Available online on 15.05.2020 at jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Research Article

Statistical Retrospective Analysis of Spontaneous Abortions in Sidi Bel Abbes Region

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ABSTRACT

Objective: The aim of our study was to identify modifiable risk factors for miscarriage and to estimate the preventable proportion of miscarriages that could be attributed to these risks. **Materials and Method:** We carried out an epidemiological study of pregnancy loss in the Sidi Bel Abbes region from 2010 to 2015, with a total of 54720 livebirths and 4349 of spontaneous abortions (SA). The risk of spontaneous abortion related to the fetal loss age, maternal age; parity and previous spontaneous abortions was studied. **Results**: The rate of spontaneous abortions varies between 7% and 9% and appears to remain constant over the six years, with an average incidence of 8%. We also observed a significant increase in the incidence of SA with the increase in maternal age. 77% of SA occurred before 12 weeks of gestation. The peak incidence occurred during the second month of pregnancy, between 6th and 10th, the rate of AS is the highest among primigests. The incidence of SRA in our study is within the range suggested by these different studies, with a SRA rate of 5%. Fetal loss is high in women in their late 30s or older, irrespective of reproductive history. **Conclusion:** The fact remains that the risk factors remain the same, namely, the increase in maternal age (inducing an increase in chromosomally unbalanced designs) and primigestity.

Keywords: Spontaneous, abortion, epidemiological, study, risk, factors.

Article Info: Received 12 March 2020; Review Completed 26 April 2020; Accepted 02 May 2020; Available online 15 May 2020

Cite this article as:

Mellali S, Haoud K, Bouguetaia MA, Diaf M, Statistical Retrospective Analysis of Spontaneous Abortions in Sidi Bel Abbes Region, Journal of Drug Delivery and Therapeutics. 2020; 10(3):202-206 http://dx.doi.org/10.22270/jddt.v10i3.4107

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INTRODUCTION:

Spontaneous miscarriage is a pregnancy that ends spontaneously before the fetus has reached a viable gestational age (fetal death before 24 weeks) [1]. Miscarriage could be considered one of the most frequent problems that could happen during the pregnancy in the human species [2]. Most studies report that around one in five clinical pregnancies will end in miscarriage [2, 3]. Chromosomal abnormality of the fetus is involved in approximately half of the miscarriage, for which errors at meiosis caused by advanced maternal age at time of conception has been found to be a risk factor [4, 5]. Indeed, most studies concerning the risk factors for spontaneous abortion have concluded that the predominant negative effects are those of advanced maternal age (with a clear increase in risk after 35 years) and previous spontaneous abortion [4,6,7,8]. Nevertheless, there have been a lot of studies investigating other risk or etiologic factors: previous spontaneous abortions and multigravidity are also well known risk factors for spontaneous abortion in subsequent pregnancies [9,10]. Several behavioural and social risk factors have been reported as increasing the risk of miscarriage, but most remain controversial or unconfirmed.

We aimed to realize an epidemiological study of pregnancy loss in the Sidi Bel Abbès region to identify modifiable risk factors for miscarriage and to estimate the preventable proportion of miscarriages that could be attributed to these.

MATERIAL AND METHODS:

We carried out a retrospective study based on the analysis of a sample of women who had undergone a spontaneous abortion (SA) and were admitted to the maternity ward of the Hassani Abdelkader hospital in Sidi Bel Abbés. Individual data sheets were compiled from the records of the patients recruited. Each record contained the following data: maternal age, gestational age, parity, gestures, history of spontaneous abortions. The characteristics of the sample are shown in **Table 1**.

Table 1: Characteristics of the sample

	Sample
Sample size	54720 LB/4349 SA
Average maternal age **(years)**	31.47
The youngest patient	**17**
Oldest patient	**60**
Middle Gestational Age (WA)	**10.96**
Youngest GA	**5**
Oldest GA	**24**

LB: Live birth, SA: spontaneous abortion, WA: weeks of amenorrhea, GA: gestational age

Statistical study: Statistical data capture and analysis was performed using software: Microsoft Office Excel 2007, IBM® Spss®statistics IBM Corp (version 20.0).

RESULTS AND DISCUSSION:

In our study, the incidence of spontaneous abortions was calculated in relation to the total number of pregnancies recorded annually during the study period (live births plus registered abortions). **Table 2** shows, for our sample, the annual incidence of SA between 2010 and 2015. The rate of spontaneous abortions varies between 7% and 9% and appears to remain constant over the six years, with an average incidence of 8%. Although the exact incidence of spontaneous abortions in a population is difficult to estimate, the rate we obtained is slightly below what is reported in the literature. Indeed, some authors place this incidence between 10 and 15% for clinically recognized pregnancies [11, 12, 13]. Others estimate it at 20% thus affecting about one in five pregnancies [3, 14]. Others go so far as to presume that this rate could be 4 to 5 times higher whereas about two thirds of pregnancies fail, if we take into account sub-clinical pregnancies, that is, pregnancies that stop just after conception and biochemical pregnancies [13,14, 15].

These different data are not contradictory and explain the relatively low incidence of SA in our study. In fact, in general women do not consult or shortly before the end of the first trimester of pregnancy and a very large number of SA occur very early in pregnancy, before or at the time of implantation or before clinical discovery of gestation. In addition, women may present a wide variety of symptoms during a miscarriage and the number of spontaneous abortions at home, without any medical intervention, is unknown.

Table 2: Annual incidence of SA

	Registered pregnancies	Spontaneous abortions	Rate %
2010	8199,00	721	9%
2011	9333,00	708	8%
2012	9181,00	714	8%
2013	9015,00	717	8%
2014	9883,00	713	7%
2015	10528,00	776	7%

Distribution of SA by maternal age:

Most studies on risk factors for spontaneous abortions concluded that the predominant negative effects are those of advanced maternal age (with a marked increase in risk after 35 years) [4,6,7,8, 16]. However, reproductive behaviour in our society has changed and, for various social reasons (education, work, late marriage, etc.), many women choose to delay motherhood. For example, according to UK census data, the number of babies born to mothers aged 35 or over doubled between 1985 and 2001, from 8% to 16% of total births [17, 18]. In the United States, this proportion increased from 19% in 1976 to 37.4% in 1998 [19, 20]. Although there is no comparable data for spontaneous abortions, it is logical to think that this rate has also increased.

Indeed, a large prospective study has shown that maternal age at conception is a strong risk factor for SA [4] due to an increase in chromosomally abnormal designs [17,21], thus, the risk of fetal loss increases significantly after the age of 35 [4]. In our study, we also observed a significant increase in the incidence of SA with the increase in maternal age, from 7.2% in patients aged 25-29 to 10% in patients aged 35-39 and 14% in patients aged 40-45 (**Table 3**).

Table 3: Distribution of SA by maternal age

Maternal age (years)	Number of cases	Rate %	Incidence %*
< 19	88	2%	7%
20 - 24	695	16%	7,1%
25 - 29	1000	23%	7,2%
30 - 34	1000	23%	8,2%
35 - 39	913	21%	10%
40 - 45	609	14%	14%
< 46	44	1%	13%

*Number of new cases/ total population

This is consistent with the results of literature [4,8,22,23]. The probability of a successful pregnancy in women aged 40 or over is therefore low, with risks of miscarriage, extra-uterine pregnancy, or a much higher stillbirth than in women in their thirties [4]. The observed association between maternal age and increased SA may be the result of age-related changes, such as an increase in chromosomal imbalances, a lower quality of the uterine mucosa which penalizes the implantation of the egg or an alteration of hormonal functions. In addition, age may be a factor in increasing exposure to unknown risk factors [21, 22].

Repartition of SA by gestational age:

Figure 1 shows the distribution of SA by gestational age. SA are generally classified as early AS (occurring before the 12th SA) and late AS (occurring between the 12th and the 24th SA [24]. The vast majority of SA occurs early, before 12 SA [24, 25, 26]. Mattar and Mendes (2002) [27] estimate that 80% of SA occurs before the end of the first trimester of pregnancy. This is consistent with our population, where 77% of SA occurred before 12 weeks of gestation.

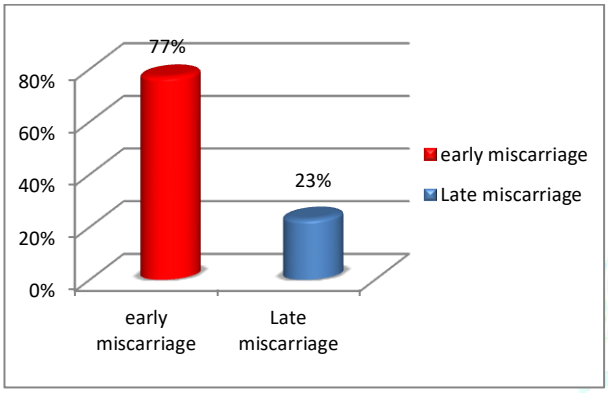

Figure 1: Rate of early and late miscarriage

In our study, the peak incidence occurred during the second month of pregnancy, between 6th and 10th week of amenorrhea (WA), with an incidence of only 40% for this period (**Figure 2**). This is similar to that of Bjorn and his colleagues (2011) [28] where the SA incidence peak is between 7th and 11th SA. The proportion of 1% recorded in the first month is clearly due to under-diagnosis, since women do not usually consult before the fourth week of pregnancy and embryo losses are not recorded. After the 12th SA, **Figure 2** shows the passage of the SA rate below 5%. These results are consistent with those obtained by Brigham and colleagues (1999) [24], who found that less than 5% of SA occurred after identification of embryonic heart activity, that is, after the first ultrasound at 12th week of amenorrhea.

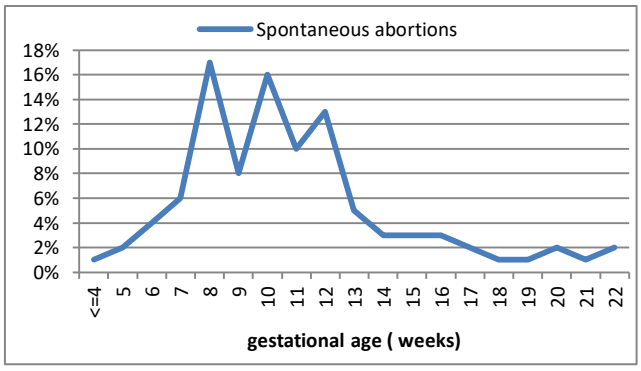

Figure 2: Repartition of SA by gestational age

Distribution of SA based on parity:

Reproductive history is a predictive factor independent of the future outcome of pregnancy. Although most studies refer to pluriparity as a known risk factor for SA [9, 10, 29], graphs obtained at Sidi Bel Abbés (**Table 4**) contradict this theory in the first analysis. Our study shows, in fact, that for our sample the rate of AS is the highest among primigests, with 31% of SA. This result is not in contradiction with the literature data; indeed, in our study, we studied the distribution and not the incidence of SA according to parity, knowing that the number of SA is becoming less and less important as parity increases. These results are nevertheless supported by a Swedish study conducted by Raymond and colleagues (1996) [30] which states that the risk of SA is higher among nullipares, even when the analysis excludes hypertensive women, diabetic, with placental complications or intrauterine growth retardation.

Table 4: Distribution of SA based on parity

Parity	Number of cases	Spontaneous abortions %
0	1348	31%
1	1043	24%
2	870	20%
3	522	12%
4	305	7%
>=5	261	6%

Breakdown of SA according to their repetition:

According to the Royal College of Obstetricians and Gynecologists (1998) and the American College of Obstetricians and Gynecologists (2001) [31, 32], spontaneous repeated abortions (SRA) are often defined as the occurrence of at least three consecutive pregnancy losses before the 24th week of amenorrhea. In nearly 50% of cases, the etiology of SRA remains unknown [33], however, the known risk factors for SRA are genetic disorders, in particular parental chromosomal abnormalities that represent a significant etiology, with a prevalence of these abnormalities ranging from 2% to 8% in couples with SRA [34], uterine pathologies, endocrine dysfunctions, autoimmune diseases, thrombophilia, and environmental factors [35].

Most studies on the subject estimate the incidence of SRA in women of reproductive age between 1 and 5% [17, 36, 37,38,39]. This frequency increases with subsequent accidents: 17-35 % after two SA, 25-46 % after three SA and more than 50 % after six SRA. The incidence of SRA in our study is within the range suggested by these different studies, with a SRA rate of

5% (**Table 5**). The increase in the risk of SA with the number of previous accidents is an argument in favour of the reality of SRA syndrome. It is estimated that the probability of having a live child decreases by 23% for each additional abortion beyond three abortions [17]. Normally, it is necessary to wait for the occurrence of three SA (definition of SRA) to undertake an etiological assessment. However, even by resisting the legitimate pressure of couples "to find a cause, and therefore propose treatment", this SRA assessment is often performed after two SA because recidivism rates after 2 or 3 SA are close. The primary role of the practitioner is first of all to reassure the couple that the likelihood of successful pregnancy after three SA is 60%.

Table 5: Breakdown of SA according to their repetition

Antecedent of miscarriage	Number of cases	Rate %
Without antecedent	2978	68.47
1 miscarriage	939	21.59
2 miscarriage	276	6.34
3 miscarriage	108	2.48
4 miscarriage	27	0.62
>=5 miscarriage	18	0.41

CONCLUSION

It is clear from our study that the situation of SA in the Sidi Bel Abbès region does not depart from the conclusions of previous studies conducted around the world. Indeed, although the incidence of SA is relatively lower than the statistics, the fact remains that the risk factors remain the same, namely, the increase in maternal age (inducing an increase in chromosomally unbalanced designs) and primigestity. We were also able to conclude that the majority of SA occurred early in pregnancy and that the ASR rate was within the 2- 8% advanced by most studies on the subject.

CONFLICT OF INTEREST:

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS:

The authors would like to express their gratitude to all the participants for their valuable assistance in this study.

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