

A study of an investigation into the obstetric outcomes following prior spontaneous abortions in a rural healthcare facility in Erode District, Tamil Nadu, India

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Abstract:

Background: Spontaneous pregnancy loss is a frequently occurring occurrence, constituting the most prevalent complication of pregnancy. Approximately 70% of human conceptions do not progress to viability, and an estimated 50% are lost prior to the first missed menstrual period. Aims: The aim of our study is to estimate the risk of the Preterm delivery, low birth weight, IUGR, recurrence of abortion, still birth, IUD, PROM in patients with previous spontaneous abortions or any other adverse outcome in women with previous spontaneous abortions. Methods: 150 cases and 150 controls were included in the study. This prospective observational study was carried out at the Department of Obstetrics and Gynecology, Government Head Quarters Hospital, Erode and Government Erode Medical College, Perundurai from January 2022 to November 2022. Results: This study highlights significant differences in pregnancy outcomes based on abortion history. Women with a prior abortion had higher rates of abortion (15%), premature rupture of membranes (33.5%), and preterm birth (9%) compared to those with no history of abortion. Additionally, the likelihood of operative

deliveries increased with previous abortions, and as the number of previous abortions rose, the risk of low birth weight in subsequent pregnancies also increased. Conclusions: This study underscores that women who have experienced first-trimester spontaneous abortions in the past significantly influence the outcomes of their subsequent pregnancies. Therefore, it is essential to offer diligent monitoring and care to all pregnant women, rather than limiting it to those with a history of recurrent pregnancy loss.

Key words: Premature, Pregnancy, trimester, spontaneous abortion.

Introduction:

Abortion is defined as the termination of pregnancy or fetal loss before reaching 20 weeks of gestation or with the birth of a fetus weighing less than 500 grams, as defined by the CDC and WHO. The abortion rate was reported as 47.0 abortions (with a range of 42.2-52.1) per 1000 women aged 15-49 years.

Spontaneous abortion, on the other hand, refers to miscarriages that occur naturally without any intentional intervention. More than 80% of spontaneous abortions happen within the initial 12 weeks of gestation. Abortion typically involves bleeding into the decidua basalis, which is followed by tissue necrosis in the surrounding area, leading to uterine contractions and expulsion of the fetus.

It's important to note that miscarriages can be emotionally distressing for couples, severely affecting their psychological well-being and diminishing their confidence in achieving successful future pregnancies.

Pregnancy plays a distinctive role in a woman's journey toward fulfillment. It should be regarded as a uniquely normal physiological phase in a woman's life. When the aspiration of motherhood is shattered by an unexpected and sudden spontaneous abortion, it inflicts profound emotional distress on both the couple and their family, along with anxiety about the outcomes of future pregnancies[1].

The term "abortion" originates from the Latin word "aboriri," meaning to miscarry. Abortion is defined as the spontaneous or deliberate termination of a pregnancy before the fetus reaches a viable stage. Various health organizations, including the National Center for Health Statistics, the Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO), all define abortion as the termination of pregnancy, whether

spontaneous or induced, occurring prior to 20 weeks of gestation or involving a fetus weighing less than 500 grams at birth. It is noteworthy that approximately 8% to 20% of known pregnancies end in spontaneous abortion[1-3].

In a study conducted by M.Y. El-Zibdeh and colleagues, they investigated the potential of dydrogesterone to reduce the occurrence of recurrent spontaneous abortion in 180 women with a history of previous abortions. Treatment with dydrogesterone commenced promptly upon pregnancy confirmation and continued until the 12th week of gestation. All participants received standard supportive care. The results showed a significant reduction ($p \leq 0.05$) in the rate of abortions in the dydrogesterone group (13.4%) compared to the control group (29%). Importantly, there were no discernible differences between the groups in terms of pregnancy complications or congenital abnormalities. This study concludes that hormonal support with dydrogesterone can enhance the likelihood of a successful pregnancy for women who have experienced recurrent spontaneous abortions[4].

David H. Thom and his team conducted a study to examine the link between spontaneous abortions and adverse birth outcomes. Their findings indicated that women who had experienced three or more spontaneous abortions were at a significantly elevated risk of various adverse birth outcomes. These included preterm birth before 37 weeks of gestation (95% increased risk), placenta previa (95% increased risk), premature rupture of membranes lasting more than 24 hours (95% increased risk), breech presentation (95% increased risk), and congenital malformations (95% increased risk)[5].

Olga Basso and her team conducted a study to assess the risk of preterm delivery, growth retardation, and low birth weight in pregnancies following spontaneous abortion. The study found that the group with a history of spontaneous abortion had an elevated risk of preterm delivery (95%), premature delivery (3%), low birth weight (7.5%), and growth retardation (10.2%) in their subsequent pregnancies. In conclusion, spontaneous abortion is associated with an increased risk of preterm delivery, intrauterine growth retardation (IUGR), and low birth weight in future pregnancies[6].

Stefanos M. Pantelakis and his team conducted a study to investigate the impact of induced and spontaneous abortions on the outcomes of subsequent pregnancies. Their findings revealed that the percentage of stillbirths and premature births among women with prior abortions, whether induced or spontaneous, was twice as high as that observed in the

control group[7].

AIMS AND OBJECTIVES:

The aim of our study is to estimate the risk of the Preterm delivery, low birth weight, IUGR, recurrence of abortion, still birth, IUD, PROM in patients with previous spontaneous abortions or any other adverse outcome in women with previous spontaneous abortions in a rural healthcare facility in Erode District, Tamil Nadu, India.

Methods:

Study Site:

This study was conducted in the Department of Obstetrics and Gynecology, Government Head Quarters Hospital, Erode and Government Erode Medical College, Perundurai , Tamilnadu, India.

Study population:

All the eligible women patients attending the antenatal outpatient who are willing to participate during the study periods in the Department of Obstetrics & Gynecology at Government Head Quarters Hospital and Government Erode Medical College, Perundurai , Tamilnadu, India, were considered as the study population.

Study design:

This is a prospective & observational study conducted in the Department of Obstetrics & Gynecology at Government Head Quarters Hospital, Erode and Government Erode Medical College, Perundurai , Tamilnadu, India.

Sample size:

A sample size of 144 is obtained by using the hypothesis testing method and based on the following assumptions: 95% confidence intervals, the prevalence of previous abortion 10% , and 5% absolute of error.

Sampling method:

All the eligible subjects were recruited into the study consecutively by convenient sampling till the sample size is reached.

Study duration:

The data collection for the study was done between January 2022 to November 2022.

INCLUSION CRITERIA:

- In this study patients with history of 1st trimester spontaneous abortion, irrespective of cause were included.
- Age group-18 to 35 years.
- Patients with 1 and/or more than 1 spontaneous abortion.
- Patients with previous live birth, followed by spontaneous abortion.

EXCLUSION CRITERIA:

- Patients with induced abortion.
- History of spontaneous abortion with twin gestation.
- History of PIH, Chronic hypertension, GDM, Juvenile DM, heart disease, anemia, Autoimmune disease and -Chronic renal disease.
- History of carcinoma.
- History of HIV/HBsAG /VDRL/Twins.
- History of Gestational Trophoblastic Disease.
- Mothers not willing for study.

DATA COLLECTION METHODS :

The data will be collected from the patients using a semi structured questionnaire. Patients who attended OPD and were admitted in the labour room for delivery, were enrolled for the study.

The patients who selected will be explained about the study and their consent obtained. The base line data will be recorded at the first antenatal visit included the following : Maternal age, Occupation, Literacy, Socio-economic status, Chief complaints, Menstrual history, Obstetrical history, Past history of illness, Hypertension, Diabetes, Chronic renal disease, Heart disease, Family history & Personal history. A thorough general physical and systemic

examination was carried out with reference to build, nutrition, height, weight, anemia, edema, and vital data. Routine examination of Hemoglobin, urine routine and microscopic examination, ABO grouping and Rh typing, random blood sugar, VDRL, HIV counselling and testing, Ultrasonography were done in all cases.

OUTCOME MEASURES: Gestational age at delivery, Mode of delivery- vaginal/LSCS/Assisted Gravida of patients, Indication for caesarean section or instrumental

delivery, Preterm/Term gestation at delivery, Birthweight of baby, Sex of Baby

Statistical analysis:

The Statistical Package for the Social Sciences software (SPSS) version 25 (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY) was used to analyze the obtained data. Unpaired T test- between groups comparison of Mean with SD. CHI SQUARE TEST & KRUSKAL WALLIS TEST both for non-parametric categorical variables. The data were evaluated using Pearson's Chi-square test (χ^2) to show statistical differences between sociodemographic variable groups. Cronbach's alpha was used to determine the questionnaire's internal consistency. When $P < 0.05$, statistically significant differences were evaluated.

Results:

A total of 150 subjects in experimental and control group people took part in the study. The age between 21-25 among cases and controls were 149 (50%). Indicating that both the groups were distributed predominantly in the 21-25 age group (figure:1). The mean age of case and control about 24.16 & 24.64 respectively. There is no significant in age between two groups. Figure 2 shows distribution of patients in Gravida 2 -210, Gravida 3-72, Gravida 4 & Above-18 and percentage of 70%, 24% & 6% respectively.

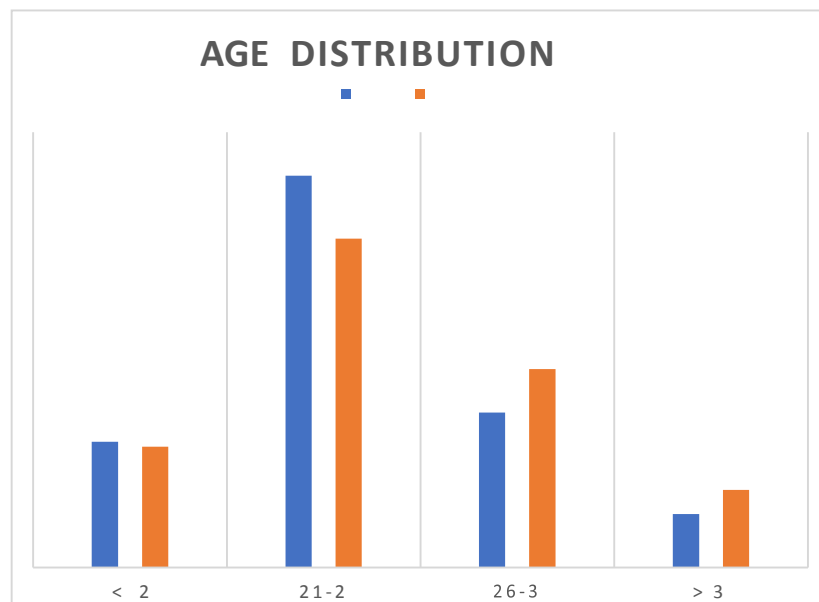


Figure 1: Cluster Bar chart showing age distribution between cases & controls.

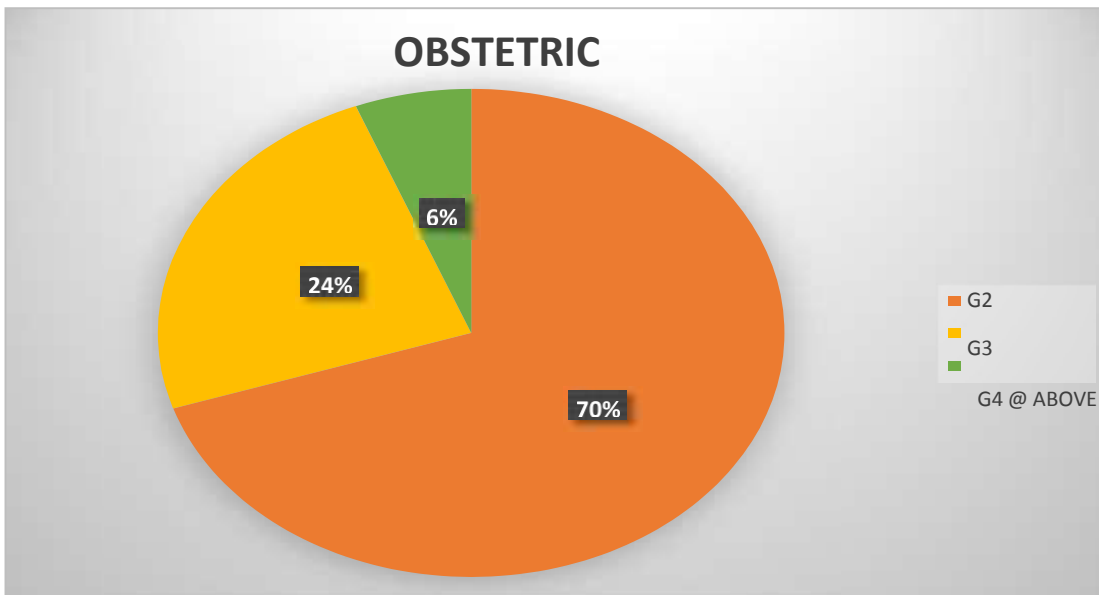


Figure 2 : Pie chart showing distribution of patients among gravida in both groups

Table 1: Obstetric index between cases vs control

OBSTETRIC INDEX	CASES	CONTROLS
G2	90	120
G3	47	25
G4 AND ABOVE	13	5
P VALUE - 0.006		
SIGNIFICANT		
KRUSKAL WALLIS TEST		

Table 1 showing gravida distribution among case & control groups. Most of the patients are gravida 2 in both groups.

Table 2: Descriptive analysis of mode of delivery in both groups

MODE OF DELIVERY	NO OF PATIENTS	PERCENTAGE
LABOUR NATURALIS	181	60%
LSCS	94	31%
OUTLET FORCEPS	3	1.00%
VACCUM ASSISTED	2	0.50%
INCOMPLETE ABORTION	6	2%
ASSISTED BREECH	1	0.50%
INDUCED ABORTION	2	0.50%
SPONTANEOUS ABORTION	11	4.00%

Table 2 shows various mode of delivery among both groups, in which labour natural about 60% & lscs about 31%.

Table 3: Comparison of mode of delivery between cases & controls

MODE OF DELIVERY	GROU P		P VALUE
	CASE S	CONTRO LS	
LABOUR NATURALIS	71	110	0.001
LSCS	55	39	0.046
OUTLET FORCEPS	2	1	0.561
VACCUM ASSISTED	2	0	0.155
INCOMPLETE ABORTION	6	0	0.013
ASSISTED BREECH	1	0	0.316
INDUCED ABORTION	2	0	0.155
SPONTANEOUS ABORTION	11	0	0.007

Table 3 compares the mode of termination of pregnancies between the cases and the controls. Thesame is depicted pictorially in figure 3.

Table 4: Descriptive Analysis of outcome in both Groups

OUTCOME	NO OF PATIENTS	PERCENTAGE
TERM	187	62.25%
TERM-PROM	55	18%
ANAMOLOUS BABY	2	0.75%
IUD	3	1%
POST TERM	4	1.5%
PRETERM	30	10%
PPROM	1	0.5%
STILL BIRTH	1	0.5%
ABORTION	17	5.5%

Table 4 shows term pregnancy 62.25%, premature rupture of membrane in about 18%,abortionabout 5.5% and preterm delivery about 10%.

Table 5: Comparison of outcome among cases & controls

OUTCOME	GROU P		P VALUE
	CASES	CONTROL S	
TERM	61(40.7%)	126(84%)	0.001
TERM-PROM	42(28%)	13(8.7%)	0.001
ANAMOLOUS BABY	2(1.3%)	0	0.155
IUD	3(2%)	0	0.081
POST TERM	2(1.3)	2(1.3%)	1
PRETERM	21(14%)	9(6%)	0.02
PPROM	1(0.7)	0	0.316
STILL BIRTH	1(0.7)	0	0.316
ABORTION	17(11.3)	0	0.001

Figure 3: Pie chart showing sex of the baby in both groups

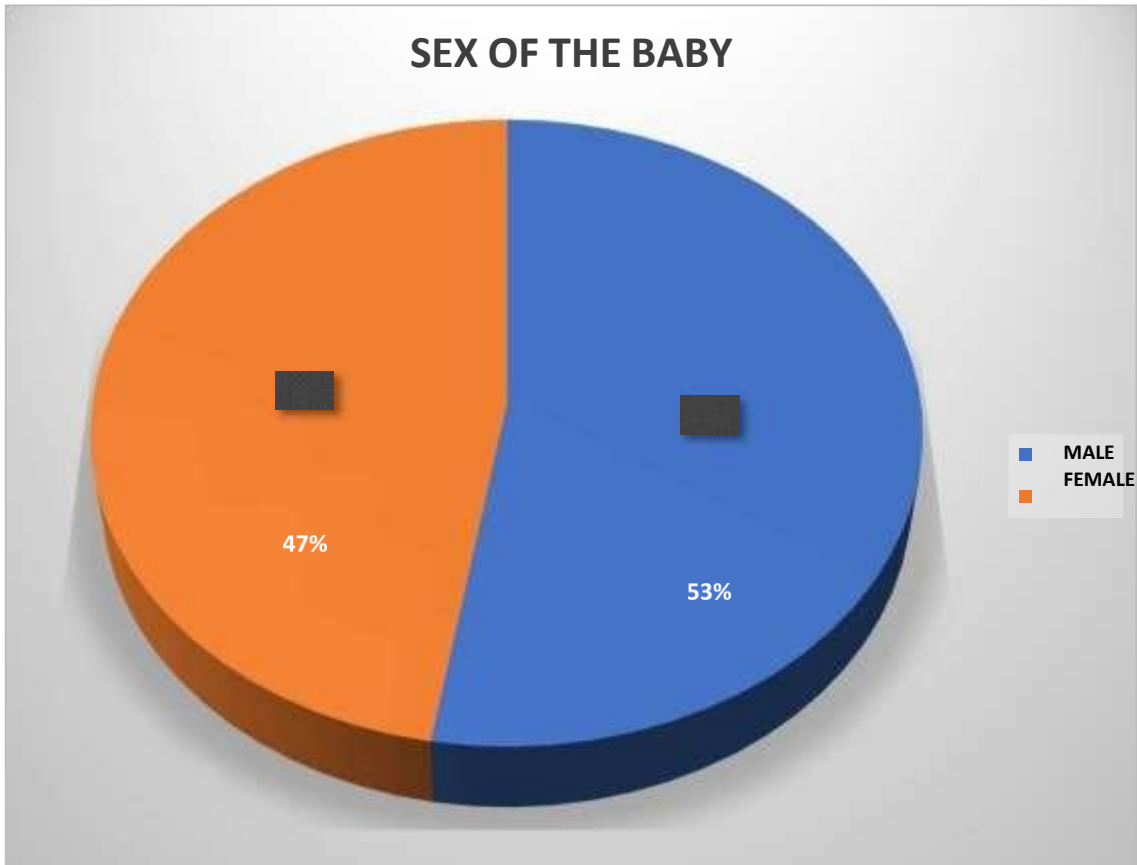


Table 5 shows comparison of outcome among cases & controls, term delivery in control group ,PROM, preterm and abortion in case group has significant P value

Table 6: Comparison of mean birth weight - cases vs controls

GROUP	BIRTH WEIGHT	
	MEAN	SD
CASES	2.79	0.24
CONTROLS	2.87	0.31
P VALUE - 0.036		
SIGNIFICANT		
UNPAIRED T TEST		

Table 6 shows Comparison of mean birth weight between cases & controls, it has significant P value among these groups

Figure 4: Cluster Bar diagram shows birth weight of cases vs controls

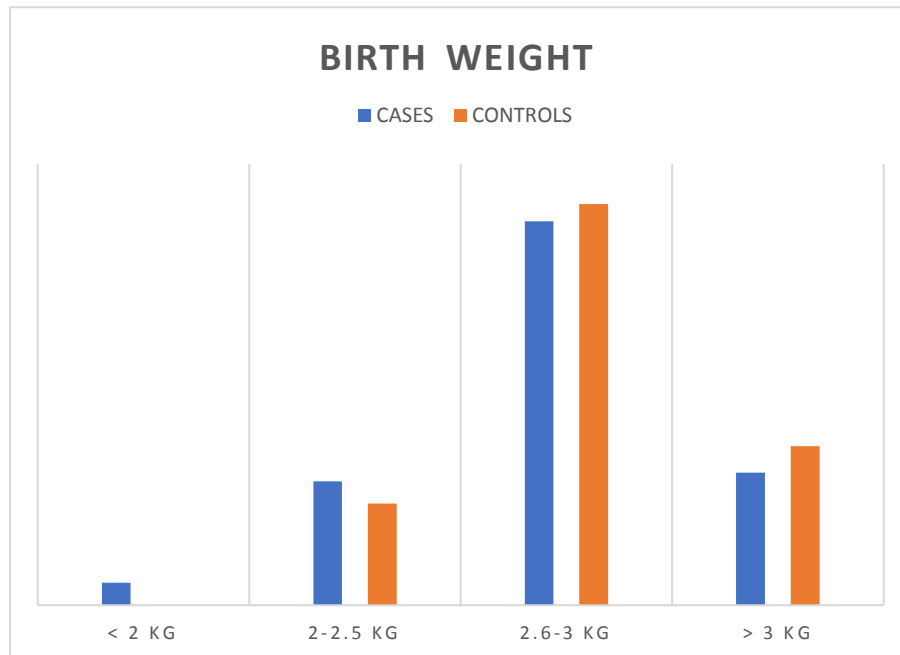
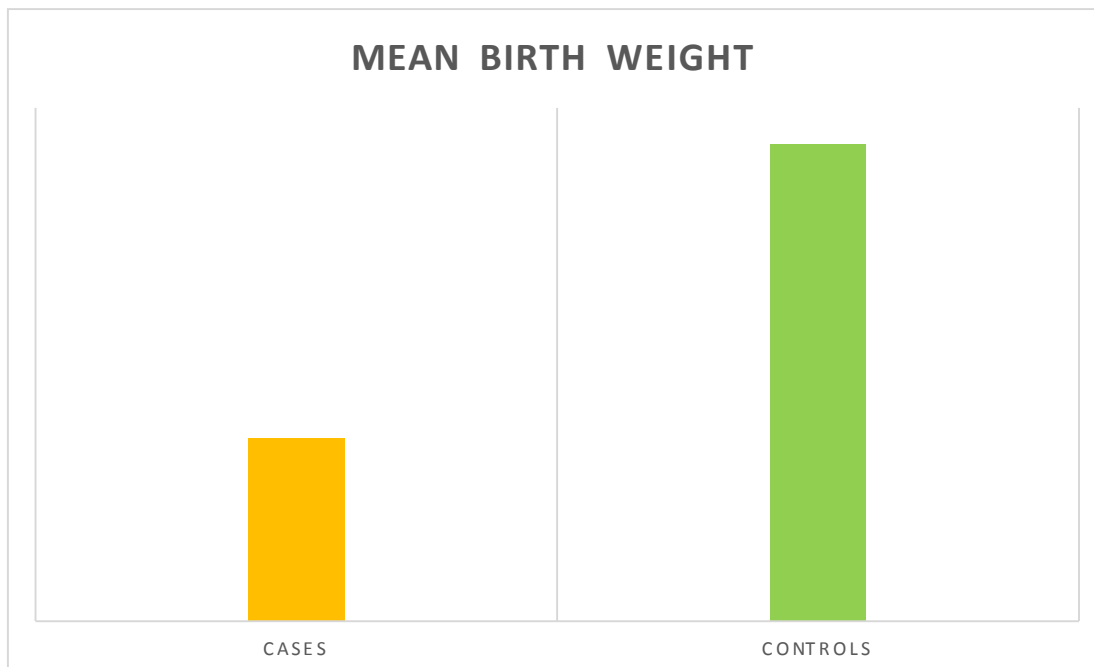


Figure 5: Bar chart showing mean birth weight - cases vs controls



Our study shows Indication for LSCS / forceps delivery in study groups, has significant P value in LSCS in case group as shown in figure 5

Table 7: Outcome in cases group based on obstetric score

OUTCOME	CASES GROUP			TOTAL
	G2	G3	G4&ABOVE	
TERM	32	22	8	61(40.7%)
TERM-PROM	30	10	2	42(28%)
ANAMOLOUS BABY	2	0	0	2(1.3%)
IUD	2	1	0	3(2%)
POST TERM	1	1	0	2(1.3%)
PRETERM	8	9	3	21(14%)
PPROM	1	0	0	1(0.7%)
STILL BIRTH	1	0	0	1(0.7%)
ABORTION	13	4	0	17(11.3%)

Table 7 shows Outcome in cases group based on obstetric score, has more abortion in gravida 2 . Our study also shows Outcome in control group based on obstetric score, has more number of term delivery

Our shows birth weight among both groups,2-2.5kg about 16.5%,2.5 -3kg about 52%,morethan 3kg is 21.5%. The same is depicted pictorially in figure 4.

Figure 6: Bar chart shows outcome in control group based on obstetric score

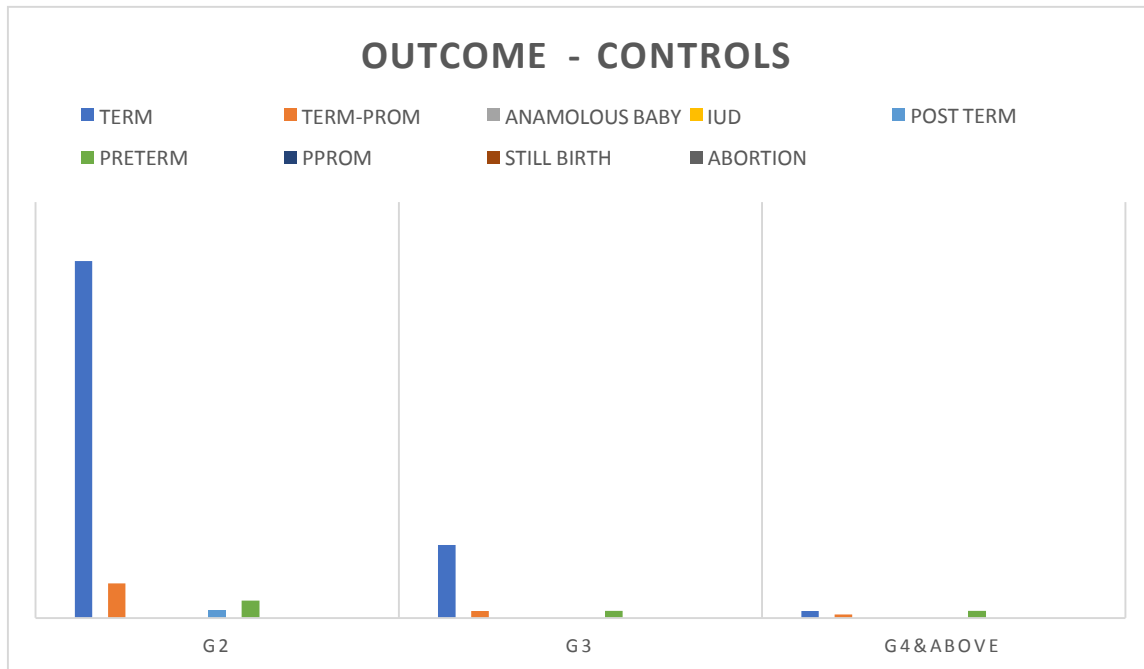


Table 8: Comparison between the birth weight and the number of previous live birth in controls group

OBSTETRIC INDEX	NUMBER OF PATIENTS	LOW BIRTH WEIGHT	PERCENTAGE	MEAN ± SD
G2PIL1	120	16	13.33%	2.89±0.25
G3P2L2	25	5	20.00%	2.87±0.21
G4P3L3 & ABOVE	5	1	20%	2.72±0.19

Table 8 shows there is no significant in mean birth weight when increasing the live birth

Table 9: Comparison between the birth weight and the number of previous abortions in cases group

OBSTETRIC INDEX	NUMBER OF PATIENTS	LOW BIRTH WEIGHT	PERCENTAGE	MEAN \pm SD
G2A1	90	11	12.20%	2.85 \pm 0.37
G3A2	47	13	27.60%	2.75 \pm 0.25
G4A3 & ABOVE	13	6	46%	2.61 \pm 0.21

Table 9 shows significant reduction in mean birth weight when abortion increases

Discussion:

A total of 300 subjects were included in the final analysis. There were 150 cases of spontaneous previous abortion in this study. There were 150 controls of full term normal delivery no abortion in this study. The outcome has been analyzed with respect to the following factors

1. Age of the patient Percentage of patients having
2. Successful pregnancies (Full term normal deliveries)
3. Preterm deliveries
4. Premature rupture of membranes
5. Post term pregnancies
6. Recurrent abortions
7. Low birth weight

In our study 150 pregnant women were cases and 150 pregnant women were controls. In both groups 17 % belonged to <20 years, 50% belonged to 21 -25 years, 24 % belonged to 26 to 30 years and 9% belonged to >30 years. The age distribution among both groups are predominant in 21-25 years of age. There was no statistical difference between the two groups regarding mean age distribution. Our study matches with Kashanian and Weintraub results. [8-9].

The distribution of the gravidas among both groups were 70 percent belonged to 2ndgravida, 24percent belonged to 3rd gravida and 6percent belonged to 4th& above gravida. The distribution of gravidas among both groups did not differ significantly.

When compares the mode of termination of pregnancy between the groups in our study,73.3percent of controls had normal deliveries and47.4percent of cases had normal deliveries. The difference is statistically significant $p = 0.001$. This shows that the percentage of pregnant women having successful term pregnancies is less with patients having prior abortion.

Edem E.Ekmo et al in their study of 176 pregnant women enrolled showed that % of women having prior abortion had less number of patients reaching to successful outcome.

In our study 26percent of controls had LSCS and 36.7 percent of cases had LSCS. The difference was statistically significant, P value of 0.046. The incidence of LSCS were high in the cases group. 0.7 percent of cases had assisted breech delivery, and no controls had assisted breech delivery. The difference was not statistically significant, $p = 0.316$. 4 percent of cases had incomplete abortion and none of the control group had abortions, the difference is statistically significant $p = 0.013$. 7.3 percent of cases had spontaneous miscarriage and none belonging to the control group had miscarriage, the difference is statistically significant $p = 0.007$. The chances of incomplete miscarriage and spontaneous miscarriage were significantly high in the patients who had previous miscarriage.

This study aligns with the research conducted by Jivraj et al. and Nielsen et al., which both observed a higher rate of caesarean section among women with prior spontaneous abortions compared to primigravida women[10&11]. However, this contradicts the findings of Annapurna et al., whose study indicated that the incidence of caesarean sections was elevated only in cases with three or more spontaneous abortions[12]. Interestingly, the current study did not identify a link between previous spontaneous abortions and preeclampsia. This lack of association may be attributed to an enhanced development of maternal-fetal immunologic tolerance during pregnancies following prior spontaneous abortions, as suggested by other studies. Consequently, prior spontaneous abortion might be regarded as a protective factor against preeclampsia in subsequent pregnancies[13-15].

When Compares the Obstetric outcome between the groups in our study, the number of patients who reached full term in the control group was 92.7percent and cases were 68.7percent. The difference is statistically significant $P = 0.001$. The number of patients who had previous

miscarriage had a significantly lesser chance of continuing the pregnancy to full term. The number of patients who delivered preterm among control group was 6 percent and among cases were 14 percent. This is statistically significant.

In our study the percentage of patients who had PROM among control group was 8.7% and among cases were 28%. The difference is statistically significant $P=0.001$ similar results found in Ekwo and Buchmayer[16&17].

In our study percentages of patients with post term pregnancies were 1.3 percent among both groups.

The stillbirths in the cases group were 0.7 percent and in the control group was nil. The percentage of the patients who had IUD in the cases group was 2 percent and in the controls was nil.

It shows that risk of miscarriage increases with each subsequent loss. In the cases group 11.3 percent had repeated abortion, as compared to control group there were no abortions. $P=0.001$, statistically significant. 73.3 percent of controls had normal deliveries & 47.4 percent of cases had normal deliveries.

The indication for LSCS/ Forceps among these groups, 47.4 percent of patients had normal delivery in the cases group whereas in the control group majority 73.3 percent of patients had normal delivery. The rest were delivered by LSCS or by forceps delivery. The difference is statistically significant. $P=0.025$.

The comparison of pregnancy outcomes between patients having 1 previous abortion (cases group) and the patients having 1 previous live birth (control group) in our study, 69 percent of patients in the cases group had full term deliveries, 94.5 percent of patients in the control group had full term deliveries. 33.5 percent had PROM in the cases group and 8.5 percent of patients in the control group had PROM ($P=0.001$) which is statistically significant. 15 percent of patients in the cases group had miscarriage & none had an abortion in the control group. $p=0.001$ statistically significant.

In our study 9 percent of patients in the cases group had preterm deliveries whereas 4 percent of patients in the control group had preterm deliveries. This shows that patients having 1 previous abortion have significantly higher chances of preterm births, Abortion and PROM in the next pregnancy.

The comparison of pregnancy outcomes between patients having previous 2 abortions and having previous 2 live birth in our study, 92 percent of patients in the control group had reached full term whereas

68.1 percent of patients in the cases group had reached full term. 19.2percent of patients in the Cases group had preterm delivery and 8percent of patients in the control group had preterm delivery, $P=0.677$ which is not statistically significant. 21.3percent of patients in the cases group had PROM and 8percent of patients in the control group had PROM. $P=0.563$ which is not statistically significant. 8.5percent of patients in the cases group had abortions and there were no abortions among the control group.

The comparison of pregnancy outcomes between patients having previous 3 or more abortion and having previous 3 or more live birth. 60 percent of patients in the control group had full term deliveries and 77 percent of patients in the cases group had full term deliveries. $P=0.605$ which is statistically not significant. Preterm, PROM, post term did not differ significantly between these two groups.

The comparison between low birth weight and the number of previous live births in the control group. The patients who had one previous delivery, the incidence of low birth weight were 12.2percent and the mean birth weight was 2.85 ± 0.37 kgs, the patients who had 2 previous live births, the incidence of low birth weight was 27.60percent and the mean birth weight of babies were 2.75 ± 0.25 kgs, the patients who had 3 & above previous live births, the incidence of Low birth weight were 46percent & the mean birth weight of babies were 2.61 ± 0.21 kgs.

The comparison between the number of previous miscarriages and the low birth weight in the cases group. The patients who had 1 previous abortion the incidence of low birth weight was 12.20percent & the mean birth weight were 2.85 ± 0.37 kgs. The patients who had 2 previous abortions the incidence of low birth weight babies were 27.60percent and the mean birth weight was 2.75 ± 0.25 kgs. Among patients who had 3 or more previous abortions, the low birth weight incidence were 46 percent & the mean birth weight was 2.61 ± 0.21 kgs. The incidence of low birth weight increases as the as the number of previous abortions increases.

Conclusion:

This study concludes that previous unfavorable pregnancy outcome increases the risk of adverse outcome in the next pregnancies. There is association between previous first trimester

spontaneous abortion and preterm delivery(14%),Recurrence of abortion(11.3%) and PROM (28%) in the subsequent pregnancies. There is no statistically significant increase in the rate of still birth, IUD and post term pregnancy in the subsequent pregnancies. From this study we observed that the pregnant women with a history of previous spontaneous abortion have a definite impact on the successful outcome in the future pregnancy. So carefulsurveillance should be provided to every pregnant woman and not to be restricted only to women with history of recurrent pregnancy loss.

Limitations:

The results obtained from this study cannot be generalized as the sample size was small.

Generalization requires the support of results from similar large studies

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Conflicts of interest:

There are no conflicts of interest.

Ethical statement:

Institutional ethical committee accepted this study. The study was approved by the institutional human ethics committee. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

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Authors' contributions: Dr.Revathi.A - conceptualization, data curation, investigation, methodology, project administration, visualization, writing—original draft, writing—review

and editing; **Dr.Sasirekha P** -conceptualization, methodology, writing—original draft, writing—review and editing; **Dr.R.Renju** and **Dr.R.Sathya** - conceptualization, visualization, supervision, writing—original draft; **Panneerselvam Periasamy** and **Dr.R.Sathya** - methodology, writing—original draft, writing, review and editing. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript.

DATA AVAILABILITY:

All datasets generated or analyzed during this study are included in the manuscript.

INFORMED CONSENT:

Written informed consent was obtained from the participants before enrolling in the study

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