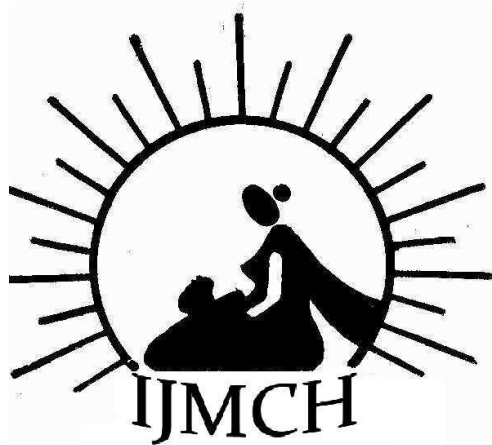


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What is the magnitude of fetal wastage in the community, and what are the major risk factors for the wastage?

Epidemiology of Fetal Wastage in Ludhiana, Punjab:

A Prospective Cohort Study

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ABSTRACT

Research Question: What is the magnitude of fetal wastage in the community, and what are the major risk factors for the wastage?

Setting: About 50,000 population of the field practice areas of the Department of Community Medicine, CMC, Ludhiana.

Study Design: Prospective cohort study

Participants: 1551 pregnant women diagnosed and followed up till 7 days after the pregnancy outcome.

Methodology: Abortion Ratio (AR) and Still Birth Rate (SBR) were calculated. Statistical analysis included the RR and its 95% CI.

Results: The study found foetal wastage to be 7.5% of the total pregnancies. The AR was 57.2/1000 live births, and the SBR was 23.1/1000 births. Too young, poor, slum-dwellers, those having <3 antenatal visits with incomplete tetanus and anaemia prophylaxis, maternal anaemia, spacing < 2 years, and under-weight women were found to be at higher risk of foetal wastage. Primigravidae were observed to be at higher risk of still birth, and multigravidae at higher risk of abortion.

Key Words: *Epidemiology, foetal wastage, abortion, still birth, cohort study*

INTRODUCTION

Pregnancy outcome in any given community - the probability of a pregnancy terminating in a full-term, healthy live birth - is a powerful indicator of the health status of its women, and of the quality of health care available to them during pregnancy and birth.⁽¹⁾ Pregnancy outcome is influenced by hereditary and environmental factors including those which affect stature in early life, current health and nutritional status, inter-pregnancy interval, maternal age, genitourinary or general diseases in women and socioeconomic and educational status.⁽²⁾ The abortion rate in India is 18.8 while that for Punjab is 31.9.⁽³⁾ Stillbirths account for over half of all perinatal deaths. One third of stillbirths take place during delivery and are largely avoidable.⁽⁴⁾ In India, most of the studies are limited to perinatal and childhood mortality and the data for pregnancy losses classified as abortions is largely missing. The present study was undertaken to find out the incidence of abortions and still births, and to determine the risk factors associated with these pregnancy outcomes in the study population in Ludhiana, Punjab.

MATERIAL AND METHODS

The present prospective cohort study was carried out over a period of two years. All the pregnant women in the field practice areas (urban, rural and urban slums) of the Department of Community Medicine, Christian Medical College, Ludhiana, identified and delivered during the two years' study period from 1.1.2006 to 31.12.2007, formed the study cohort. The women joined the study at varying gestational period, depending upon the time of their identification and registration, and were followed up till 7 days after the termination of their pregnancies. In the total of approximately 50,000 population (20,000 urban, 20,000 slum and 10,000 rural), 1551 pregnancies were diagnosed in the above time period, out of which 40 went to their parental home for delivery during the study or were otherwise lost to follow up. Consequently, 1511 pregnant women completed the study. Information was obtained by using a pre-tested questionnaire, and the data was compiled and analysed using Epi-Info version 6.

Operational definitions: The termination of a [pregnancy](#) earlier than 28 weeks of gestation was considered to be abortion. The birth of a dead baby after 28 weeks of gestation was taken as still birth. Gestational age of 28 weeks corresponds to a birth weight of 1000 gms.⁽⁵⁾ The Abortion Ratio (AR) was calculated in terms of the number of abortions per 1000 live births.⁽³⁾ The Still Birth Rate (SBR) was calculated in terms of the number of still births per 1000 total births (live + still births).⁽⁵⁾

Perinatal mortality in this study has been discussed elsewhere.⁽⁶⁾ The present paper discusses pregnancy wastage (abortions and still births).

RESULTS

The present study found foetal wastage (abortions + still births) to be 7.5 % of the total pregnancies. The abortion ratio was 57.2/1000 live births, and the still birth rate was 23.1/1000 births. (Table I a & b)

The AR was observed to increase with increasing maternal age, the lowest (48.2) being in the < 20 years old and the highest (86.5) in those aged 30 years or more, though the differences were not statistically significant. However, maternal age was observed to significantly influence the risk of still birth, with the SBR in the < 20 years old being the

Table -1a: Socio-demographic pattern of foetal wastage

FACTORS	Total pregnancies	No. of Abortions	Abortion		Total Births (n=1431)		Still Birth	
			Ratio	RR (95 % CI)	Live	Still	Rate	RR (95 % CI)
	1511	80	57.2		1398	33	23.1	
Mother's Age								
< 20 yrs	94	04	48.2	1.0	83	07	77.8	4.5 (1.9 - 10.3)
20-29 yrs	1210	60	53.1	1.1 (0.4 – 2.9)	1130	20	17.4	1.0
30 yrs or more	207	16	86.5	1.7 (0.6 – 5.0)	185	06	31.4	1.8 (0.7 - 4.4)
Mother's Education								
Illiterate	503	25	53.8	1.2 (0.7 – 2.3)	465	13	27.2	1.6 (0.7 - 3.6)
Up to Middle	375	15	42.8	1.0	350	10	27.8	1.6 (0.7 - 3.9)
Matric & Above	633	40	68.6	1.6 (0.9 – 2.8)	583	10	16.9	1.0
Mother's Occupation								
Housewife	1419	79	60.4	5.2 (0.7– 6.8)	1308	32	23.9	2.2 (0.3 - 15.7)
Working outside	92	01	11.1	1.0	90	01	11.0	1.0

Table –I b: Socio-demographic pattern of foetal wastage (contd.)

FACTORS	Total pregnancies	No. of Abortions	Abortion		Total Births (n=1431)		Still Birth	
			Ratio	RR (95 % CI)	Live	Still	Rate	RR (95 % CI)
	1511	80	57.2		1398	33	23.1	
Family Type								
Nuclear	458	25	59.5	1.1 (0.7 – 1.7)	420	13	30.0	1.5 (0.7 - 3.0)
Joint	1153	55	56.2	1.0	978	20	20.0	1.0
Residence								
Slum	598	35	64.4	1.4 (0.9 – 2.3)	543	20	35.5	3.2 (1.3 - 7.4)
Urban	652	28	45.4	1.0	617	07	11.2	1.0
Rural	261	17	71.4	1.5 (0.9 – 2.8)	238	06	24.6	2.2 (0.7 - 6.5)
Monthly Per Capita Income (Rs.)								
0- 499	516	31	66.2	1.4 (0.8 – 2.3)	468	17	35.0	2.6 (1.0 - 6.5)
500 – 999	519	23	47.3	1.0	486	10	20.2	1.5 (0.5 - 4.1)
1000 & above	476	26	58.5	1.2 (0.7 – 2.1)	444	06	13.3	1.0

Table – II a: Foetal wastage in relation to MCH factors

FACTORS	Total pregnancies (n = 1511)	No. of Abortions (n = 80)	Abortion		Total Births (n=1431)		Still Birth	
			Ratio	RR (95 % CI)	Live (n=1398)	Still (n=33)	Rate	RR (95 % CI)
Gravidity								
1	442	14	33.9	1.0	413	15	35.0	2.6 (1.2 - 5.8)
2 – 3	793	47	63.8	1.8 (1.0 – 3.3)	736	10	13.4	1.0
> 3	276	19	76.3	2.2 (1.1 – 4.2)	249	08	31.1	2.3 (0.9 - 5.8)
Spacing (n=1069, primigravidae excluded)								
<2 yrs	652	49	82.9	1.8 (1.1 – 3.2)	591	12	19.9	1.3 (0.5 - 3.5)
=/> 2 yrs	417	17	43.1	1.0	394	06	15.0	1.0
Maternal Anaemia								
Hb < 10 gm/dl	577	62	125.8	5.7 (3.4 – 9.6)	493	22	42.7	3.6 (1.7 - 7.3)
Hb =/>10 gm/dl	934	18	19.9	1.0	905	11	12.0	1.0
Body Mass Index								
Normal (18.50 – 24.99)	1171	59	54.1	1.1 (0.5 – 2.6)	1090	22	19.8	1.0
Overweight (=/> 25.00)	137	06	46.9	1.0	128	03	22.9	1.2 (0.3 - 3.8)
Underweight (< 18.50)	203	15	83.3	1.7 (0.7 – 4.3)	180	08	42.5	2.1 (1.0 - 4.8)

Table – II b: Foetal wastage in relation to MCH factors (contd.)

FACTORS	Total pregnancies (n = 1511)	No. of Abortions (n = 80)	Abortion		Total Births (n=1431)		Still Birth		
			Ratio	RR (95 % CI)	Live (n=1398)	Still (n=33)	Rate	RR (95 % CI)	
Antenatal Visits									
< 3	625	51	91.1	2.5 (1.6 – 3.9)	560	14	24.4	1.1 (0.6 - 2.2)	
3 or more	886	29	34.6	1.0	838	19	22.2	1.0	
Tetanus Toxoid (2 doses/Booster)									
Not received	100	50	1041.7	23.5 (15.7–5.1)	48	02	40.0	1.8 (0.4 - 7.2)	
Received	1411	30	22.2	1.0	1350	31	22.4	1.0	
Iron-folate tablets									
Not received	180	64	561.4	29.2 (17.3-49.4)	114	02	17.2	1.0	
Received	1331	16	12.5	1.0	1284	31	22.4	1.4 (0.3 - 5.6)	

highest at 77.8, with a RR of 4.5 (95 % CI 1.9 – 10.3) as compared to the 20-29 years old who had the lowest SBR at 17.8. (Table I)

The AR was highest (68.6) and the SBR lowest (16.9) in the most educated women (matriculate and above). Both the AR and the SBR were higher in housewives as compared to those working outside and higher in nuclear as compared to joint families. The AR was highest in the rural population, but the SBR was highest in the slum-dwellers. But the differences were statistically not significant. (Table I)

Both the AR as well as the SBR were highest in the poorest, those with monthly per capita income of < Rs 500. The poorest were at significantly higher risk of still births in comparison to the richest (RR 2.6, 95 % CI 1.0 – 6.5). (Table I)

Increasing gravidity was observed to be a significant determinant of abortion, with AR in the primigravida being 33.9/1000, in gravida 2-3 it was 63.8/1000 (RR 1.8, CI 1.0 – 3.3) and 76.3 in gravida >3 (RR 2.2, CI 1.1 – 4.2). The primigravida were observed to be at significantly higher risk of still births, with a SBR of 35.0 (RR 2.6, CI 1.2 – 5.8). (Table II a & b)

Those with <3 antenatal visits were at significantly higher risk of abortion, with AR 91.1/1000 (RR 2.5, CI 1.6 – 3.9), as compared to those with 3 or more antenatal visits. The differences in SBR were not statistically significant.

Similarly, those who did not receive complete tetanus prophylaxis were at extremely high risk of abortion, with AR 1041.7/1000 (RR 23.5, CI 15.7 – 35.1), and the differences in SBR were statistically not significant.

Those who did not receive iron-folate tablets were also observed to be at very high risk of abortion, with AR 561.4/1000 (RR 29.2, CI 17.3 – 49.4), and the difference in SBR were statistically not significant.

Maternal anaemia was found to be significant risk factor for both abortions as well as for still birth, with AR 125.8/1000 (RR 5.7, CI 3.4 – 9.6) and SBR 42.7/1000 (RR 3.6, CI 1.7 – 7.3).

Spacing of <2 years was observed to be a risk factor for abortion, with AR 82.9/1000 (RR 1.8, CI 1.1 – 3.2), though not for still birth.

Underweight women, with BMI < 18.50, were found to be at higher risk of still births, with SBR 42.5 (RR 2.1, CI 1.0 – 4.8). BMI did not appear to be a significant risk factor for abortion.

DISCUSSION

In our study 5.2 % of the pregnant women suffered an abortion and 2.3% had still births. These findings are corroborated by an ICMR multicentric study⁽⁷⁾ which documented abortions in 5.4 % and still births in 2.6 % of the sampled women. The SBR of 23.1/1000 births in our study is also comparable to that reported by other researchers, 20.8/1000 in Varanasi⁽²⁾ and 27.4/1000 in Vellore.⁽⁸⁾ The AR was found to increase with increasing age of the mother, highest in the older mothers. This may be because of a tendency to conceive repeatedly in an attempt to achieve the desired number and sex of children. Moreover, most teenage mothers would be primis, hence AR is naturally lowest in them but when we consider SBR, it is significantly higher in teenage mothers as reported by Raymond *et al*⁽⁹⁾ which may be a result of unfavourable social and behavioural conditions among pregnant teenagers. Lowest AR and highest SBR in teenage mothers has also been reported in a study in Denmark.⁽¹⁰⁾

Joint family seemed to be protective for the pregnant with lower AR and SBR as compared to nuclear family. Women in joint families fare better during periods of recognized dependency, i.e., pregnancy and childbirth, than their nuclear family counter parts, as there is sharing of responsibility in joint families. Agarwal *et al*⁽²⁾ also found larger families to have reduced AR and SBR.

The AR was observed to be more in mothers with higher education, which is contrary to the findings of other researchers.^(2,11) However, these researchers have reported only spontaneous abortions. The findings in our study may be because of sex selective, induced abortions which are quite common in Punjab. In our study, 18 out of 80 abortions (22.5%) were induced. Education arms the women with the awareness and knowledge regarding availability of facilities for abortions. No association was found between SBR and maternal literacy in the present study. Kumar and Singhi⁽¹²⁾ also did not find parental literacy to have any influence on the risk of still birth.

Both the AR and the SBR were higher in housewives as compared to those working outside. Employed women are generally more educated, have a higher family income and therefore experience the advantages of better socio-economic status as compared to the unemployed. However, Banerjee and Hazra⁽¹¹⁾ have reported employment during pregnancy to result in adverse outcomes.

The poorest had significantly higher SBR and were most vulnerable for the adverse outcomes, abortions as well as still births. Huang DY *et al*⁽¹³⁾ also found low socio economic status to be significantly associated with unexplained foetal death. Agarwal *et al*⁽²⁾ reported women with lower per capita income to have 65 – 73 % attributable risk for higher rates of abortion as well as still births.

The rural women had higher rates of abortions, followed by slum dwellers, whereas still birth rates were significantly higher for slum dwellers. The urban women had better outcome of pregnancy which is contrary to a report from Maharashtra⁽¹⁴⁾ which reported both the rate and ratio of spontaneous abortion to be higher in urban areas.

The AR was found to be increasing with parity of women but SBR was found to be significantly higher in the primigravida followed by those with gravidity >3, and lowest in 2nd - 3rd gravida. Other researchers^(2, 11, 13) also found SBR to be minimum in 2nd para and increasing thereafter, forming a parabolic curve.

Less than 3 antenatal visits were associated with significantly higher AR and also higher SBR in our study. Similar findings have been reported by Huang DY *et al*.⁽¹³⁾

Incomplete tetanus prophylaxis and course of iron-folate tablets were associated with very high AR in our study, which reflects the fact that many women suffer abortion before they are able to receive complete tetanus prophylaxis and full course of iron-folate tablets. Earliest possible identification and registration of the pregnant women, along with provision of tetanus and anaemia prophylaxis starting from the time of identification/registration would help prevent many women from suffering an abortion in an unprotected state. The National Programme recommendation of starting tetanus prophylaxis from the first opportunity, the second dose 4 weeks later, is usually not followed in actual practice, with most health care providers preferring to delay the first dose till 16 weeks of gestation. This leaves the woman unprotected in the event of her suffering an abortion in early pregnancy.

Maternal anaemia in our study was found to be a significant risk factor for both AR and SBR. There is usually a 2 to 3-fold increase in perinatal mortality rate when maternal haemoglobin levels fall below 8.0 g/dl and 8-10 fold increase when maternal haemoglobin levels fall 5.0 g/dl.⁽¹⁵⁾ The control of nutritional anaemia, an observed risk factor in pregnancy wastage, will improve the pregnancy outcome.⁽¹⁶⁾

Birth spacing of less than 2 years was associated with significantly higher AR. Most of the researchers^(7,11,14) also reported short inter-pregnancy interval to be associated with pregnancy wastage. We did not find a statistically significant association between short inter-pregnancy interval and SBR, which is in agreement with the findings of Kumar and Singhi.⁽¹²⁾

The under-weight women, with BMI < 18.5, were at significantly higher risk of still births. Agarwal *et al*⁽²⁾ reported attributable risk 76 – 80 % for still births in underweight women.

CONCLUSIONS AND RECOMMENDATIONS

Our study found foetal wastage (abortions + still births) to be 7.5 % of the total pregnancies. The AR was 57.2/1000 live births, and the SBR was 23.1/1000 births. The too young, the poor, the slum-dwellers, those having <3 antenatal visits with incomplete tetanus and anaemia prophylaxis, maternal anaemia, spacing < 2 years, and the under-weight women were at higher risk of foetal wastage. The primigravidae are observed to be at higher risk of still birth, while increasing gravidity was associated with higher risk of abortion. The study underscores the need for targeting these “high risk” women for priority care and the need for early identification and registration of the pregnant women. Efforts to delay the age at marriage and hence the age at childbirth, are important to avoid pregnancy in the <20 years old. Equally important are efforts to improve the status of women, and overall socio-economic development, which requires inter-sectoral co-operation and co-ordination.

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