

# Effect Of Topical Coconut Oil Application In Less Than 1250 Grams Weight Infants On The Incidence Of Late-Onset Sepsis- An Observational Study

Dr. Abhishek Ramesh Jain<sup>1</sup>, Dr. Shubham Ashok More<sup>2</sup>, Dr. Shilpa Pawar<sup>3</sup>,  
Dr. Prabha Khaire<sup>4</sup>, Dr. Pavandev<sup>5</sup>

<sup>1</sup> Assistant Professor, <sup>2</sup> Junior Resident, <sup>3</sup> Associate Professor, <sup>4</sup> Professor and Head, <sup>5</sup> Junior Resident,  
Department of Pediatrics, Government medical college, Aurangabad (Maharashtra, India)

## Abstract:

**Background:** Topical oil application for neonates and infants has been a traditional practice in India and many low and middle-income countries. Every year, an estimated 15 million babies are born preterm globally, and over a million die due to complications of prematurity<sup>[1]</sup>. Premature babies are at an increased risk of a breach in their epithelial skin barrier and are at an increased risk of hypothermia. Topically applied coconut oil could provide a physical barrier and enhance the development of a skin barrier, reducing microorganism invasion and preventing hospital-acquired infection.

**Methods:** This is a prospective observational study conducted in a tertiary care hospital, level 3 NICU, between January 2019 to July 2019. The study population consists of preterm infants with birth weight less than 1250 grams admitted to tertiary care center who are hemodynamically stable & not have sepsis at the time of enrollment. The primary objective of the study was to observe the incidence of late-onset sepsis. Two epochs were used to conduct this study. In epoch 1, babies had routine care for two months, without oil application. Epoch 2 had babies with oil application and routine care for two months.

**Results:** In the oil application group, the septic screen was positive in 6/36 (16.7%) individuals. With no oil applied, we found 15/35 (42.9%) newborns with septic screen positive. ( $p=0.016$ ). The results of culture-positive sepsis were not found to be statistically significant in the groups.

**Conclusion:** We conclude that topical application of coconut oil on very low birth weight neonates is beneficial in terms of mortality, prevention of late-onset sepsis, achieving higher growth velocity, maintaining skin barrier, and reducing pain in neonates.

**Key words:** Preterm; Late onset sepsis; Coconut oil; Low birth weight

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## I. INTRODUCTION:

Topical oil application for neonates and infants has been a traditional practice in India and many low and middle-income countries (LMIC). Every year, an estimated 15 million babies are born preterm globally, and over a million die due to complications of prematurity<sup>[1]</sup>. Premature babies are at an increased risk of a breach in their epithelial skin barrier. Topically applied coconut oil could provide and enhance physical skin barrier. It helps in reducing microorganism invasion and prevent hospital-acquired infection in premature infants. Topical emollient coconut oil also reduces trans-epidermal fluid losses and promotes growth<sup>[1]</sup>. A recent study showed that topical application of coconut oil is associated with lower rates of hospital-acquired infection, better skin condition and less breakdown of skin.

In this study, we aim to assess effect of topical application of coconut oil in reducing the incidence of late-onset sepsis.<sup>[2]</sup>

## II. METHODS:

This was a prospective observational study conducted in a tertiary care hospital, between January 2019 to July 2019. The primary objective of the study was to determine effect of topical application of coconut oil in preterm infants admitted to tertiary care unit weighing less than 1250 grams. The secondary objectives were to observe skin condition; growth parameters; time to reach full feeds, NEC, jaundice, episodes of severe apnea, mortality, and duration of hospital stay. The study population consists of preterm infants with birth weight less than 1250 grams admitted to tertiary care unit. The exclusion criteria were infants with major congenital anomalies, congenital skin disorders, infants requiring mechanical ventilation as defined as mean airway pressure

> 10 cm H<sub>2</sub>O or fio<sub>2</sub> > 60%, infants with necrotizing enterocolitis > stage 2. Two epochs of sampling size 35 each were enrolled.

The study was carried out after receiving approval from the institutional ethical committee. After receiving informed written consent from the parents, infants meeting the inclusion criteria were enrolled. Two epochs were used to conduct this study. In epoch 1, babies had routine care for two months, without oil application. Epoch 2 had babies with oil application and routine care for two months.

100 % pure coconut oil was used for topical application and was marketed by Marico Ltd with the brand name Parachute coconut oil. The amount applied was 1.5 ml/kg of oil, twice a day by trained staff. It was applied all over the body except the head, face, and intravenous catheter sites till the discharge of the baby. The decision of treating pediatrician was considered in withholding oil application depending on the clinical condition of the baby.

It covered the number of days spent there, the daily skin condition as measured by the skin score (NSCC) the average daily weight gain, apnea episodes, feed intolerance, the frequency of late-onset sepsis (clinical, biochemical, and microbiological), Patients will be followed till death or discharge.

### III. STATISTICAL ANALYSIS:

The data were examined with SPSS V15.0. (Statistical Package for Social Sciences, Version 15.0). For continuous data, the data were presented as Mean SD (n), and for categorical data, as Number (Percentage). For numerical data, the Student's unpaired t-test was used to compare means. For categorical data, the Fisher Exact Probability test or the Chi-square test was used to compare percentages. In order to compare the two means, the Student's unpaired t-test was used. ANOVA (F-test was used to compare the means of the three groups, and the Scheffé post hoc test was then used to compare the means of the two groups. Pearson Correlation Coefficient (r) was calculated between 2 variables to check for the association. All statistical tests were two-tailed. Alpha (α) Level of Significance was taken as P<0.05. S=Significant, NS=Not Significant, DF=Degrees of freedom, P=Probability value.

### IV. RESULTS:

Out of 88 preterm babies born during the study period, 71 were enrolled in the study. The two groups were comparable for baseline characteristics.

**Table I: Comparison of baseline characteristics**

Baseline parameter	Coconut oil group n=36	No oil group N=35	P value
Gestation age	29.53±3.21	30.03±2.2	0.43
Males	24(66%)	16(45.7%)	0.07
Type of admission- inborn	31(86%)	31(88%)	0.61
Primipara mother	14(44.4%)	21(60%)	0.32
Immunized mother	35/36(97.2%)	34/35 (97.3%)	0.88
Pregnancy induced HTN	7 (19.4%)	11 (31.4)	0.24
Gestational diabetes mellites	0	0	NA
History of leaking p/v	19(52%)	15(42%)	0.4
Antenatal steroids	24 (66%)	27(77.2%)	0.60
APGAR at 5mins	7.64±0.93	7.49±1.01	0.5
Weight	1.101±0.12	1.07±0.149	0.146
Head circumference	26.17±1.1	26.06±1.3	0.70
Length	36.93±1.44	37.44±1.9	0.243
RDS	27(75%)	21(60%)	0.17
Surfactant therapy	23(69.3%)	21(60%)	0.73
NIV Support	24(66.3%)	23(65.2%)	0.93
Invasive respiratory support	13(36%)	18(51%)	0.19

**Table II: Primary outcomes**

Parameter	Oil applied	No oil applied	P value
Sepsis screen positive (n)	6/36	15/35	0.016
Blood culture positive (n)	4/36	7/35	0.3

In the oil application group, the sepsis screen was positive in 6/36 (16.7%) individuals. With no oil applied, we discovered 15/35 (42.9%) newborns with sepsis test positive results. Statistics showed that the difference was significant. (p=0.016)

The results of culture-positive sepsis were not found to be statistically significant in the groups.

Feasibility and safety: It was feasible for twice-daily oil application. There were no adverse events observed in the oil application group.

**Table III: Comparison of secondary outcomes**

Parameter	Oil applied	No oil applied	P value
Number of infants with Neonatal jaundice requiring phototherapy (n)	27/36	26/35	0.941
Number of infants having feed intolerance (n)	9/36	11/35	0.547
Number of infants with significant apneas (n)	5/36	8/36	0.329
Number of infants having NEC during a stay in NICU	0/36	2/35	0.14
Survival (n)	33/36	27/35	0.079

**Table IV: Comparison of secondary outcomes**

	Oil applied	No oil applied	P value
Time taken to reach full feeds (days)	12±4.7	11.77±4.2	0.832
Average skin NSSC score	3.78±0.637	5.89±1.23	0.001
Time taken reach birth weight (Days)	13.53±2.19	15.2±3.4	0.016
Average weight gain per kg per day(gms)	14.44±5.98	10.42±7.2	0.013
Average length gain per kg per week (cm)	0.669±0.09	0.566±0.10	0.00
Average head circumference gain per week (cm)	0.71±0.079	0.69±0.09	0.556
Average Weight at discharge (kg)	1.72±0.31	1.487±0.333	0.03
Average length at discharge	41.05±2.8	40.66±2.5	0.473
Average head circumference at discharge	30.44±1.5	29.7±2.00	0.084
Average duration of stay in NICU (days)	41.64±17.53	36.91±18.46	0.237

## V. DISCUSSION:

This is an observational study conducted in a tertiary care center in India. We applied coconut oil to preterm newborns weighing less than 1250grams. The study was focused to examine the potential benefits of applying coconut oil to lower the incidence of neonatal sepsis and other clinical characteristics such as weight gain, jaundice and feed intolerance.

The positive effects of coconut oil application to reduce late-onset sepsis were similar to previous studies.<sup>[2][3][4][5]</sup> The effect of coconut oil in maintaining skin integrity was beneficial to prevent sepsis. This may be correlated with However, culture-positive sepsis was not seen to be statistically significant, as proved in other studies.

In our study, we found that topical application of oil helped in weight gain congruent with other studies.<sup>[10][11]</sup> Our study did not support the role of coconut oil application on average head circumference gain per week (cm), average length at discharge, average duration of stay in NICU (days).<sup>[2][3]</sup> Coconut oil application did not reduce the need for phototherapy, feed intolerance, necrotizing enterocolitis, and episodes of apnea unlike other studies.<sup>[7][8][9]</sup>

Survival was found to be statistically significant between two epochs, unlike another study<sup>[2]</sup>.

Strengths of study: our study was feasible. It was also timely efficient and cost effective. Our study could give attention to various details.

Limitations of the study- larger sample size would help to strengthen the evidence of our primary objective. Blinded Randomized control trial are better for proving medical benefits of coconut oil. Long term follow-up studies would help in establishing evidences for role of coconut oil in growth and development. There was lack of generalizability. Our study had potential for sampling bias and it was difficult to control confounding bias.

## **VI. CONCLUSIONS:**

We conclude that topical application of coconut oil on very low birth weight neonates is beneficial in terms of mortality, prevention of late-onset sepsis, achieving higher growth velocity, and maintaining the skin barrier.

We did not find a difference in the incidence of jaundice requiring phototherapy, duration of NICU stay, feed intolerance, and NEC.

We did not find any adverse events following the application of oil viz; erythema, excoriation, or rash.

## **DECLARATIONS**

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*Conflict of interest:* No

*Ethical approval:* Yes.

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