



## **The Association of Maternal Age and Maternal Weight with Duration of Labor in Nulliparous Patients Having Spontaneous Labor**

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### **Abstract**

As per the National Vital Statistics for the year 2011, the birth rate among the older women specially those aged 35 years and above is steadily rising over the past few years, similarly the increasing prevalence of the overweight and obesity in pregnant population is of high concern due to its association with the obstetrical interventions and complications.

The mechanism of the possible synergistic effect of obesity on labour duration with spontaneous onset is not studied much, we therefore have planned this study to see the effect of the BMI (body mass index) recorded at the time of delivery on duration of labour in patients having spontaneous labour. For the sake of our study the active phase is defined as the cervical dilatation of 5cm or more.

### **Objective:**

The Purpose of carrying out this research was to determine the association between the maternal age and weight with the duration of labor and intrapartum complications which was our primary outcome, the secondary outcomes were relationship of birth weight and gender prevalence with the maternal age and weight.

### **Material and methods:**

It was a retrospective observational study. The data was collected from 01/10/2021-31/03/2022. It was conducted in the obstetrics and gynecology department of the Dr. Sulaiman Alhabib hospital Sweidi branch which is a 350 bedded multidisciplinary hospital. All nulliparous women who presented with spontaneous onset of labour at term with cephalic presentation were included in the trial while the women having any medical disorders like gestational diabetes and hypertension etc. were excluded. The data was collected with the help of the predesigned proforma. Once the required number of the patients were enrolled and the data is collected, then the data was entered in the SPSS program version 26 for the analysis. The primary and the secondary outcomes were recorded. The qualitative data was analyzed by using the CHISQUARE TEST while STUDENT T test was applied to the quantitative data. The P- value of 0.05 was considered as significant.

**Results:**

The total number of the patients enrolled to the trial were 330. The patients were divided into two groups according to their ages and the BMI, and the duration of the active phase of the first stage of the labour, second and third stage was compared. There were 195 patients Group 1 (19-30 years) and out of them 44.6% (n=87) had duration of the active phase of labor more than 5.1 hours in comparison to the group 2 (30.1-40 years) in which 48.8% (n=66) out of 135 patients had longer duration of the first stage of labor. This difference was not found statistically significant. However, the patients in the group 2 were found to have shorter second and third stage of labor and the difference was found to be statistically significant, 98.7% (n=80) of the patients who delivered normally in group 2 had second stage duration less than one hour and 100% (n=81) of the patients had delivered placenta within one minute of delivery of the baby.

The rate of LSCS was found statistically higher in patients in group 2. Similarly, the rate of intrapartum complications like fetal distress and failure to progress was also found to be more pronounced in the older age group. The fetal distress was observed in 14.7% (n=29) and 24.6% (n=33) in group 1 and 2 respectively. No significant difference was found in gender prevalence and neonatal weight.

As per the BMI of the patients they were divided into 4 groups. No significant difference was found in the duration of labour in all the groups. The rate of LSCS was found to be higher in group C (BMI 25-29.9) and group D (BMI 30-39.9), i.e., 29.7% (n=41) and 37.1% (n=52) respectively but the difference was not found statistically significant. Similarly, no effect of the maternal BMI was observed on neonatal weight and gender prevalence.

**Conclusion:** The patients in the age group 2 (30 years and above) were found to have shorter second and third stage of labour as compared to their younger counterparts. However, no difference was found in the length of the first stage of the labour. The rate of intrapartum complications like LSCS, fetal distress and failure to progress was found significantly higher in the group 2. However, no significant difference in gender prevalence and neonatal weight was found in both age groups.

In the current study no effect of the maternal weight and BMI at the time of delivery was found on the duration of labour, intrapartum complications, birth weight of the neonate and gender prevalence among the neonates.

## Introduction

As per the National Vital Statistics for the year 2011, the birth rate among the older women specially those aged 35 years and above is steadily rising over the past few years [1]. Similarly the increasing prevalence of the overweight and obesity in pregnant population is of high concern due to its association with the obstetrical interventions and complications.[2,3] It is stated that obese women have increased risk of labor induction , prolonged labor , increased risk of instrumental Delivery and caesarean section.[4,5] The mechanism of the possible synergistic effect of obesity on labour duration with spontaneous onset is not studied much, we therefore have planned this study to see the effect of the BMI (body mass index) recorded at the time of delivery on duration of labour in patients having spontaneous labour. For the sake of our study the active phase is defined as the cervical dilatation of 5cm or more.[6]

The Purpose of carrying out this research was to determine the association between the maternal age and weight with the duration of labor and intrapartum complications which was our primary outcome, the secondary outcomes were relationship of birth weight and gender prevalence with the maternal age and weight.

Our hypothesis was that the younger, average weight nulliparous women have shorter labors than their elderly, overweight or obese counterparts and have less risk of the intrapartum complications.

## Material and Methods

It was a retrospective observational study. The data was collected from 01/10/2021- 31/03/2022. It was conducted in the obstetrics and gynecology department of the Dr. Sulaiman Alhabib hospital Sweidi branch which is a 350 bedded multidisciplinary hospital. All nulliparous women who presented with spontaneous onset of labour at term with cephalic presentation were included in the trial while the women having any medical disorders like gestational diabetes and hypertension etc. were excluded. The data was collected with the help of the predesigned proforma. Once the required number of the patients were enrolled and the data was collected, the data was entered in the SPSS program version 26 for the analysis. The primary and the secondary outcomes were recorded. The qualitative data was analyzed by using the CHISQUARE TEST while STUDENT T test was applied to the quantitative data. The P- value of 0.05 was considered as significant.

The threshold for stratification in two groups was selected as 30 years which is in accordance with the other studies.16

## Results

The total number of the patients enrolled to the trial were 330.

The patients were divided in to two groups according to their ages and the duration of the active phase of the first stage of the labour was compared as shown in table 1.

Duration of first stage of labour	Age Group 1 (19-30)	Age Group 2 (30.1-40)	Total
1-5 hours	55.3% (n=108)	50.3%(n=68)	53.3%(n=176)
5.1-10 hours	44.6 % (n=87)	48.8%(n=66)	46.3%(n=153)
10.1>	0%(n=0)	0.7%(n=01)	0.3%(n=01)
Total	100% (n=195)	100%(n=135)	100%(n=330)

**Table 1:** Effect of age on duration of first stage of labour

The Independent student T Test was applied as the data was quantitative and the P-Value was found to be 0.82, which showed that the difference is insignificant.

The comparison of the second and third stage of the labor was found statistically significant with the P-Value being 0.002 and 0.01 respectively as shown in table 2 and 3.

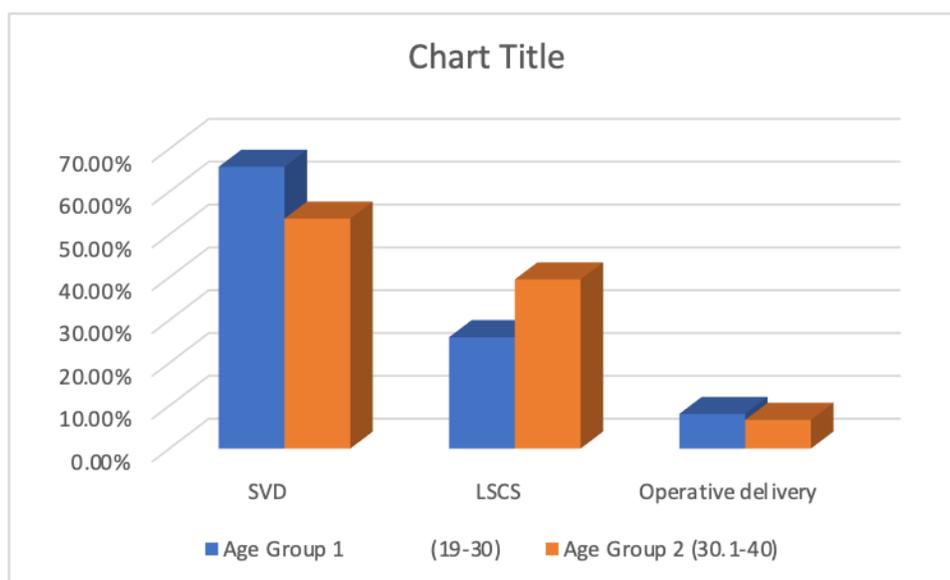
Duration of second stage of labour	Age Group 1 (19-30)	Age Group 2 (30.1-40)	Total
Less than 1 hour	95.5% (n=141)	98.7%(n=80)	96.9%(n=221)
1.1-2 .0 hours	03.4 % (n=05)	1.2%(n=01)	2.6%(n=06)
2.1-3.0>	0.68%(n=01)	0.0%(n=0)	0.43%(n=01)
Total	100% (n=147)	100%(n=81)	100%(n=228)

**Table 2:** Effect of age on duration of second stage of labour

Duration of third stage	Age Group 1 (19-30)	Age Group 2 (30.1-40)	Total
Less than 1 minute	96.5% (n=142)	100%(n=81)	97.8%(n=223)
1.1-3 .0 minutes	0.68% (n=01)	0.0%(n=0)	0.43%(n=01)
3.1-5.0 minutes	2.7%(n=04)	0.0%(n=0)	1.75%(n=04)
Total	100% (n=147)	100%(n=81)	100%(n=228)

**Table 3:** Effect of age on duration of Third stage of labour

The number of the patients having LSCS in group 2 was significantly higher as shown in the graph 1 below.



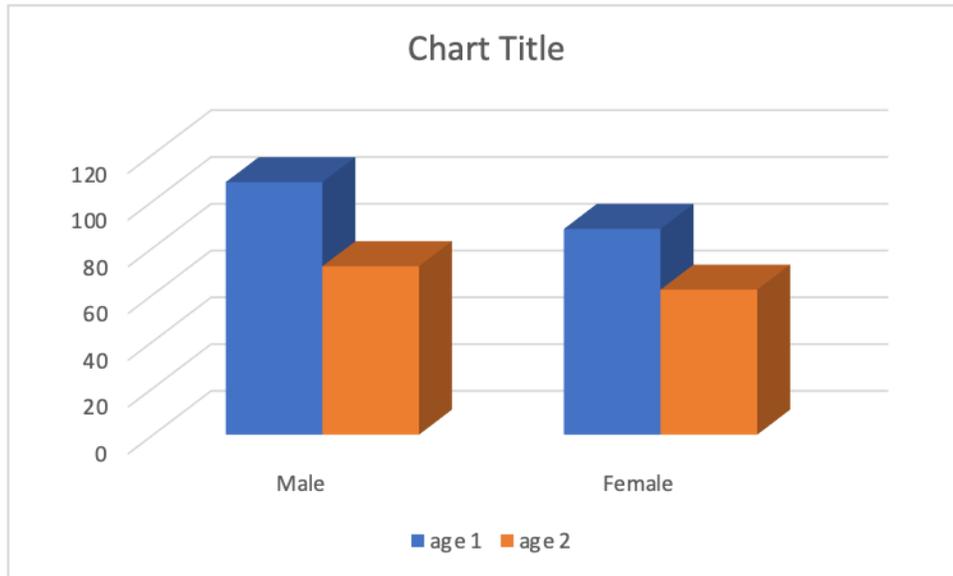
**Graph 1:** Comparison of mode of delivery in two age groups

The difference was found statistically significant as shown by the P-Value of 0.03 after applying the Chi-Square test.

Regarding the other complications the fetal distress was found in 14.7%(n=29) in patients with group 1 in comparison to 24.6%(n=33) in group 2, failure to progress was observed in 13.2%(n=26), and 11.1%(n=15) in both groups 1 and 2 respectively. The rate of the other complications was 4.5 %(n=9) in group 1 and 10.4%(n=14) in group 2.

As explained above, the rate of intrapartum complications was found to be statistically higher in patients in group 2 as demonstrated by the P-Value of 0.01 after applying the Chi-Square test.

No significant difference was found in the gender prevalence as shown by the P-Value of 0.6, and as depicted in the graph below:



**Graph 2:** Neonatal Gender prevalence in two age groups

The effect of neonatal weight when compared in both the groups as demonstrated in the table 4 was not found statistically significant. P value was calculated as 0.4 after applying the T-Test.

Neonatal weight In kg	Age Group 1 (19-30) years	Age Group 2 (30.1-40) years	Total
2.5-3.0	63.2% (n=124)	56.7%(n=76)	60.6%(n=200)
3.1-3.5	25% (n=49)	32.0%(n=43)	27.8%(n=92)
3.6>	11.7%(n=23)	11.1%(n=15)	11.5%(n=38)
Total	100% (n=196)	100%(n=134)	100%(n=330)

**Table 4:** Effect of maternal age on neonatal weight

In the current study it was found that 82% of the patients having the normal BMI (18.5-24.9) gained less than 16 kg of the weight during the pregnancy in comparison to 86% of the overweight patients with BMI (25-29.9), this difference was not found statistically significant.

The BMI was calculated at the time of the presentation in the labour ward for delivery, according to the BMI the patients were divided in to four groups. Group A with BMI of less than 18.5, group B with BMI of 18.6-24.9 and group C and D with BMI of 25-29.9 and 30.0-39.9, respectively. No statistically significant difference was found in the duration of all stages of labour in these groups as the P-Value was found to be 0.8,0.3 and 0.3, when the difference was compared for first, second and third stage of labour, respectively.

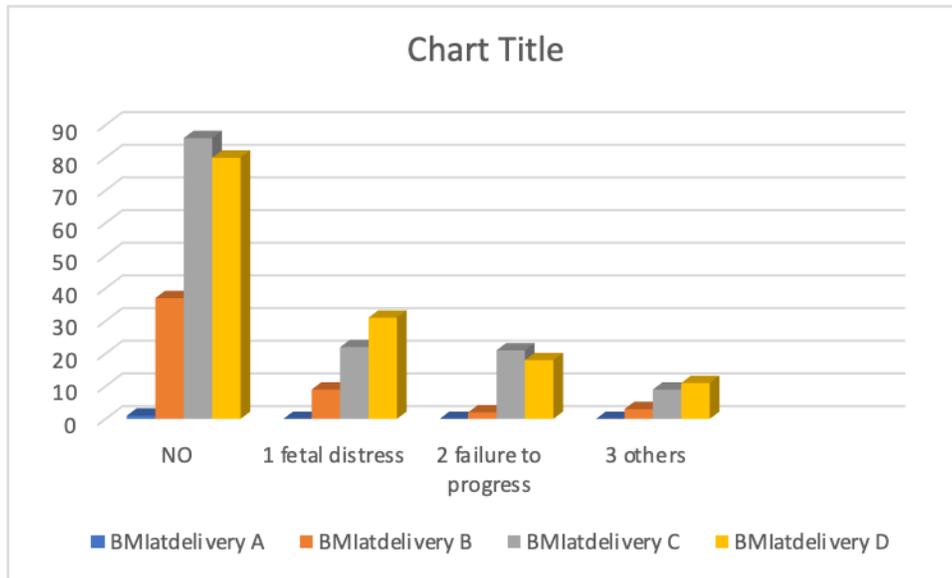
The rate of LSCS was also insignificantly higher in patients who belong to group C and D, as the calculated P-Value after applying the Chi-Square test was 0.5.

The difference is shown in table 5.

	Group A (BMI18.5<)	Group B (BMI18.6-24.9)	Group C (BMI 25-29.9)	Group D (BMI 30.0-39.9)	Total
SVD	100%(n=01)	70.5%(n=36)	62.3%(n=86)	55.7%(n=78)	60.9% (n=201)
LSCS	0% (n=0)	21.5%(n=11)	29.7%(n=41)	37.1%(n=52)	31.5% (n=104)
Operative delivery	0%(n=0)	7.8%(n=4)	7.9%(n=11)	7.1%(n=10)	7.5% (n=25)
Total	100% (n=1)	100%(n=51)	100%(n=138)	100%(n=140)	100% (n=330)

**Table 5:** Rate of LSCS in different BMI groups

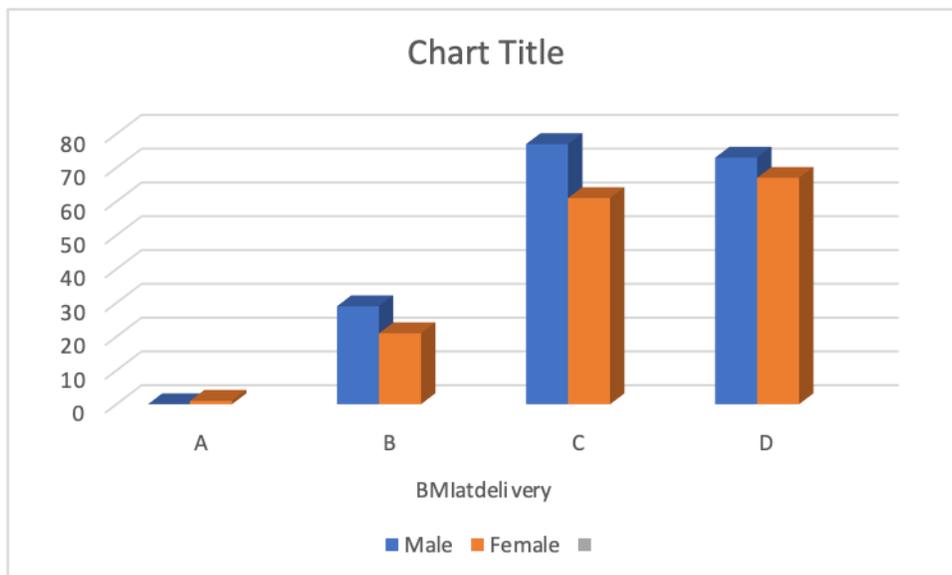
Similarly, no significant difference in other intrapartum complications were found as shown in graph 3.



**Graph 3:** The rate of intrapartum complications in different BMI groups

When the neonatal weight was compared among the four BMI groups in the current study and it was found that there was no effect of the maternal BMI on the birth weight of the newborn as demonstrated by the P- value of 0.1.

Furthermore, no difference was found in the gender prevalence among all the groups. Male babies were found to be, 55.7%(n=29), 55.6%(n=77), 52.1%(n=73) of the patients with in the group B, C and D respectively as shown in Graph 4.



**Graph 4:** Gender prevalence in different BMI groups

## Discussion

Over the last three decades, the average BMI has increased significantly and the obesity has become a global health issue.[7] The prevalence of the overweight and obesity, defined as a BMI of 25-29.9 kg/m<sup>2</sup> and 30 > kg/m<sup>2</sup>, respectively, is also increasing worldwide.[8] The studies on the association of the maternal age and the duration of the labour showed inconsistent results.[9] In the current study we found no difference in the length of the first stage of labor in both the younger and the older population, while significant reduction in the second and third stage of labor was found in the group 2 of the nulliparas which was in contrary to the findings of the Zaki and colleagues.[10]

The results of the current study were contradictory to the observations of the Waldenstorm and colleagues who found that the incidence of the labor dystocia leading to prolonged labour increases with the increase in the maternal age.[16]

Greenberg and colleagues.[11] found that the first and second stage of the labour was longer in nulliparous women till the age of 34 years after which the length of the labour decreased in patients with 35-39 and 40 > years old groups, which partially supports the results of the current study stating shorter second and third stage of labours in patients after 30 years of age.

The rate of LSCS was found higher in patient who belong to the older population group which was in agreement with the findings of the Adashek and colleagues.[12]

Previously published studies failed to determine the extent to which BMI influence the labor duration. Carlhall and colleagues found that in nulliparous women with a spontaneous onset of labour, duration of the active phase of labour is significantly increased in the women with increasing maternal BMI [13] this is in contrary to the observations of the current study as no difference in the duration of the labour was found among the patients with different BMI at the time of delivery. The work of Usha Kiran and colleagues however supports the results of the study under consideration by showing no significant effect of the BMI on labor duration.[14]

Ellekjaer and colleagues found no association between BMI and the duration of the labour in total supporting the observations of the current study, however an increased incidence of shorter second stage was observed for patients having BMI above

30kg/m<sup>2</sup> which is in contrary to the results found by the authors of the current study. In the same study increased risk of caesarean section and PPH was found in the obese nulliparous women which was also contradictory to the observations of the current study. Pre pregnancy obesity was also found to be associated with the increased caesarean section rate and has the greater risk of pregnancy complications.[15]

## Conclusion

The patients in the age group 2 (30 years and above) were found to have shorter second and third stage of labour as compared to their younger counterparts. However, no difference was found in the length of the first stage of the labour. The rate of intrapartum complications like LSCS, fetal distress and failure to progress was found significantly higher in the group 2. However no significant difference in gender prevalence and neonatal weight was found in both age groups.

In the current study no effect of the maternal weight and BMI at the time of delivery was found, on the duration of labour, intrapartum complications, birth weight of the neonate and gender prevalence among the neonates.

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