.)

In India- The rates of cesarean deliveries have more than doubled from 8% in 2005 to 17% in 2016. The World Health Organization in 1985 recommends that cesarean deliveries should not exceed 10% to 15% of all deliveries in any country. The global rate of caesarean sections has climbed from roughly 7% in 1990 to 21% today, and is expected to continue rising over the next decade. From 2005 to 2016, the rate of cesarean delivery increased from 8.5% to 17.2% in India. However, the Centres for Disease Control and Prevention reports more than 31% of all deliveries in the U.S. were by C-section in 2018. According to Tricia Elliott, TJC's director of Quality Measurement, certain U.S. hospitals report C-section rates as high as 60%. (Bhatia et al. 2020)

High Risk Pregnancies- A high-risk pregnancy is one that threatens the health or life of the mother or her fetus. It frequently necessitates specialised treatment from properly qualified professionals. Some pregnancies become high-risk as they develop, while some women are predisposed to difficulties for a variety of reasons even before they get pregnant. Risk factors for a high-risk pregnancy can include: Existing health conditions such as high blood pressure, diabetes, or being HIV-positive, Overweight and obesity. ("High Risk Pregnancy Melbourne | Dr Stephen Cole" n.d.)

The aim of the study was to analyse the impact of covid-19 on the rate of caesarean deliveries in low-risk pregnancies in a tertiary care hospital in Delhi.

## LITERATURE REVIEW

COVID-19 caused serious morbidity in 2/32 women, and both of them required ICU treatment. COVID-19 looks to be less fatal than SARS and MERS, despite the small number of cases recorded so far. Preterm birth was reported in 47 percent of women hospitalized with COVID-19, putting a strain on new born facilities if the UK's plausible worst-case scenario of 80 percent of the population is realized (Mullins et al. 2020).

In hospitalized mothers infected with coronavirus infections, including COVID-19, >90% of whom also had pneumonia, preterm birth is the most common adverse pregnancy outcome. Preterm birth, preeclampsia, caesarean section, and perinatal death were all linked to COVID-19 infection (and pooled proportions). The findings from this study can guide and enhance prenatal counselling of women with COVID-19 infection occurring during pregnancy, although they should be interpreted with caution in view of the very small number of included cases (D et al. 2020).

Pregnant women are more likely to contract the coronavirus. Respiratory infectious diseases have demonstrated an increased risk of adverse maternal obstetrical complications than the general population due to physiological changes occurred during pregnancy (Diriba, Awulachew, and Getu 2020).

Women with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection have had high rates of preterm birth and caesarean delivery ("Change in the Incidence of Stillbirth and Preterm Delivery During the COVID-19 Pandemic | Neonatology | JAMA | JAMA Network" n.d.).

COVID-19 has an indirect negative impact on mother and child health, despite the fact that it has no direct influence on pregnancy outcomes. Emergency obstetric and antenatal care are essential services to be continued with awareness of people while maintaining social distancing and personal hygiene ("The Effect

of the COVID-19 Pandemic on Maternal Health Due to Delay in Seeking Health Care: Experience from a Tertiary Center - Goyal - 2021 - International Journal of Gynecology & Obstetrics - Wiley Online Library” n.d.).

Impact of COVID-19 on the new-born, caution should COVID-19 infection in pregnancy leads to increased risk in pregnancy complications such as preterm birth, PPRM, and may possibly lead to maternal death in rare cases (Akhtar et al. 2020).

During the Ebola outbreak, the Liberian health system was severely debilitated, and basic maternal health treatments were difficult to come by. In the light of the major reporting gaps during the Ebola period, and the reduced use of health facilities for maternal care, these findings highlight the need for measures to avoid such disruptions during future outbreaks (“Effects of the 2014 Ebola Outbreak on Antenatal Care and Delivery...: Ingenta Connect” n.d.).

Most human infections result from human-to-human spread, and when particular medical procedures are combined with poor infection control the virus can disseminate within the hospital (Park et al. 2016).

Although active treatment is linked to a slight reduction in the CS rate, it is extremely prescriptive and interventionist. It's possible that some of the active management package's components are more effective than others. Further work is required to determine the acceptability of active management to women in labour(Brown et al. 2008).

## MATERIAL AND METHODS

A study was carried out in Obstetrics and Gynaecology Department (Tertiary Care Hospital, New Delhi.) The duration of study was (1 Month) 17th June to 17 July 2021. The Retrospective study was done on secondary data taken from CPRS Software (Computerized Patient Record System) and the sample size we have collected was of total 493 deliveries from which 336 deliveries happened in (Jan-May) 2020 and 157 new-borns were delivered in year 2021 (Jan-May) since the inception of covid-19 and peak level of covid-19. The study population was all the obstetrical deliveries in tertiary care hospital, where cases (caesareans performed) vs. controls (caesareans performed as per the wish over natural birthing option) pregnancies were studied. The Sampling Technique used for this research study was Stratified Sampling. Exclusion criteria included High risk and Low risk pregnancies delivery cases – Vaginal delivery whereas Inclusion criteria included High risk and Low risk pregnancies delivery cases – C-section.

## Data collection tool-

**TOOL KIT- There are different kind of categories present in our birth toolkit which is used to identify or classify the deliveries of Low risk and High-risk pregnancies. CLINICAL AUDIT Gynecology & Obstetrics Toolkit**

<b>Patient's Name</b>	
<b>Consultant</b>	
<b>Date of Admission</b>	
<b>Age</b>	
<b>Pt Height (cm)</b>	
<b>Pt Weight</b>	
<b>BMI/ At the 1st Antenatal Visit</b>	
<b>Parity(G,P,A)</b>	
<b>Previous Abortion</b>	
<b>Baby Weight (Kg)</b>	
<b>Presentation</b>	
<b>Gestation Week at delivery</b>	
<b>No of Gestation</b>	
<b>Indication for LSCS</b>	
<b>Risk Factors/Remarks to be put by SPOC /HOD</b>	
<b>Type of Delivery</b>	
<b>Previous Still Birth</b>	
<b>Previous congenital disorder</b>	
<b>Type of labor</b>	
<b>Induction</b>	
<b>Indication for Induction</b>	
<b>Method of Induction</b>	

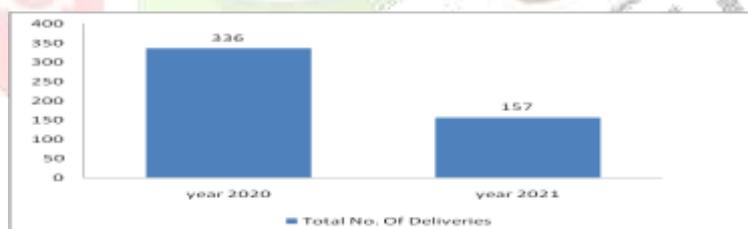
<b>Duration Of Augmentation/ Induction (hr:mm)</b>	
<b>Type of LSCS</b>	
<b>Date of delivery</b>	
<b>Category</b>	

In the year 2020 during the 1st wave of covid-19, 336 new borns were delivered in a tertiary care hospital from Jan to May 2020 out of which 65 deliveries were low risk in nature and from those 65 low-risk pregnancies around 34 were C-section deliveries. On the other hand, In the year of 2021 at the time of the 2nd wave of covid-19, 157 new borns were delivered in tertiary care hospital, new Delhi from Jan to May out of which 49 deliveries were low risk in nature and from those 49 low risk pregnancies around 38 were C-section deliveries.

DATA	2020 year (Jan-May)	2021 year (Jan-May)
<b>Total No. Of Deliveries</b>	<b>336</b>	<b>157</b>
<b>Low-Risk Pregnancies delivered</b>	<b>65/336</b>	<b>49/157</b>
<b>C-section in Low-Risk Pregnancies</b>	<b>34/65</b>	<b>38/49</b>
<b>Rate of Low-Risk Pregnancies delivered</b>	<b>19.34%</b>	<b>31.21%</b>
<b>Rate of C-section in Low-Risk Pregnancies</b>	<b>52.30%</b>	<b>77.55%</b>

## RESULT

**Figure 1:**



**Fig.1:** This graphical representation shows the comparison between the data of total no. of deliveries in tertiary care hospital in the year of 2020 and 2021 in the period of Jan-May. The total no. of deliveries happened in tertiary care hospital in the month of Jan-May 2020 were 336 and in the year 2021 Jan-May were 157.

Figure 2.1:

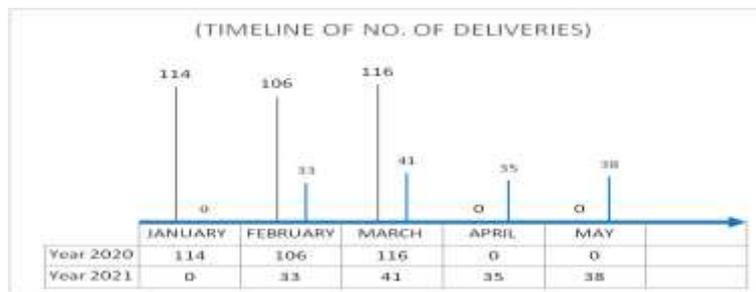
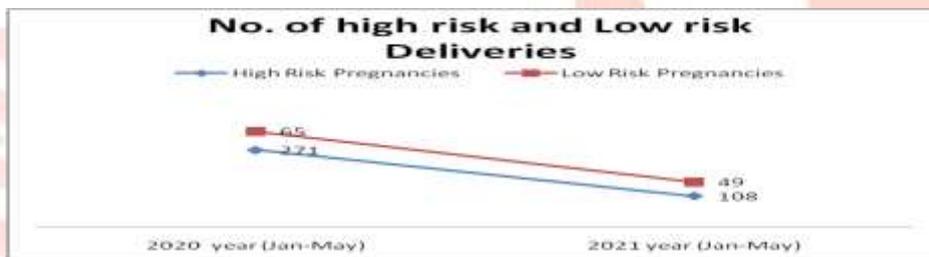


Figure 2.2



**Fig. 2.1 and 2.2:** This graphical representation shows the comparison between the monthly wise data of total no. of deliveries in tertiary care hospital in the year of 2020 and 2021 in the period of Jan-May. The total no. of deliveries performed in tertiary care hospital in the following month were as follow: In 2020, Jan-114, Feb-106, March-116, April-0 and in May- 0. Whereas in 2021, Jan-0, Feb-33, March-41, April-35 and in May-38 deliveries were performed.

Figure 3:



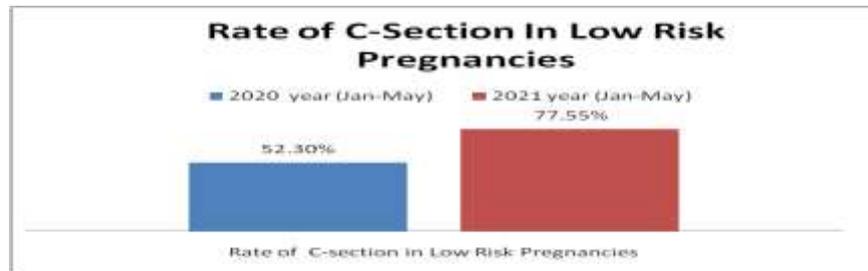
**Fig 3:** This graph shows the total no. of high-risk pregnancies and Low risk pregnancies occurred in a tertiary care hospital in the year of 2020 and 2021 from January to May during the impact of covid-19 1st and 2nd wave. 271 high-risk pregnancies cases were there in the year 2020 whereas in the year of 2021 the data of high-risk pregnancy deliveries was 108 (more than 50 % were rapidly decreased). And 65 of low-risk pregnancies delivered in the year of 2020 and the no. of low-risk pregnancy deliveries has also decreased in the year of 2021 at the time of the 2nd wave of covid-19 i.e., 49.

Figure 4:



**Fig 4:** This graph represents the number of different kind of deliveries performed in low-risk pregnancies cases at the time of covid-19 (Jan-May) in year of 2020 and 2021. In year 2020: 34 C-sections, 27 normal vaginal deliveries and 4 vacuum deliveries were done. On the other hand, In year 2021: 38 C-sections, 11 normal vaginal deliveries and 0 vacuum deliveries were carried out in a tertiary care hospital.

Figure 5:



**Fig 5:** This graphical representation shows the comparison between the data of no. of C-section deliveries in low-risk pregnancies in a tertiary care hospital in the year of 2020 and 2021 month of Jan-May. The rate of total no. Of C-section deliveries in low-risk pregnancies happened in tertiary care hospital in year 2020 was 34/65 (52.30%) whereas in year 2021 it was found to be 38/49 (77.55%).

**Identification of low-risk pregnancies**

Group	Value
Maternal age	< 40 years
Body Mass Index	< 35 BMI
Parity	P = 0
Baby's Weight	< 3.8 kg
Presentation	Cephalic
Gestation Week at delivery	> 36 weeks and < 40 weeks
No. Of Gestation	Singleton

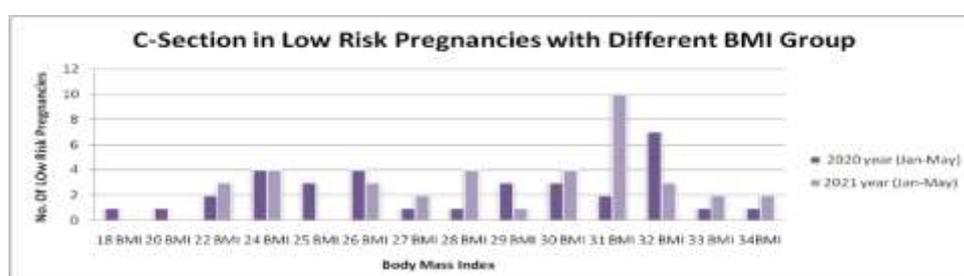
**Graphical representations of LSCS in low-risk pregnancies according to different groups:**

Figure 6:



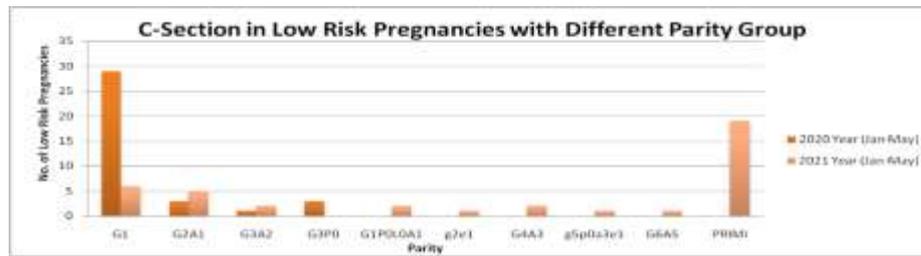
**Fig 6:** This graphical representation shows the C-section deliveries in low-risk pregnancies happened in different maternal age group at the time of covid 19 in Jan-May in year of 2020 and 2021. Most of the C-section deliveries in low-risk pregnancies happened in the following maternal age group - In 2020, age group - 32-year-old - 7 C-sections. In 2021, age group - 30-year-old – 8 C-sections were performed

Figure 7:



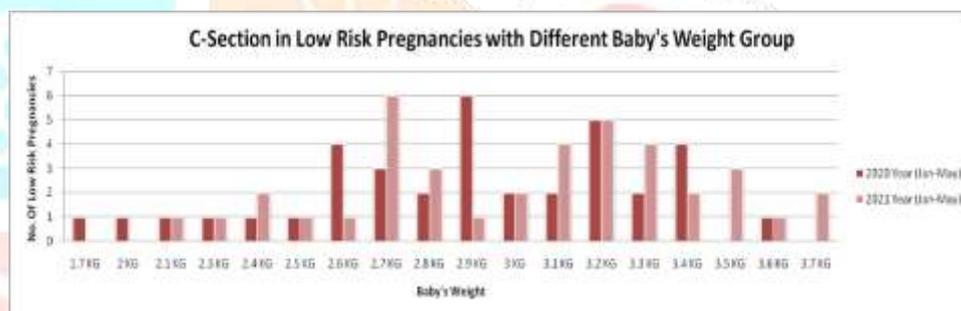
**Fig 7:** This graphical representation shows the C-section deliveries in low-risk pregnancies according to different body mass index group at the time of covid 19 (Jan-May) in year of 2020 and 2021. Most of the C-section deliveries in low-risk pregnancies happened in the following BMI group - In 2020, BMI group - 32 BMI - 7 C-sections. In 2021, BMI group - 31 BMI - 10 C-sections were carried out.

**Figure 8:**



**Fig 8:** This graphical representation shows the C-section deliveries in low-risk pregnancies performed in different parity group at the time of covid 19 (Jan-May) in year of 2020 and 2021. Most of the C-section deliveries in low-risk pregnancies happened in the following Parity group - In 2020, Parity group - G1 - 29 C-sections. (Gravidity is defined as the number of times that a woman has been pregnant). In 2021, Parity group - PRIM1 – 19 C-section (PRIMI refers to the first-time pregnant woman. It is referred as primigravida).

**Figure 9:**



**Fig 9:** This graphical representation shows the C-section deliveries in low-risk pregnancies performed in different baby's weight group at the time of covid 19 (Jan-May) in year 2020 and 2021. Most of the C-section deliveries in low-risk pregnancies happened in the following Baby's Weight group: In 2020, Baby's Weight group - 2.9kg - 6 C-sections and 3.2 kg- 5 C-sections. In 2021, Baby's Weight group - 2.7 kg- 6 C-sections and 3.2 kg- 5 C-sections were done.

### Indications for caesarean section in low-risk pregnancies

According to the study of no. of cases of low-risk C-section deliveries, we have observed that C-section deliveries in low-risk Pregnancies happened due to the presence of different kind of risk factors or complications in pregnant women and because of Covid-19 waves the chances of complications and risk factors also increased in low-risk pregnancies. Different kind of indications and risk factors are the main cause of C-sections in low-risk pregnancies at the time of covid-19. There are 5 main risk factors that are shown in the graphs which are highly responsible for c-section delivery in low-risk pregnancies -

**a. CMR (C-section on maternal request)**- A complicated but relevant and timely concept, caesarean delivery on maternal request (CDMR) is defined as a caesarean delivery for a singleton pregnancy on maternal request at term in the absence of medical or obstetrical indications. **b. Fetal distress**-Fetal distress is a term used to describe indicators that the fetus is not doing well before and during childbirth. Fetal distress is a rather infrequent labor problem. It usually happens when the fetus isn't getting enough oxygen. The pregnancy lasts too long (post maturity). **c. GDM (gestational diabetes mellitus)**- Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. The definition applies whether insulin or only diet modification is used for treatment and whether or not the condition persists after pregnancy. **d. CPD (Cephalopelvic disproportion)**- Cephalopelvic disproportion (CPD) is a pregnancy complication in which there is a size mismatch between the mother's

pelvis and the fetus head. The baby's head is proportionally too large or the mother's pelvis is too small to easily allow the baby to fit through the pelvic opening. **e. Meconium-Stained Liquor**- Meconium-Stained liquor (MSL) is the passage of meconium by a fetus in utero during the antenatal period or in labour.

Figure 10.1:

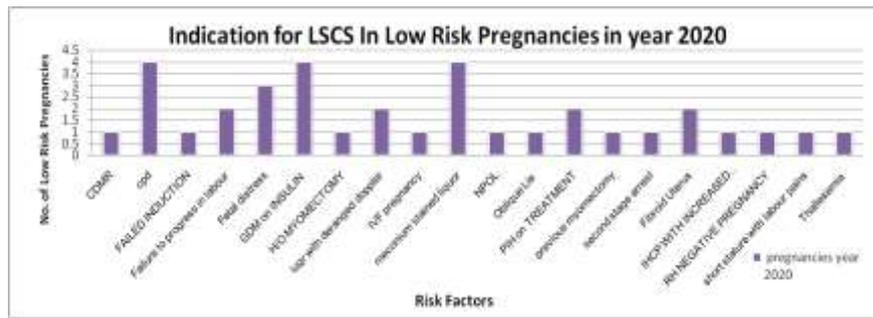


Fig 10.1: This graphical representation shows the C-section deliveries in low-risk pregnancies carried out in different inductions/risk factors at the time of covid 19 (Jan-May) in year 2020. In year 2020, there are 4 main risk factors that are shown in the graph which are highly responsible for c-section delivery in low-risk pregnancies. CPD Cephalopelvic disproportion - 4 C-sections, Fetal distress - 3 C-sections, GDM (gestational diabetes) insulin - 4 C-sections, and Meconium -Stained Liquor - 4 C-sections.

Figure 10.2:

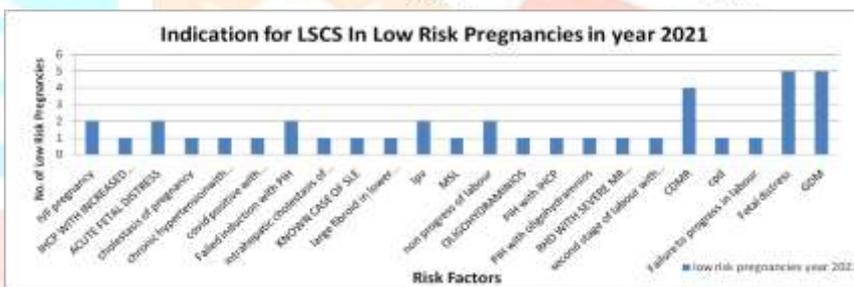


Fig 10.2: This graphical representation shows the C-section deliveries in low-risk pregnancies carried out in different inductions/risk factors at the time of covid 19 (Jan-May) in year of 2021. In year 2021, there are 3 main risk factors that are shown in the graph which are highly responsible for performed c-section delivery in low-risk pregnancies: CDMR (C-section on maternal request) - 4 C-sections, Fetal distress – 5 C-sections, and GDM (gestational diabetes)- 5 C-sections.

Figure 11:

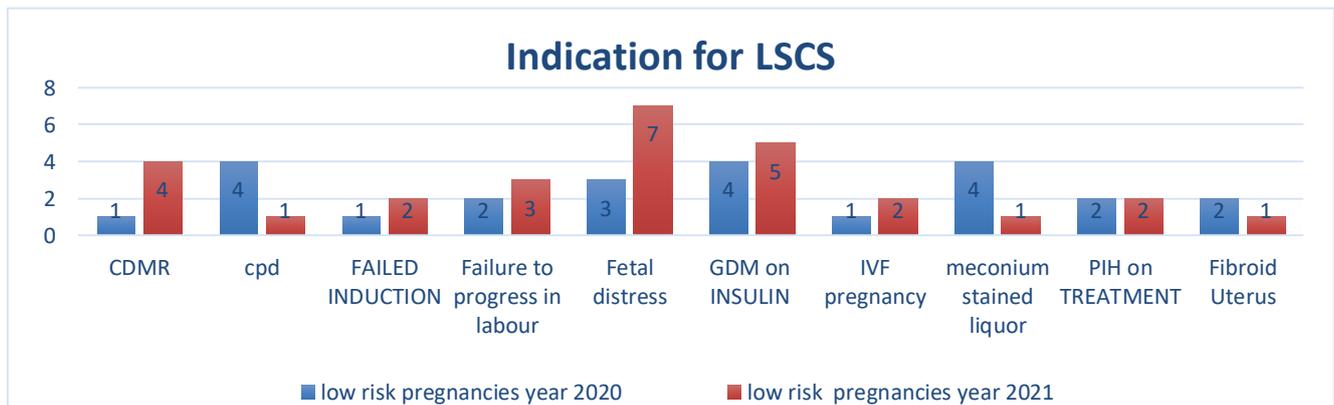


Fig 11: This graphical representation shows the Comparison of data of LSCS in low-risk pregnancies happened according to different risk factors at the time of covid 19 (Jan-May) in the year 2020 and 2021. According to the observation in this graph -The cases of CDMR, failed induction, failure to progress in labor,

fetal distress, GDM on insulin, IVF pregnancy has increased in year 2021 as compared to 2020. On the other hand the cases of CPD, Meconium stain liquor, fibroid uterus were higher in year 2020 as compared to the year 2021.

## DISCUSSION

In this study, **Fig 1:** The total no. of deliveries happened in tertiary care hospital in the month of Jan-May 2020 is 336 and the year 2021 Jan-May is 157 where it is observed that the total no. of deliveries happened in the year of 2020 (covid-19 1st wave) are highest in number as compared to that of year 2021 (covid-19 2nd wave). The impact of 2nd wave of Covid-19 on no. Of deliveries happened in tertiary care hospital was higher as compare to the 1st wave of covid- 19. **Fig 2.1 and 2.2:** According to the data of year 2020 most of deliveries happened in between Jan to march 2020 in a tertiary care hospital, however the 1st case of covid-19 was found in Delhi in the 1st week of march 2020 and 1st lockdown declared in Delhi from the 22nd march 2020. So, after the month of march the delivery rate at a tertiary care hospital was badly affected by the 1st wave of covid-19 and lockdown due to which no. of deliveries were automatically decreased over the month of march 2020. This graph also shows the rate of new born delivered at a tertiary care hospital which was highly affected by the 2nd wave of covid-19 which started in India in the month of April 2021. If we talk about the new born delivery data of year 2021 at the tertiary care hospital, New Delhi, we can observe that after Jan 2021 the cases of covid-19 1st wave had started to decrease and condition of India was also under control by the government as they had started to provide the vaccination and proper treatment to the people and recovery rate of covid-19 patients also increased therefore at that time the new born delivery rate was also increased. However according to this graph the new born delivery rate raised from Jan to April 2021 then 2nd wave of covid-19 started in the month of April 2021 which reduced the rate of new born deliveries for the month of May 2021. **Fig 3:** The impact of covid-19 1st and 2nd wave at tertiary care hospital – 271 high-risk pregnancies delivered in the year 2020 and in the year 2021 the data of high-risk pregnancy deliveries was found to be 108 (more than 50 % were rapidly decreased). And 65 of low-risk pregnancies were delivered in the year 2020 and the no. of low-risk pregnancy deliveries has also decreased in the year 2021 at the time of the 2nd wave of covid-19 which was found to be 49 deliveries. The data of low-risk and high-risk pregnancies delivery were too low in 2021 as compared to 2020 because the covid-19 2nd wave affected the pregnant ladies on a higher level as compared to the 1st wave of covid-19 because of that, the more complication in pregnancies has been developed which increased the C-section rate at the time of a pandemic situation. **Fig 4:** If we compare the data on a yearly basis the results show that caesarean section deliveries in low-risk pregnancies are highest in the no. whether in year 2020 or 2021 but according to comparison of 1st and 2nd wave of covid-19 between year 2020 and 2021, we can see the no. of normal deliveries and vacuum deliveries of low-risk pregnancies data has decreased more than 50% in 2021 as compared to the 2020 data. On the other hand, the C-section deliveries in low-risk pregnancies has been increased from 34 to 38 in a year 2021. **Reason** - Due to Covid-19 situation, more no. of the complications and covid-19 symptoms were present in the pregnant women and also due to shortage of staff in the hospital, the maximum no. of deliveries which happened in emergency situations were c-section as it was the only option left for the doctors even in the case of low-risk pregnancies. **Fig 5:** The rate of total no. Of C-section deliveries in low-risk pregnancies performed in tertiary care hospital in 2020 is 34/65 (52.30%) and in 2021, it's 38/49 (77.55%) thus the observation shows that the more no. of C-sections deliveries in low-risk pregnancies happened in the year 2021 as compared to year 2020. Due to covid-19 it was an emergency condition when less staff were available in the hospitals and not only in the case of pregnancies, even in other departments there was a shortage of staff, people were not able to get proper treatment and healthcare services, at the time of the 2nd wave of covid-19 in the year 2021 more no. of emergency deliveries happened where C-section deliveries were required in high no. of the cases because of shortage of staff and more no. Of complications in low-risk pregnancies as well. **Fig 6:** In 2020, Most of the C-section deliveries in low-risk pregnancies happened in the following maternal age groups: 32-year-old - 7 C-sections. In 2021, age group - 30-year-old - 8 C-sections. **Fig 7:** Most of the C-section deliveries in low-risk pregnancies happened in the following BMI group - In 2020, BMI group - 32 BMI - 7 C-sections. In 2021, BMI group - 31 BMI - 10 C-sections. **Fig 8:** Most of the C-section deliveries in low-risk pregnancies happened in the following Parity group - In 2020, Parity group - G1 - 29 C-sections (The number of times a woman has been pregnant is known as gravidity). In 2021, Parity group - PRIMI - 19 C-section (PRIMI refers to the first-time pregnant woman. It is referred as primigravida). **Fig 9:** Most of the C-section deliveries in low-risk

pregnancies happened in the following Baby's Weight group - In 2020, Baby's Weight group - 2.9kg - 6 C-sections, 3.2 kg- 5 C-sections. In 2021, Baby's Weight group - 2.7 kg- 6 C-sections, 3.2 kg- 5 C-sections. **Fig 10.1:** In year 2020, there were 4 main risk factors as shown in the graph which are highly responsible for c-section delivery in low-risk pregnancies. 1.CPD Cephalopelvic disproportion - 4 C-sections, 2. Fetal distress - 3 C-sections, 3.GDM (gestational diabetes) insulin - 4 C-sections, 4. Meconium -Stained Liquor - 4 C-sections. **Fig 10.2:** In year 2021, there were 3 main risk factors as shown in the graph which are highly responsible for performed c-section delivery in low-risk pregnancies. 1.CDMR (C-section on maternal request) - 4 C-sections, 2. Fetal distress - 5 C-sections, 3.GDM (gestational diabetes)- 5 C-sections. **Fig 11:** According to the observation in this graph -The cases of CDMR, failed induction, failure to progress in labor, fetal distress, GDM on insulin, IVF pregnancy has increased in year 2021 as compared to 2020. On the other hand, the cases of CPD, Meconium stain liquor, fibroid uterus are higher in year 2020 as compared to the year 2021.

This study has reported that there was a relatively high CS rate in Low-risk pregnancies at a tertiary care hospital, New Delhi, during the covid-19 pandemic. When medically justified, C-section deliveries can prevent maternal and perinatal mortality and morbidity. The WHO recommends in 1985 that there is no justification for any region to have a CS rate higher than 10–15%. However, currently available evidence shows that there was no important association between the CS rate and maternal and neonatal mortality as the C-sections rate in low-risk pregnancies exceeded 52.3% in year 2020 and 77.5% in year 2021. The reasons behind increasing the rate of c section in low-risk pregnancies during this pandemic are - more complications in pregnancies and risk factors caused by covid-19 pandemic situation because pregnant women did not receive daily basis pre-natal check-ups, and due to shortage of staff and higher no. of deliveries doctors also give the preference to c section deliveries due to emergency situations, etc. Not surprisingly, more confirmed COVID-19 cases could bring more restrictions on daily life, women in severely affected places may be required to “shelter at home” and may have missed more prenatal examinations. Women living in locations with more confirmed cases had a considerably greater probability of "never attending" routine prenatal check-ups than women living in regions with fewer confirmed cases, according to the study. More research is needed to uncover the underlying reasons for skipping routine check-ups, which could have resulted in a variety of negative pregnancy outcomes, including C-sections. These findings suggest that more medical aid and focused advice should be offered in severely damaged areas.

## CONCLUSION

COVID-19 1st and 2nd wave situation alone became a common factor for more cesarean deliveries early. The rise in caesarean rates in these data, particularly in low-risk pregnancies, may indicate obstetricians seeking to provide the best possible care to their patients in light of continually changing guidelines on the safest form of delivery for the woman, newborn, and provider. The rate of C-section deliveries was badly affected by covid 19 pandemic in year 2020 and in 2021 at tertiary care hospital, Delhi. However, the 2nd wave of covid 19 in 2021 affected the rate of c section deliveries in low-risk pregnancies at higher level as compared to the 1st wave of covid 19. Due to covid-19 it was an emergency condition when less staff was available in the hospitals and not only in the case of pregnancies, even in other departments there was a shortage of staff, people were not able to get proper treatment and healthcare services, at the time of the 2nd wave of covid-19 in the year 2021 more no. of emergency deliveries happened where C-section deliveries were required in high no. of pregnancy cases, due to shortage of staff and higher no. of complications in low-risk pregnancies were present. **Clinical Recommendations-** Prolonged latent phase should not be an indication for C.S. - Nullipara - > 20 hrs., Multipara - > 14 hrs., cervical dilation of 6cm should be considered the threshold for active labor. Standards of active phase progress should be applied after this, slow but progressive labor in 1st stage of labor should not be an indication of C.S., active 1st stage arrest- >6cm dilation, Ruptured membranes, 4hrs of adequate uterine activity or, 6hrs of inadequate uterine activity with oxytocin administration, No cervical changes, second Stage Arrest- If maternal & fetal conditions permit-, 2hrs pushing in multipara, 3hrs pushing in nullipara, longer duration may be appropriate With epidural analgesia Fetal malposition. **Administrative Recommendations-** Counselling of pregnant Women, extra care and timely consultation should be done, feedback of patient, attend prenatal classes, monthly audit of the department, training of staff.

## IMPLICATIONS

Large no. of delivery data should be collected, there should be an interaction with patient and hospital staff, Pregnant women counselling should be done, Reasons of risk factors should be mentioned, Patient and their family feedback should be taken, Extra Care and timely consultation should be done, pregnant women should attend Prenatal Classes, Monthly audit of the department should be done, Training of the staff should be done.

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