Effect of Lunar Cycle on Delivery Rates in a Tertiary Care Hospital in India - A Retrospective Study

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ABSTRACT

BACKGROUND

From ancient period, moon has been held responsible for many biological activities. The lunar cycle has long been thought to have many chemical & physical effects on human beings especially women. The menstrual cycle, conception, delivery and even fertility have been closely linked to the moon's cycles. The relation of lunar phases to the birth rate has been the focus of considerable research with still controversial results. We wanted to study the moon phases with regard to birth rate, relationship between lunar position and the time of delivery, preterm delivery, intrauterine fetal death (IUFD), instrumental delivery, normal vaginal delivery (NVD), lower segment Caesarean section (LSCS) and multiple pregnancy.

METHODS

Retrospective data from daily antenatal mother admissions, and delivery rates present in the public domain of a tertiary care hospital of Midnapore Medical College, Midnapore, India from 1st Oct 2019 to 30th Sept 2020 was evaluated with one-way analysis of variance (ANOVA).

RESULTS

Delivery rates were not related to lunar 1st quarter, full moon, new moon, and last quarter of lunar cycle with total delivery ($P < 0.05$), LSCS ($P > 0.05$), NVD ($P > 0.05$), instrumental delivery ($P > 0.05$), twin delivery ($P > 0.05$), and IUFD ($P > 0.05$).

CONCLUSIONS

Birth rates do not correlate with phases of the moon.

KEYWORDS

Lunar Cycle, Birth, Delivery, Pregnancy, Obstetrics

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DOI: 10.18410/jebmh/2021/64

How to Cite This Article:
Pal A. Effect of lunar cycle on delivery rates in a tertiary care hospital in India - a retrospective study. J Evid Based Med Healthc 2021;8(06):332-336. DOI: 10.18410/jebmh/2021/64

Submission 12-10-2020,
Peer Review 25-10-2020,
Acceptance 21-12-2020,
Published 08-02-2021.

BACKGROUND

The lunar cycle has an important role in the human life. Earlier, calendars were itself made on the cycle of the moon, i.e. lunar movement cycle. if there is any correlation between the moon movement and the delivery rates then it will be easy to predict the rates of the delivery and further assessment of the progression of delivery and management of the mortality and morbidity with respect to the maternal and fetal outcome. It will be easy to provide help and management to the pregnant mothers. Previous studies showed lunar cycle had no correlation with the delivery rates and frequency of delivery.[1,2,3,4,5,6,7] and some studies showed positive correlation with the moon cycle[6] one of the lunar cycle or sidereal cycle is 27.32 days and has one full moon and one new moon, which corresponds to the relative position of moon with respect to sun and earth. A major correlation is seen between spontaneous delivery and full moon phase, especially multiparous women.[7]

Moon moves east by 12.2° per day and the gravitational power of moon relates the position odd moon with respect to the earth, i.e. full moon and new moon and the moon's gravitational power has effects on human lives and cell cycle. The study of frequency of birth may provide clues to know the mechanism of birth related to the moon's position and movement. All cells of a human contain biological clock.[8] This clock has component of the input signals e.g.-light / gravitational pull, hormone, clock itself and output signals.[9,10]

Many people and even among nurses of obstetrics wards believe that the moon phases affect the onset of labour and that the full moon raises the number of births.

Neurophysiologist regarded sleep-wake rhythm, body temperature; the levels of melatonin, cortisol and growth hormone in the blood are governed by a circadian rhythm, hypothalamus, by the suprachiasmatic nucleus, in order to ensure the programming of the adaptive response to external changes. Specially, the day / night cycle is transposed as an input from the retinal photoreceptors, to the central nervous system (CNS), which in turn regulates the cycle of sleep and wake. In addition, during night, the exposure to light suppresses the synthesis of melatonin which is secreted by the pineal gland.[11]

Sarkar and Biswas have noted that the vaginal pH of women during the ovulatory phase[12] coinciding with the full moon, was alkaline (pH 8.7 ± 0.4), while the ovulation, during the three previous days, was slightly acidic (pH 6.2 to 6.4 ± 0.5,); the temperature of the body was increased (+ 0.5° F) in women who had ovulated at the full moon phase; additionally they have associated the alkaline environment and the basal temperature of the body with the conception of male infants.

Among other motives, this interest has inspired researchers to investigate the effect of the lunar cycle and other natural phenomena such as, for example, precipitation temperature variations, and barometric pressure on pregnancy and labour.[13-22] Closely related papers analysed other potential effects of the lunar cycle, such as the effect of the full moon on animal bites.,[23,24] crime.,[25] and urinary retention.[26] The role of radiation and geomagnetic disturbances on human health outcomes have been investigated less extensively. Existing evidence indicates, for example that solar activity is correlated with human conceptions[27,28] human life spine[29,30] and other health outcome variables.

We wanted to study the moon phases with regard to birth rate, relationship between lunar position and the time of delivery, preterm delivery, intrauterine fetal death (IUFD), instrumental delivery, normal vaginal delivery (NVD), lower segment Caesarean section (LSCS) and multiple pregnancy.

METHODS

Data Collection

Retrospective data from daily antenatal mother admission, delivery rates present in the public domain of a tertiary care hospital in Midnapore Medical College, Midnapore, India, from 1st Oct 2019 to 30th Sept 2020 was evaluated.

Statistical Analysis

Patients were grouped into delivered occurring on new moon (new moon ± 1 day), first quarter (first quarter ± 1 day), full moon (full moon ± 1 day), last quarter (last quarter ± 1 days) as per lunar cycle and were grouped and tabled in Microsoft Excel and analyzed by Statistical Package for the Social Sciences (SPSS) 23 and analysis of variance (ANOVA) test is performed for statistical significance.

RESULTS

A total of 12435 deliveries occurred in the given period with average mean ± SD of 33.98 ± 7.77 delivery per day. Among NVD, total deliveries were 7345 with mean ± SD 20.07 ± 5.48 delivery per day, among LSCS total deliveries by LSCS were 4474 with mean ± SD was 12.22 ± 4.23 per day, total instrumental deliveries were 613 with mean ± SD 1.67 ± 1.377 daily. Among twin deliveries of 232 in 1-year mean ± SD was 0.63 ± 0.75, among the preterm deliveries of total 1701 in the period mean ± SD was 4.65 ± 0.136. A total of 370 IUFD were there in the study period with mean ± SD of 1.01 ± 1.12 daily.

Total Delivery	Mean	Std. Deviation	Std. Error	95 % Confidence Interval for Mean	Minimum	Maximum	Lower Bound	Upper Bound
First quarter	39	33.79	9.180	1.470	30.82	36.77	16	58
Full moon	36	34.89	8.228	1.371	32.10	37.67	14	48
Last quarter	36	32.67	7.661	1.277	30.07	35.26	18	48
New moon	36	33.81	8.211	1.368	31.03	36.58	19	53
Total	**147**	**33.79**	**8.307**	**.685**	**32.44**	**35.14**	**14**	**58**

Table 1. Distribution of Total Delivery in Different Phases of Lunar Cycle

DELIVERY	Mean	Std. Deviation	Std. Error	95 % Confidence Interval for Mean	Minimum	Maximum	Lower Bound	Upper Bound
ND								
First Quarter	39	20.51	5.776	.925	18.64	22.39	11	38
Full Moon	36	20.81	5.008	.835	19.11	22.50	7	30
Last Quarter	36	19.22	5.060	.843	17.51	20.93	11	29
New Moon	36	19.86	6.109	1.018	17.79	21.93	10	40
Total	147	20.11	5.491	.453	19.21	21.00	7	40
LSCS								
First Quarter	39	11.51	5.062	.811	9.87	13.15	2	23
Full Moon	36	11.89	4.006	.668	10.53	13.24	5	21
Last Quarter	36	11.50	3.989	.665	10.15	12.85	2	18
New Moon	36	11.92	3.620	.603	10.69	13.14	6	19
Total	147	11.70	4.185	.345	11.02	12.38	2	23
Instrument								
First Quarter	39	1.77	1.564	.250	1.26	2.28	0	6
Full Moon	36	2.19	1.721	.287	1.61	2.78	0	7
Last Quarter	36	1.75	1.680	.280	1.18	2.32	0	8
New Moon	36	2.08	1.339	.223	1.63	2.54	0	5
Total	147	1.95	1.578	.130	1.69	2.20	0	8

Table 2. Distribution of Normal Vaginal Delivery, LSCS, Instrumental Delivery in Different Phases of Lunar Cycle

delivery	Mean	Std. Deviation	Std. Error	95 % Confidence Interval for Mean	Minimum	Maximum	Lower Bound	Upper Bound
Preterm								
First Quarter	39	4.95	3.776	.605	3.72	6.17	0	20
Full Moon	36	4.25	2.430	.405	3.43	5.07	0	11
Last Quarter	36	4.22	2.179	.363	3.48	4.96	0	10
New Moon	36	4.75	2.407	.401	3.94	5.56	1	12
Total	**147**	**4.55**	**2.785**	**.230**	**4.10**	**5.00**	**0**	**20**
Twin								
First Quarter	39	.51	.683	.109	.29	.73	0	2
Full Moon	36	.69	.889	.148	.39	1.00	0	3
Last Quarter	36	.69	.920	.153	.38	1.01	0	4
New Moon	36	.78	.722	.120	.53	1.02	0	2
Total	**147**	**.67**	**.805**	**.066**	**.54**	**.80**	**0**	**4**
IUFD								
First quarter	39	1.13	1.341	.215	.69	1.56	0	5
Full Moon	36	1.53	1.341	.224	1.07	1.98	0	5
Last Quarter	36	.97	1.108	.185	.60	1.35	0	4
New Moon	36	1.00	1.095	.183	.63	1.37	0	5
Total	**147**	**1.16**	**1.237**	**.102**	**.95**	**1.36**	**0**	**5**

Table 3. Distribution of Twin, IUFD, Pretem, Delivery in Different Phases of Lunar Cycle

ANOVA		Sum of Squares	DF	Mean Squares	F	Significance
Total	Between groups	88.909	3	29.636	.424	.736
	Within groups	9985.553	143	69.829		
	Total	10074.463	146			
ND	Between groups	54.348	3	18.116	.596	.619
	Within groups	4347.910	143	30.405		
	Total	**4402.259**	**146**			
LSCS	Between groups	5.781	3	1.927	.108	.955
	Within groups	2551.049	143	17.840		
	Total	**2556.830**	**146**			
Instru-ment	Between groups	5.503	3	1.834	.733	.534
	Within groups	358.062	143	2.504		
	Total	**363.565**	**146**			
Twin	Between groups	1.423	3	.474	.727	.537
	Within groups	93.244	143	.652		
	Total	**94.667**	**146**			
IUFD	Between groups	7.098	3	2.366	1.564	.201
	Within groups	216.303	143	1.513		
	Total	**223.401**	**146**			
Preterm	Between groups	14.748	3	4.916	.629	.597
	Within groups	1117.620	143	7.816		
	Total	**1132.367**	**146**			

Table 4. Statistical Analysis of Total Delivery in Different Phases of Lunar Cycle

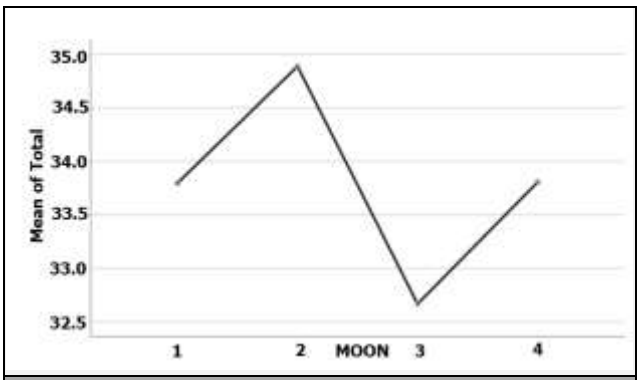

Figure 1. Total Delivery Rates with Moon Phases (1 = First Quarter, 2 = Full Moon, 3 = Last Quarter, 4 = New Moon)

DISCUSSION

Data of this study focused on the lunar cycle effect on frequency of birth. These results suggest that the gravitation of the moon may have no influence on the frequency of births. Here our study deal with daily data where it is much easier to associate individual observation with the corresponding phases of moon which were collected from one hospital.

The results (Table 1) display the effect of lunar cycle in frequency of total birth and there is no marked increased in number of births in 4 phases of the moon, this means that the moon in any of its phases do not affect the proportion of births.

A study by Abell and Greenspan,[31] on 11691 deliveries in 51 lunar cycles shows no correlation between the rate of birth and the moon cycle, just like our study, data performed by other authors[32] with a cohort study of the same amount, has not reported statistically significant differences in the frequency of deliveries during the different moon phases and in another contrary research. Oliver Kuss and Anja Kuehn[33] conducted a retrospective cohort analysis on 4,071,669 live and stillbirths and found that there is no association of the lunar cycle and the number of births from South-West Germany. But Randall's reported parallel with this study that the gravitation may have an influence on our body more than we have known before and this is in contrast with this study.

In our study, preterm deliveries were 1701 and had no correlation with lunar cycle (Table 4). In conclusion, consideration of the influence of the moon the tides led, over the centuries, to believe that it may cause the premature rupture of membranes (PROM), by an effect on the pressure of the amniotic fluid of pregnant women, and that, change of pressure could thereby inducing labour. The study of Lentz et al.[34] investigated the synergistic relationship between gravitational and barometric pressure forces in relation to the physiology of pregnancy, reporting that neither the barometric pressure gradients nor the size has a significant effect on human gestation and that gravitational influences of the new and full moons had no effect on the rate of birth.

Generally, by complex interactions of the hypothalamic-pituitary axis, the ovaries, and the genital tract, the

progression of spontaneous and regular ovulatory menstrual cycle is regulated. The hormonal system plays roles in the labour system.[32] In women, the duration of the cycle of menstruation in the reproductive age is approximately 28 days, which is very similar to a moon cycle. The hormonal system controls labour, this may be regulated by moon gravitation. According to previous studies, all mammalian cells seem to possess internal biological clocks.[35]

In our study according to Table 4 there is no correlation between IUFD pregnancy outcomes and lunar cycle which was performed on 370 IUFD delivered in one lunar year; there is no obvious increase in numbers of IUFD in any phase of the moon. Any other study about the correlation between lunar cycle and the frequency of multiple pregnancy outcomes was hardly seen as in our study.

In our study, according to Table 4, there is no correlation between multiple pregnancy outcomes and lunar cycle which was performed on 232 twins delivered in one lunar year in which there was no obvious increase in numbers of twins in any phase of the moon. Any other study about the correlation between lunar cycle and the frequency of multiple pregnancy outcomes was hardly seen as in our study.

CONCLUSIONS

Delivery rates were not related to lunar 1st quarter, full moon, new moon, and last quarter of lunar cycle with total delivery ($P < 0.05$), LSCS ($P > 0.05$), NVD ($P > 0.05$), instrumental delivery ($P > 0.05$), twin delivery ($P > 0.05$), and IUFD ($P > 0.05$).

Recommendations

Our data allows us to conclude that there is no correlation with lunar cycles, in contrary to popular beliefs.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
Financial or other competing interests: None.
Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

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