

# Gap in breast feeding practices between caesarean and normal deliveries

## Abstract

**Background:** World Health Organization universally recommends colostrum, a mother's first milk or the 'very first food' as perfect for every newborn. It has long-term health benefits associated with both the mother and child. Maternal benefits of breastfeeding include faster involution of the uterus and a lower risk of hemorrhage after birth. Caesarean mothers facing difficulty breastfeeding within an hour post child birth is a rising primary concern for medical professionals worldwide.

**Objectives:** This aspect in the periphery of the C-section needs the specific aim of the study; these proximately affect maternal health. The paper aims to examine the difference in prevalence between C-sections and normal delivery on colostrum feeding practiced by women.

**Methods:** The data used was of fourth round of National Family Health Survey (2015-16). Bivariate and multivariate techniques have been carried out to know the difference in the prevalence of colostrum feeding among mothers giving birth by both types of delivery.

**Conclusions:** We found that women who delivered via C-section had a lower prevalence of feeding colostrum to the newborn than those who delivered normally. A significant, around 15 percentage point difference was found between both the types. Findings suggest that surgical delivery, unless necessary, should be discouraged. It will be quite effective in addressing the delay in colostrum feeding problem.

**Keywords:** caesarean delivery, colostrum feeding, India, NFHS-4

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## Introduction

WHO universally recommends colostrum, the mother's first milk or the 'very first food' as perfect for every newborn. Colostrum, the yellowish, thick secretion by the breast during the first few hours after delivery, is highly significant for infant survival.<sup>1</sup> It acts as the newborn's first immunization. India ranks 56th in early initiation of breastfeeding.<sup>2</sup> Maternal benefits of breastfeeding include faster involution of the uterus and a lower risk of hemorrhage after birth. Breastfeeding is one of India's most practiced feeding practices yet; colostrum feeding has varying myths associated with it.

The most prevalent and harmful among those happens to be the colostrum or mothers' first milk not being fit for consumption by the child. It has been found that if the susceptible neonates are given anything else, contamination may cause infection, leading to diarrhea and increased chances of mortality. The bacterial carrier could be the food or the utensils itself.<sup>3</sup> Breastfeeding in the first hour of life is significantly essential for survival. The first feed, or colostrum, is the baby's first vaccine and is extremely rich in nutrients and antibodies. Continuous and exclusive breastfeeding after that is also significant.<sup>4</sup> Such feeding directly influences the postnatal metabolic adaptation of neonates. Colostrum feeding needs to be started in the first hour after giving birth because it is the first vital step towards reducing infant and under-5 mortality.<sup>5-10</sup>

Evidence suggests that such feeding reduces the risk of respiratory infections, ear infections and influenza and diarrheal diseases. For instance, a study claimed that that colostrum has a high concentration of antibodies against measles; and they concluded that colostrum feeding is one of the most sought-after solutions for reducing neonatal mortality.<sup>5</sup> Likely, a study from Sweden also suggested that breast milk protects against neonatal septicaemia and meningitis caused

by Gram-negative bacteria.<sup>6</sup> Another study from Ghana showed that timely initiation of breastfeeding has the potential to prevent 16% of neonatal deaths if all infants are breastfed from day 1, and 22% if breastfeeding is practiced within the first hour.<sup>7</sup>

While the benefits of breastfeeding and exclusive breastfeeding have received increased attention for a long time, the significance of colostrum has been remote in research. Analyses have instead stressed exclusive association between breastfeeding along with maternal and socioeconomic factors. Studies have considered the relationship between various components of breastfeeding, but little attention has been paid to the colostrum-feeding variable directly being hampered by caesarean deliveries.

Studies have found that women who deliver their babies under caesarean section procedure are less likely to breastfeed or delay breastfeeding initiation.<sup>8,9</sup> Lower breastfeeding initiation and increased difficulties in breastfeeding in women with C-section deliveries may be related to a physiologic influence on lactogenesis.<sup>10</sup> Delays in breastfeeding initiation accompanying caesarean section deliveries are associated with complications such as hemorrhage in mothers during delivery, maternal/infant separation, reduced suckling ability, decreased infant receptivity, and insufficient milk supply, which are predictive of shortened breastfeeding duration.<sup>8,11</sup> Nevertheless, other literature present contradicted these results. For instance, Pérez-Escamilla in their study, asserted that caesarean section delivery did not affect breastfeeding duration if women-initiated breastfeeding from birth and maintained breastfeeding for at least four weeks postpartum.<sup>12,13</sup>

On the other hand, the normal delivery neonate can be put to the breast immediately after birth without any need for other additional feeding items or supplements thus, it avoids any bacterial contamination.<sup>14,15</sup> Given the critical care, this aspect needs to be looked

upon; the government under the flagship National Health Mission of the Ministry of Health and Family Welfare is improving breastfeeding practices. A yearlong ‘MAA’ (Mothers’ Absolute Affection) Program was launched nationwide in 2016. A set of guidelines was laid down to implement the program at ground level. Besides this, advertisements to promote the concept were also played on television channels and radio shows.<sup>16</sup> These aspects in the periphery of C-sections need to be studied since it affects maternal and child health. Against this backdrop, the paper’s main objectives are to examine the gap between colostrum feeding practices of mothers giving birth via C-section and normal delivery.

**Data source**

The data used in this paper was of National Family Health Survey’s 4<sup>th</sup> round conducted in India in 2015-16 by MOHFW, government of India with International Institute of Population Sciences (IIPS), Mumbai serving as regional coordinator. NFHS is a nationally representative, large scale, repeated cross sectional survey in representative samples of households throughout India and is similar to Demographic Health surveys that are conducted in other countries. The principal objective of NFHS is to provide updates and evidence of trends in key population, health and nutrition indicators, including HIV prevalence. Moreover, the survey covers a range of health-related issues, including fertility, infant and child mortality, maternal and child health, perinatal mortality, adolescent reproductive health high-risk sexual behaviour, safe injections, tuberculosis, and malaria, non-communicable diseases, domestic violence, HIV knowledge, and attitudes toward people living with HIV. The survey adopted uniform sample design in all states. In each state, the rural sample was selected in two stages, with the selection of Primary Sampling Units (PSUs), which are villages, with probability proportional to population size (PPS) at the first stage, followed by the random selection of households within each PSU in the second stage. In urban areas, a three-stage procedure was followed. In the first stage, wards were selected with PPS sampling. In the next stage, one census enumeration block (CEB) was randomly selected from each sample ward. In the final stage, households were randomly selected within each selected CEB. The survey collected information from a nationally representative sample of 103,411 men and 699,686 women age 15-49 during the period 2015-2016.<sup>17</sup>

**Methodology**

**Descriptive variables**

The primary dependent variables taken for the study are dichotomous viz. colostrum feeding having response ‘yes’ or ‘no’. Colostrum feeding was created by considering the duration of breast-feeding initiation within an hour post birth of the child.

The independent variables included were various socio-economic background characteristics and some selected characteristics of mother. The important characteristics assessed in this study were Current age of mothers; Parity; Mother’s education; Place of residence; Wealth index; Region; Religion; Caste; Multiple births; Age of mother at first birth; Ante Natal Care visits; Place of delivery and Body Mass Index of mothers.

**Statistical analysis**

Bivariate and multivariate analysis has been carried out to know the difference in prevalence of colostrum feeding among mothers who have delivered by C-section and those who delivered normally. Further, binary logistic regression analysis by Osborne & King

was used to establish the association between the outcome variable (colostrum feeding) and other determinants among caesarean mothers in India.<sup>18</sup>

Logistic Regression models are commonly estimated by maximum likelihood function.

For these outcome variables, logistic regression model takes the form:

$$\text{Log} (P/1-P) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 \dots \dots \dots \beta_nX_n$$

Where Xi’s are covariates and βi’s are coefficients. P is predicted probability and log odds of P and (1-P) provides the odds ratios with respect to reference category.

Variance inflation factor (VIF) was also obtained to check the multicollinearity,<sup>19,20</sup> For all the analyses, STATA version 15 was used.

**Results**

Table 1 shows the distribution of women who have given at least one birth in last five years preceding the survey by some selected background characteristics. A higher percentage of mothers, around 39 percent belong the age group 25-29 years. As per educational level, around 45 percent mothers were secondary educated. Around 71 percent of the mothers belonged to rural areas. A large percent, around 44 percent of mothers belonged to other backward classes. Majority of women belonged to Hindu religion (78.7%) followed by Muslims (16.6%) percent. Wealth quintile wise, around one-fourth of women belonged to poorest quintile, and around 15 percent of the women belonged to the richest quintile. As per region, around one-fourth of women, belong to Eastern and Northern region and the minimum percentage of mothers belonged to North-eastern region around 4 percent. The total observations for the current study are 259,627.

**Table 1** Distribution of women who have given at least one birth in last five years preceding the survey by some selected background characteristics India (2015-16)

Background Characteristics	Sample of children	
	Percentage	Frequency
Current age of mothers (Years)		
<20	2.6	6,699
20-24	30.1	78,177
25-29	38.3	99,396
30-34	18.9	49,005
35+	10.2	26,350
Educational Level		
No education	30.1	78,027
Primary	14.1	36,472
Secondary	45.4	117,915
Higher	10.5	27,213
Residence		
Urban	28.1	72,860
Rural	71.9	186,767
Caste		
SC	21.5	55,928
ST	10.5	27,362
OBC	44.2	114,688
Others	23.8	61,649
Religion		
Hindu	78.7	204,235

Table continued ....

	Sample of children	
Muslims	16.6	42,974
Christian	2	5,309
Others	2.7	7,109
Wealth Index		
Poorest	25.4	65813
Poorer	22	57054
Middle	19.8	51501
Richer	18.1	47075
Richest	14.7	38184
Region		
Northern	25.1	65,275
Eastern	25.4	66,054
Central	9.3	24,142
Western	18.6	48,249
Southern	18	46,795
North-eastern	3.5	9,113
Total	100	259,627

Table 2 shows the feeding practices (whether colostrum feeding was done by women post-delivery) of women who have given birth by caesarean section and normal delivery. As it can be vividly seen in the table, the prevalence of women who had early initiation of breastfeeding is much higher in case of normal delivery (72%) as compared to caesarean section delivery (56.7%); this is uniform across all the age groups, even amongst the age group of 35 years and above, the prevalence was 57 and 68 percent amongst caesarean and normal delivery mothers respectively. Amongst the non-educated mothers, around 50 percent caesarean mothers and 66 percent normal delivery mothers reportedly fed colostrum to their infants. In urban area, also, the prevalence of feeding colostrum is more among normal delivery (57%) in comparison to caesarean (72%). A significant percent point difference can be seen between colostrum feeding practice of the top most wealth quintile amongst caesarean mothers (55%) and normal delivery mothers (73%). Overall, across all the background characteristics, a higher prevalence of colostrum feeding was observed among those women delivering normally than those delivering by caesarean.

**Table 2** Percentage distribution of colostrum feeding among C-section and normal delivery with some selected background characteristics, India (2015-16)

Background Characteristics	Colostrum feeding	
	C- Section Delivery	Normal Delivery
Current age of mother (Years)		
<20	49.1	72.3
20-24	56.7	72.8
25-29	57.2	73
30-34	56.7	70.8
35+	57.2	67.8
Highest educational Level		
No education	49.8	65.8
Primary	55.7	70.8
Secondary	58.4	76.4
Higher	56	74.3
Residence		
Urban	57	74.2
Rural	56.5	71.3
Caste		
SC	59.4	72

Table continued ....

	Colostrum feeding	
ST	64.9	76.7
OBC	57.1	69.7
Others	53.4	74.2
Religion		
Hindu	56.8	72.2
Muslims	55.2	68.6
Christian	67.4	85.5
Others	51.6	76.8
Wealth Index		
Poorest	51.9	67.7
Poorer	57.3	72.5
Middle	58.2	74
Richer	58.8	75.4
Richest	54.5	73.1
Region		
Northern	36.1	56.1
Eastern	52.5	73.4
Central	47.1	74.1
Western	59	77.1
Southern	68	86.3
North –Eastern	68.2	86.5
Total	56.7	72

Table 3 shows the colostrum feeding practices of women who had given birth by caesarean and normally by selected characteristics of mother and child. The colostrum feeding prevalence is significantly higher in case of normal delivery (72%) in comparison to caesarean delivery (57%). In fact such pattern is uniform across all the characteristics. In case of multiple births (twins, triplets) the percentage of women feeding colostrum is less (50%) amongst caesarean mothers as that of in single births (64%) amongst normal delivery mothers, also higher percent of women of second parity depicted the same pattern. ANC visits played a positive role in colostrum feeding, the prevalence of such practice among women with more than 4 ANC visits is more as compared to those making fewer visits, 58 percent amongst caesarean mothers and an impressive 78 percent amongst normal delivery mothers. Even the prevalence of smaller size children given colostrum is very low (38%) in case of caesarean section delivery. Caesarean deliveries in public health facility had higher percentage of mothers feeding colostrum to their children in comparison to those delivered in private, 64 percent against 53 percent.

**Table 3** Percentage distribution of colostrum feeding among C-section and normal delivery by some mother and child determinants, India (2015-16)

Background Characteristics	Colostrum feeding	
	C- Section Delivery	Normal Delivery
Age at first birth		
15-19	56.5	72.2
20-24	56.5	71.5
25-29	56.6	73.7
30-34	60.1	75.3
35+	56.5	71.3
Multiple Births		
No	56.8	72.1
Yes	50	63.4
Parity		
1	55.7	72.1
2	59	75.6
3+	53.4	68.7
Antenatal care visits		
None	54.9	63.7
1-3	52.9	68

Table continued ....

	Colostrum feeding	
4+	57.7	78.3
Size of child at birth		
Very large	60.8	74
Larger than average	57.8	75.7
Average	57.5	72.2
smaller than average	49.3	68.8
Very small	37.8	57.3
Place of delivery		
Public health facility	63.8	77
Private health facility	52.6	70.9
Body Mass Index of mother		
Underweight	56.5	71.7
Normal	57	71.9
Overweight	56.9	73.2
Obese	53.7	72.2
Total	56.6	72

Table 4 shows the odds of mothers feeding colostrum to the child after delivery amongst caesarean and normal deliveries. In Model 1; It can be clearly seen, the odds of colostrum feeding for caesarean delivery mothers when women’s educational level was highest was 11 percent more than the women who were not educated. Amongst both the models, as educational level increases, the odds of a women feeding colostrum to the child was found to be increasing. As compared to rural areas, the urban mothers who delivered by caesarean deliveries fed colostrum 7 percent more to their babies. Among mothers delivering by caesarean section, in comparison to SC women, the odds of colostrum feeding amongst other caste mothers was around seven percent less. Amongst wealth index, women from the richer group were 13 percent more likely to feed colostrum to the children. In comparison to Northern women, southern women were around four times more likely to feed colostrum to their newborns. In comparison to the women who had given first birth at 15-19 years, women who gave birth to their first child later in life viz. 25-29 years were 18 percent more likely to feed colostrum to their children. Women who delivered in private facility set up were around 42 percent less likely to feed colostrum to their child in comparison to public set up deliveries. As per BMI levels of mothers, the mothers who were in the overweight or obese category were less likely to feed colostrum to their children as compared to underweight mothers. Model 2 shows the odds of colostrum feeding amongst those women who delivered normally. While looking education level wise, it can be clearly seen that with increase in educational level, the odds of practice of feeding colostrum to the child were increasing. As compared to non-educated mothers, educated were 20 percent more likely to feed colostrum to their children while delivering normally. In comparison to SCs, ST women were 18 percent more likely to feed colostrum to their children. As compared to Hindu religion mothers, those of Muslim religion were 5 percent less likely to feed colostrum to their new born however, mothers from other religion were 19 percent more likely to feed colostrum to their children as compared to Hindu mothers while delivering normally. As compared to mothers from Northern region, those from Western and Southern region were 2 times and 3 times more likely to feed colostrum to their children after delivery. Mothers who have their first child much later in life had higher odds of feeding colostrum to their children than the 15–19-year-old mothers. Normal delivery mothers who had more than 4 ANC checkups, were 45 percent more likely to feed colostrum to children. Size of a child is an important factor affecting the colostrum feeding of the women. It can be seen that smaller the child size at the time of birth, less likely are they to be fed colostrum. In comparison to those being delivered in

public sector facilities, children born in private set up were 38 percent less likely to be fed colostrum while delivered normally.

**Table 4** Logistic regression estimates of Colostrum feeding among C-sec and Normal delivery by background characteristics, India (2015-16)

Background Characteristics	Colostrum feeding	
	C- Section Delivery Model 1 Adjusted Odds Ratio (SE)	Normal Delivery Model 2 Adjusted Odds Ratio (SE)
Educational Level		
No education ®		
Primary	1.0*(0.998)	1.058**(0.003)
Secondary	1.156*(0.002)	1.222**(0.000)
Higher	1.113*(0.053)	1.202**(0.000)
Residence		
Urban®		
Rural	1.073**(0.017)	1.072**(0.000)
Caste		
SC ®		
ST	1.098*(0.104)	1.185**(0.000)
OBC	0.831**(0.000)	0.886**(0.000)
Others	0.932**(0.092)	1.098**(0.000)
Religion		
Hindu ®		
Muslims	1.147**(0.000)	0.957**(0.017)
Christian	1.05*(0.486)	1.158**(0.000)
Others	1.152*(0.020)	1.196**(0.000)
Wealth Index		
Poorest ®		
Poorer	1.051*(0.423)	1.063**(0.001)
Middle	1.060*(0.340)	1.013**(0.519)
Richer	1.136*(0.041)	1.036**(0.135)
Richest	1.105*(0.137)	1.050**(0.085)
Region		
Northern ®		
Eastern	2.052*(0.000)	4.033 (0.000)
Central	1.668*(0.000)	1.824**(0.000)
Western	2.099*(0.000)	2.124**(0.000)
Southern	4.044 (0.000)	3.565 (0.000)
North-eastern	3.063 (0.000)	1.925**(0.000)
Age at first birth		
15-19 ®		
20-24	1.077**(0.032)	1.044**(0.001)
25-29	1.187**(0.000)	1.117**(0.000)
30-34	1.389*(0.000)	1.238*(0.000)
35+	1.120 (0.300)	1.050 (0.644)
Multiple Births		
No®		
Yes	0.783*(0.016)	0.742*(0.000)
Parity		
1®		
2	1.146**(0.000)	1.334**(0.000)
3+	1.142**(0.001)	1.270**(0.000)
Antenatal care visit		
None®		
1-3	1.047*(0.452)	1.147**(0.000)
4+	1.087*(0.144)	1.454**(0.000)
Size of child at birth		

Table continued ....

Colostrum feeding		
Very large <sup>Ⓢ</sup>		
Larger than average	0.971*(0.613)	1.000***(0.991)
Average	0.987*(0.801)	0.986***(0.566)
smaller than average		
Very small	0.765*(0.000)	0.847***(0.000)
Place of delivery		
Public sector health facility <sup>Ⓢ</sup>		
Private sector health facility	0.580***(0.000)	0.625***(0.000)
Body Mass Index of mother		
Underweight <sup>Ⓢ</sup>		
Normal	1.014***(0.731)	1.039***(0.008)
Overweight	0.981***(0.675)	0.987***(0.599)
Obese	0.894*(0.057)	0.982***(0.688)
Constant	0.583*(0.000)	1.025***(0.551)

## Discussion

The current study from the nationally representative data is an effort to systematically and comprehensively study one of the most under-studied concerns following caesarean deliveries- the feeding of colostrum to the child within an hour or so of birth. It has been set out to investigate pattern in breastfeeding practices in India. The defensive effect of breastfeeding depends on its duration and exclusivity.<sup>21,22</sup> The results of the current study found a massive 15 percentage points' difference in the prevalence of colostrum feeding among mothers who delivered via caesarean section and those who delivered normally was there, and this is every way worrying because in India, the prevalence of C-section deliveries has almost doubled during the last decade and it is expected to increase even more in the upcoming decade as shown in the NFHS findings.<sup>17</sup> Higher institutionalized births are increasing the access to gynecological and obstetric care. However, C-section deliveries too have shown an increasing trend due to the increasing access to healthcare.<sup>23</sup> Given if the C-section rates in the world keep on increasing at the current rate, breastfeeding immediately after childbearing would become a difficult practice to promote and follow. The mothers not in sense, post-delivery would not be able to breastfeed the baby.<sup>7</sup> The current prevalence of 41 percent from hospitals deliveries falls short of the national target of at least 50 percent colostrum.<sup>7</sup> There are a variety of misconceptions associated to colostrum feeding being less prevalent in rural locations than in metropolitan areas, this has also been observed in the results of the study. The place of delivery was the most significant predictor of early breastfeeding initiation. These findings reflect a general lack of information among rural mothers; most believe it is inappropriate to drink and toss it away instead of feeding the infant.<sup>24,25</sup>

Mothers who delivered surgically had difficulty in colostrum feeding practice; this is in accordance to the study by Evans and others; they found that breast milk transfer among women with C-section was significantly lower, especially in the first few days post giving birth in comparison to women with normal births. Furthermore, existing literature also states that lactation is delayed in mothers who deliver by caesarean section because the process of lactation is disturbed by surgeries.<sup>26-29</sup> Also, mothers not coming to senses on-time post the operation can be the correct reason for the delay in breastfeeding initiation. According to a study by Patel and others, the use of general or spinal anesthesia for caesarean delivery and trauma during surgery delays the recovery of mothers.<sup>7</sup> The study results clearly show there is still a long way to go to reach 100 percent colostrum feeding practices to be instilled by the masses.<sup>30</sup> An early study in 2002 found

that babies born via caesarean section were less likely to have skin-to-skin contact immediately after birth and were more likely not to have got breastfed within the first 24 hours post-delivery.<sup>10</sup> Skin-to-skin contact also has been suggested to improve breastfeeding initiation, maintenance and duration.

It was found that timely initiation of breastfeeding was seen to be significantly improving with higher maternal education. It is likely that education plays a vital role in changing mothers' traditional beliefs and attitudes towards breastfeeding, thereby enhancing the acceptability of colostrum and helping cope with the unfit notion of yellow colored milk being unfit for drinking for the newborn.<sup>22</sup> A positive association was found between increased ANC visits and colostrum feeding among normal and caesarean section delivery mothers. One possible explanation of this is that women having gone for so many check-ups must face complications during pregnancy and hence would choose to feed the newborn consciously. Further, another possible reason would be that these women were advised properly to feed colostrum to their children during their visits.<sup>24,31</sup>

Apart from all the aforementioned other explanations of such lower prevalence of colostrum feeding among caesarean mothers could be the poor suckling ability of the child, in case it is premature or weak. Mother's inability to produce milk sufficiently or on time could also be one of the reasons underlying such a problem.

## Conclusion

The study portrays evidence of a strong association between type of delivery and the practice of colostrum feeding. It has been found that the chance of being fed colostrum increases as the level of education of the women and socioeconomic status of the household increases. Women who delivered via C-section had lower prevalence of feeding colostrum to the newborn compared to those who delivered normally. A significant, around 15 percentage point difference was found between both the types of deliveries. This calls for attention in research, practice and policy, because not many acknowledge it as a concern. Initiatives including improved education, training and communication, is necessary to break the silence and make people aware about the significance. Caesarean delivery mothers need encouragement and assistance for initiating early breastfeeding so that it can adhere to implementation of Baby Friendly Hospital Initiatives.

## Recommendations

Lactating women face a number of challenges that should be addressed with suitable guidelines. In India, timely breastfeeding initiation and colostrum feeding has several misconceptions hence is not widely practiced, this should be dealt with high priority. Breastfeeding zones should be established in public settings. Maternity leave should be taken seriously as well. Support and direction from family members should be encouraged, and family members should receive suitable counselling. The myths about the quantity being inadequate should also be tackled with cautiously. Traditional practices of feeding the child the cow's milk with honey should be discouraged. Overall, the awareness regarding the benefits should be stimulated and the myths hovering around should be discouraged.

## Strength

An important strength of this study is that it used a large nationally representative sample, thus we believe it could be generalized to most populations within the India. This cross-sectional survey dataset helps in determining level of breastfeeding, in the two years preceding the survey. Such findings might be of significance for improving child health by running few intervention programs.

## Limitation

One limitation of this study happens to be the nature of the study, because it was cross-sectional, the cause-effect relationship of different variables with timely initiation or pre-lacteal feeding could not be assessed. The unavailability of some mothers, especially those delivered by caesarean section, might have biased the estimation of timely initiation upward.

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## Data

The data is publicly available at the DHS website and is free to use.

## Conflict of interest

There was no conflict of interest.

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