Original Article

Study of amniotic fluid index by color doppler in pregnant bidi workers and pregnant non bidi workers

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Abstract

Background: Bidi rollers are exposed to smokeless tobacco through cutaneous and pharyngeal route. Amniotic fluid assessment by color Doppler is one of the important tools in assessing the fetal health in all risk categories. This study aimed to search for a relationship between AFI measurements in pregnant bidi workers and pregnant non bidi workers by Doppler ultrasonographic evaluation. **Material and Methods:** The study population comprises two equal groups of 100 women each with singleton pregnancies of bidi worker and non-bidi workers at 37-38 weeks gestational age.USG examination including color Doppler and pulsed Doppler velocimetry (L&T Company) was carried out. Amniotic fluid index was determined using four quadrant method. **Results:** In study group (pregnant bidi workers) there were 4 cases of AFI <6 cm and 1 case in control group (pregnant non bidi workers) with AFI <6 cm. The pregnant bidi workers rolling >1000 bidies/day had lower values of amniotic fluid index (AFI) than pregnant bidi workers rolling <1000 bidies/day. **Discussion:** The bidi worker women should not work in during pregnancy period and should get dietary allowance and paid leave.

Key Words: color Doppler, amniotic fluid index, pregnant bidi workers.

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INTRODUCTION

In India, there are a large number of bidi industries spread across the length and breadth of the country. There are 119 small and large bidi industries in the city of Solapur, where this study was done. Around 65,000 women are employed in these industries.Evidence regarding the negative effects of tobacco smoking on fetal development is widely documented in existing literature. The toxic effects vary from perinatal complications, such as low birth weight, to changes in adult behavior[1-3]. Bidi rollers are exposed to unburnt tobacco dust through cutaneous and pharyngeal route[1]. Amniotic fluid assessment by color Doppler is one of the important tools in assessing the fetal health in all risk categories especially beyond the period of viability[4]. Amniotic fluid index (AFI) is one of the major and deciding components of fetal biophysical profile and by itself it can predict pregnancy outcome. Very low values are associated with intrauterine growth restriction and renal anomalies of fetus, whereas high values may indicate fetal GI anomalies, maternal diabetes mellitus, and so forth. AFI by four-quadrant technique as described by Phelan *et al*[5] in 1987 and it is a popular and reliable method of quantifying amniotic fluid till today. This study aimed to search for a relationship between AFI measurementsin pregnant bidi workers and pregnant non bidi workers by Doppler ultrasonographic evaluation.

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MATERIAL AND METHODS

In this comparative prospective study, 100 women with singleton pregnancies of bidi worker women at 37-38 weeks gestational age were selected as cases and 100 cases of pregnant non bidi workers at 37-38 weeks gestational age were selected as controls. Detailed occupational history was taken. It included number of bidies prepared per day, number of hours she is working daily, number of years she is preparing bidies and occupation of her husband. Economical history was taken including her daily wages, weekly income of her husband and from this their monthly income calculated assessing their socioeconomic status. In all pregnancies, gestational age was calculated by LMP and earliest ultrasound in first trimester. With written consent, USG examination including Color Doppler and pulsed Doppler velocimetry (L&T Company) was carried out. Amniotic fluid index was determined using four quadrant method.The ultrasound examination was carried out after instructing the patient to empty her bladder. The patient was asked to lie down in supine position. Uterus was arbitrarily divided into four quadrants using lineanigra as a vertical line and a transverse line passing through umbilicus, as described by Phelan *et al.*[5]. The transducer was placed in each of these quadrants in sagittal plane perpendicular to patient's abdomen and maximum depth of amniotic fluid was calculated in centimeters excluding the cord loops and small fetal parts. Caution was exercised to avoid excessive pressure on the transducer to avoid wrong AFI measurements. The amniotic fluid index (AFI) is calculated by adding the depth in centimetres of the largest vertical pocket in each of four equal uterine quadrants[6].

RESULTS

In present study, 70% of cases were in age group of 21-25 year. Minimum numbers of subjects were between the age group of >30 yrs (4%).A total of 87% of study group and 78% of control group subjects were illiterate. In both the groups 60% of cases were primigravidae followed by 20% second gravidas, 16% third gravidas and 4% fourth gravid or more.

Table 1: Comparison of AFI between study and control group

Amniotic fluid index (AFI)	Study Group	Control Group
<6	4	1
6-10	80	31
>10	16	68
Mean±SD	8.56±1.95	12.19±2.81
95% confidence limit	4.66-12.46	6.57-17.81

(Z = 10.61; p value < 0.001)

In study group (pregnant bidi workers) there were 4 cases of AFI <6 cm and 1 case in control group (pregnant non bidi workers) with AFI <6 cm. In study group, 80% of cases had their AFI between 6 to 10 cm; while 68% of cases in control group (pregnant bidi workers) had their AFI more than 10 cm. There was statistically significant difference in amniotic fluid index between study and control group. Pregnant bidi workers had significantly lower amniotic fluid index as compared to pregnant non bidi workers.

Table 2: Correlation between number of bidies prepared per day and AFI

Number of bidies prepared/day	<501	501-1000	>1000
Amniotic fluid index (AFI) Mean ± SD	9.18 ± 1.50	6.46 ± 0.63	3.75 ± 0.95

The pregnant bidi workers rolling >1000 bidies/day had lower values of amniotic fluid index (AFI) than pregnant bidi workers rolling <1000 bidies/day; this difference is statistically significant ($p < 0.001$). This means amniotic fluid index (AFI) goes on decreases with increase in number of bidies prepared per day.

DISCUSSION

The bidi industries supply raw material like tobacco and tendu leaves to the women workers. They take them home and put many hours in rolling bidies. While making bidies, tobacco is absorbed through intact skin of hand and inhaled as dust.While handling, they inhale tobacco dust and volatile components of tobacco in their work environment (often their homes) and are at risk for genotoxic hazards[7]. These effects are more hazardous in pregnant women. It is well known that outcome of pregnancy depends upon antenatal care and proved that pregnancy complications are high in unregistered cases. There was no difference in ANC registration status in both the groups. In bidi working pregnant women very few women get proper antenatal care. They came for registration at around 28 to 30 weeks of gestational age. After that they came directly for delivery. Most of our patients were in the age group of 21-25 years. This is the age group of maximum fertility. Fridrick found that preterm deliveries were more commonly seen in low maternal age, low maternal weight and in smokers[8]. WisborgK *et al*[9] found no modification by maternal age of the association between smoking and preterm birth. Simpson[10] found that the babies of smokers are affected independent of age. In smokers increasing maternal age usually means a longer exposure to cigarettes that might interact with direct toxic effects of tobacco smoke. In present study, 60% of cases of both groups were primigravidas and 4% were fourth gravidaeor more. Kleinman and co-workers[11] found a difference between primipara and multipara in terms of effect of smoking. There was no significant difference in literacy in both groups. Because of illiteracy these women were not aware

of antenatal care, hygiene, proper diet. They also did not know about hazardous effect of tobacco handling and did not take any preventive measure for the same. Nutritional status is directly proportional to the socioeconomic condition of the family. These women were poorly nourished. They spent many hours in rolling bidies neglecting their nutrition. In the late second trimester and in the third trimester, amniotic fluid volume is largely contributed by fetal urinary production. The compromised fetus produces less urine and consequently oligohydramnios. Various ultrasound techniques have been evolved for assessing amniotic fluid volume. The first method described was measurement of deepest vertical pocket by Chemberlain et al in 1984[12] who defined normal amount of amniotic fluid as the largest vertical pocket measuring between 2 and 8 cm. A few years later**,** Phelan[6] proposed AFI as a more objective and reproducible method as it estimates the amount of amniotic fluid in four quadrants. The uterus is arbitrarily divided into four quadrants by the umbilicus transversely and lineanigra vertically. The largest vertical pocket, free of fetal parts and loops of cord, in each quadrant is measured. An AFI of 5-18 cm is considered normal. The mechanism is probably uteroplacental insufficiency which explains the genesis of both fetal growth restriction and decreased liquor. Fetal hypoxia causes redistribution of cardiac output in favour of fetal brain diverting the blood supply away from kidneys and lungs. This results in reduced fetal urinary production and decreased lung secretions, which contribute to amniotic fluid volume. In study group (bidi worker) there were 4 cases of AFI <6 cm and 1 case in control group (non bidi worker) with AFI <6 cm. In study group (bidi worker) 80% of cases had their AFI between 6 to 10 cm; while 68 % of cases in control group (bidi worker) had their AFI more than 10 cm. The mean AFI of study group and control group were 8.56 cm (95% confidence limit from 4.66 cm to 12.46 cm) and 12.19 cm (95% confidence limit from 6.56 cm to 17.81 cm) respectively. This indicate that bidi working group is associated with significantly low AFI as compared with non bidi working group. In study group bidi workers rolling 501-1000 bidies per day had lower values of AFI than bidi workers rolling <501 bidies per day; this difference was statistically significant. ($p < 0.001$). In study group bidi workers rolling >1000 bidies per day have lower values of AFI than bidi workers rolling 501-1000 bidies per day; this difference is statistically significant ($p < 0.001$). In study group bidi workers rolling >1000 bidies per day had lower values of AFI than bidi workers rolling <501 bidies per day; this difference was also statistically significant. ($p<0.001$). This means AFI decreases with increase in number of bidies prepared per day. Color Doppler is useful in studying adverse effects of tobacco handling in bidi workers. There is need to set up antenatal care clinic in bidi industrial areas. Pregnant bidi workers should get dietary allowance and paid leave. Use of gloves and mask during rolling bidies will reduce adverse effects of tobacco handling in pregnant bidi workers. Future studies like doing maternal serum nicotine levels and cord blood nicotine levels will through light on whether the ingredients of tobacco cross placental barrier.

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