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EFFECT OF COCONUT OIL VERSUS MEDIUM CHAIN TRIGLYCERIDE OIL MASSAGE ON WEIGHT GAIN IN LOW BIRTH WEIGHT NEWBORNS: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Background: *The empirical evidence from clinical studies has demonstrated that massage as a form of touch therapy, can be effectively employed from infancy to promote the physical and neurological development of premature and underweight newborns. The purpose of current study is to evaluate the effectiveness of oil massage by comparing weight gain in low birth weight newborns using two different oils i.e. coconut oil and medium-chain triglyceride oil (MCT).*

Methodology: *This randomized controlled trial was conducted at Children Hospital, Pakistan Institute of Medical Sciences (PIMS) after taking ethical approval from June to September of 2024. The study included a newborn that was older than 24 hours; Newborns that are hemodynamically stable, weigh less than 2500 grams at birth, and were born between 28 and 37 weeks gestational age, free of congenital or systemic illnesses. The study's exclusion criteria included the following: low birth weight newborns demonstrating sensitivity to coconut oil/MCT oil, receiving total parenteral nutrition (TPN) or intralipid therapy; and life-threatening abnormalities or anomalies. Additionally Parents whose consent was not to participate in the study were not included. Participants were randomly assigned to either the coconut oil or MCT oil massage group through lottery method. Weight was measured at enrolment and on day 15 of massage therapy in both the groups using a calibrated digital scale. Independent t-test was applied to compare mean birth weight among 'coconut oil massage' group and 'MCT oil massage' group.*

Result And Findings: *The study revealed no statistically significant difference in the baseline weights between the MCT oil group (1432.80 ± 210.22 gm; p = 0.35) and the coconut oil group (1416.58 ± 267.98 gm). On Day 15, there was no significant difference in the final weights of the two groups, with the coconut oil group gaining weight at 1588.40 ± 273.67 gm and the MCT oil group gaining weight at 1533.30 ± 206.39 gm (p = 0.33).*

Conclusion: *In conclusion, coconut oil is a cost-effective option and provides comparable weight gain to MCT oil, making it the preferred choice for neonatal care.*

Keywords: *Coconut oil, Low birth weight, Medium-chain triglyceride oil, Massage therapy.*

INTRODUCTION

Low birth weight (LBW) is an enormous health concern globally that is frequently linked to higher rates of newborn morbidity and mortality, as well as developmental and long-term health issues.(1) The term LBW refers to infants weighing less than 2500 grams at birth. These babies struggle to grow and gain weight in a healthy way, which is important for their general development and well-being.(2, 3)

LBW newborns must acquire weight quickly and appropriately throughout the neonatal stage in order to survive and develop normally. There have been several approaches investigated to encourage weight gain in these susceptible newborns, such as dietary modifications, specialized care methods, and adjunct therapies.(4) One such adjunct therapy that has garnered attention is the use of oil massage. Many cultures have long used various types of oils for massage, with the idea being that this will promote healthy growth and outcomes for the newborn.(5, 6)

Massage therapy has been suggested as a non-pharmacological strategy to promote weight gain in LBW neonates.(7, 8) The use of oils in neonatal massage has gained attention due to its potential benefits in promoting weight gain, enhancing skin barrier function and enhancing overall growth and development. Among the various oils used for neonatal massage, coconut oil and medium-chain triglycerides (MCT) oil have been highlighted for their potential benefits.(9, 10)

Several systematic reviews and meta-analyses have consolidated the evidence on the benefits of oil massage for neonatal weight gain. A meta-analysis of randomized controlled trials on massage therapy for preterm neonates was carried out by Lu et al. (2020), drawn the conclusion that oil massage—specifically, using coconut oil and MCT oil significantly enhanced weight gain and overall growth.(11) Similarly, a systematic review by özdemir and yildiz (2019) supported the use of these oils in neonatal care by highlighting the beneficial effects of oil massage on preterm infants' weight gain.(12)

Despite the traditional use and potential benefits, scientific evidence comparing the effectiveness of coconut oil versus MCT oil massage on weight gain in LBW newborns is limited. Coconut oil massage has been in practice for years in our culture for low birth weight (LBW) newborns to promote weight gain. The literature and guidelines lack existing evidence to support the adoption of that practice. In the context of a developing country with significant infant mortality, it is imperative to determine whether coconut oil which is inexpensive and easily accessible may be beneficial in weight gain. This randomized controlled trial aims to fill this gap by rigorously evaluating and comparing the impacts of these two oils on the weight gain of LBW infants. By doing so, it seeks to provide evidence-based guidance for neonatal care practices that can be implemented in clinical and community settings to improve the health outcomes of LBW infants. The aim of this study was to compare the effects of coconut oil vs. medium chain triglycerides (MCT) oil massage on the weight gain of LBW neonates. We tested the primary hypothesis that the use of coconut oil massage results in a significantly greater rate of weight gain compared to MCT oil massage.

MATERIAL & METHODS

This randomized controlled trial was conducted at the Children Hospital, PIMS in Islamabad over a four-month period following the approval of the ethical review committee. The sample size, calculated using Epitool, Mean & Standard deviation (SD) for Group A: 14.76±4.09(13), Mean & SD for Group B: 8.65±15.37(13) while keeping Alpha level is 0.05 and Power is 0.80; determined that approximately 108 participants were needed, with 54 assigned to each of the two groups i.e. coconut oil massage and MCT oil massage. Non-probability purposive sampling was employed to select participants based on inclusion criteria, which included newborns with a birth weight less than 2500 grams, gestational ages between 28 and 37 weeks, and ages above 24 hours, ensuring they were hemodynamically stable without congenital or systemic diseases. Exclusion criteria eliminated those with serious medical conditions such as respiratory or cardiac diseases, skin lesions, severe sepsis, or those receiving total parenteral nutrition or intralipid therapy. Additionally, babies that demonstrated sensitivity to the oils were omitted. Data collection initiated with obtaining informed consent from parents. Demographic data (age, sex, gestational age) were recorded for each participant. The massage groups were assigned randomly using a lottery system. Mothers were taught

massage techniques and advised to use 10 ml of oil for 15 minutes twice a day for 15 days. A preliminary skin test for coconut or MCT oil was performed to ensure no adverse reactions occurred before initiating the massage. The massage therapy consisted of three steps: Step 1: Touch the head, neck, shoulders, back, thighs, ankles, legs, and hands with her fingertips (5 minutes); Step 2: Touch the face and cheeks, chest, abdomen, plantar, and palm areas with her fingertips (5 minutes); Step 3: Open and close the joints (passive movements) of the shoulders, elbows, knees, and wrists separately (5 minutes).(14, 15) Weight measurements were taken at enrollment and again on day 15 using a calibrated digital scale.

Data analysis was conducted using SPSS version 26. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. An independent t-test was employed to compare mean birth weights between the two groups, with a significance level set at $p < 0.05$.

RESULTS & FINDINGS

Total 54 neonates were included in each group i.e. coconut oil and MCT oil groups, there were no losses to follow-up. The babies' mean age in days was 9.6 ± 3.07 and birth weight in gm was 1393.34 ± 240.66. The newborn's weight ranged from 850 to 2100 gm. The newborns' baseline characteristics in the coconut and MCT oil group are displayed in Table 1.

Table 1: Baseline characteristic of participants in study groups

Variables	Coconut oil group	MCT oil group
Gender (n/%) Male Female	 22/40.74 32/59.25	 28/51.85 26/48.14
Birth weight (gm) (Mean, SD)	1416.58±267.98	1432.80±210.22
Gestation age (weeks) (Mean, SD)	32.64±1.91	32.82±1.72

Table 2: Comparison of weight (gm) at Day 1 and Day 15 & weight change in coconut and MCT oil group.

Variables	Coconut oil group Mean±SD	MCT oil group Mean±SD	P-value
Weight (gm) At Day 1	1416.58±267.98	1432.80±210.22	0.35
Weight (gm) At Day 15	1588.40±273.67	1533.30±206.39	0.33
Weight change in gm	171.82.92±91.23	161.20±107.98	0.59

The study compared weight changes in the coconut oil and MCT oil groups from Day 1 to Day 15. There was no significant difference in the mean weight of the coconut oil group on Day 1 (1416.58±267.98 gm) and the MCT oil group (1432.80 ± 210.22 gm; $p = 0.35$). By Day 15, the coconut oil group's weight increased to 1588.40 ± 273.67 grams, and the MCT oil group to 1533.30 ± 206.39 grams ($p = 0.33$), also showing no significant difference between the two groups.

The weight change over the 15-day period was 171.82 ± 91.23 grams for the coconut oil group and 161.20 ± 107.98 grams for the MCT oil group. The P-value of 0.59 indicates there is no statistical significance in the variation of weight change between the groups, yet the group using coconut oil showed a marginally higher increase in weight than the group using MCT oil.

DISCUSSION

This study compared the effects of coconut oil and MCT oil on weight gain among neonates over a 15-day period. The baseline characteristics of the two groups were comparable, with no significant differences in birth weight, or gestational age. The mean age of the neonates was 9.6 ± 3.07 days, and their birth weights ranged from 850 to 2100 grams, with a mean of 1393.34 ± 240.66 grams.

The study showed no significant difference in baseline weights between the coconut oil group (1416.58 ± 267.98 grams) and the MCT oil group (1432.80 ± 210.22 grams; $p = 0.35$) on Day 1. By Day 15, both groups

gained weight, with the coconut oil group at 1588.40 ± 273.67 grams and the MCT oil group at 1533.30 ± 206.39 grams (p = 0.33), showing no significant difference in final weights.

The overall weight change in the 15-day period was slightly higher in the coconut oil group (171.82 ± 91.23 grams) compared to the MCT oil group (161.20 ± 107.98 grams). However, the p-value of 0.59 suggests that this difference was not statistically significant. These findings suggest that while both coconut oil and MCT oil are effective in promoting weight gain in neonates, neither oil provides a significant advantage over the other. The lack of a statistically significant difference between the two groups indicates that either oil could be used for neonatal weight gain without concern for a markedly different outcome.

Kumbhojkar and Akbani's (2020) study examined the effect of coconut oil massage on weight gain in infants. According to the study, babies who got massages with coconut oil gained much more weight than babies who did not. The authors hypothesize that part of the weight increase seen can be attributed to the medium-chain fatty acids (MCFAs) in coconut oil, which promote quick energy metabolism.(16)

A systematic analysis by Pupala et al. (2019) that examined the effects of topical coconut oil administration on preterm newborns lends further support to these findings. The analysis, which included several randomized controlled studies, came to the conclusion that because coconut oil massage improves energy metabolism and skin barrier function, it is linked to enhanced weight gain, especially in premature newborns.(17)

A randomized controlled trial was carried out by Liao et al. (2021) to assess the impact of MCT oil massage on the growth of premature newborns. According to the study, newborns who got MCT oil massages gained a lot more weight than babies in the control group. The effective absorption and utilization of MCFAs in MCT oil, which offer a rapid source of energy for growth, is credited by the researchers for this impact.(9)

The previous literature results are consistent with this study finding; Garbi et al. (2022) conducted a randomized controlled trial to examine the benefits of massages with coconut oil against MCT oil on the weight gain of very preterm infants. The findings showed that there was no discernible difference between the two oils' abilities to foster weight gain.(18) A meta-analysis of massage therapy for preterm newborns, encompassing studies on coconut oil and MCT oil, was carried out by Lu et al. (2020). The investigation found that applying coconut oil and MCT oil, in particular, greatly enhanced weight gain and general growth in premature newborns.(11)

In a comparable manner, Getaneh et al. 2024 systematic study emphasized the benefits of emollient oil application on weight development in premature neonates, with coconut oil and MCT oil standing out as especially useful choices. The review underlined the importance of these oils in strengthening skin barrier function, limiting trans-epidermal water loss, and promoting energy metabolism, all of which contribute to enhanced weight gain.(19)

The current study's findings are in line with earlier research that demonstrated the benefits of both oils for neonates nutritional support, especially for preterm or low birth weight babies.(10, 20) To determine whether there are any long-term variations in the growth patterns amongst neonates receiving these oils, further research with larger sample sizes and longer follow-up periods might be recommended.

CONCLUSION

The study revealed that there was no statistically significant difference in weight gain between the coconut oil and MCT oil groups over the 15-day period. However, the slightly higher weight gain in the coconut oil group, combined with its cost-effectiveness, makes it a preferable option for neonatal care. Given that both oils promote similar outcomes, the use of coconut oil may be a more economical choice without compromising the growth of neonates.

REFERENCES

Okwaraji YB, Krasevec J, Bradley E, Conkle J, Stevens GA, Gatica-Domínguez G, et al. National, regional, and global estimates of low birthweight in 2020, with trends from 2000: a systematic analysis. The Lancet. 2024;403(10431):1071-80.

Kelele D, Sirait RW, Riwu YR. Factors related to the incidence of low birth weight (LBW). Journal of Health and Behavioral Science. 2022;4(1):130-43.

Yulianti I, Saudah N, Wahyuningrum T. Maternal Characteristics as Predictors For Birth Of Low Birth Weight (LBW). 2021.

Singh A, Kaur H, Gupta G, Naranje K, Verma A, Roy A, et al. Enhancement of immunity and health in neonates and infants. Journal of Neonatology. 2021;35(3):138-54.

Chaturvedi S, Randive B, Pathak A, Agarkhedkar S, Tillu G, Darmstadt GL, et al. Prevalence and perceptions of infant massage in India: study from Maharashtra and Madhya Pradesh states. BMC pediatrics. 2020;20:1-8.

Blanks KJ, Musaba MW, Ren L, Burgoine K, Mukunya D, Clarke A, et al. Neonatal emollient therapy and massage practices in Africa: a scoping review. International Health. 2024;16(2):152-64.

Shayani LA, Maraes VRFdS. Manual and alternative therapies as non-pharmacological interventions for pain and stress control in newborns: a systematic review. World Journal of Pediatrics. 2023;19(1):35-47.

Lestari KP, Nurbadlina FR, Wagiyo, Jauhar M. The effectiveness of baby massage in increasing infant's body weight. Journal of public health research. 2021;10(1_suppl):jphr. 2021.332.

Liao Y-C, Wan Y-H, Chen P-H, Hsieh L-Y. Efficacy of medium-chain triglyceride oil massage on growth in preterm infants: a randomized controlled trial: A CONSORT-compliant article. Medicine. 2021;100(30):e26794.

Niemi A-K. Review of randomized controlled trials of massage in preterm infants. Children. 2017;4(4):21.

Lu L-C, Lan S-H, Hsieh Y-P, Lin L-Y, Chen J-C, Lan S-J. Massage therapy for weight gain in preterm neonates: A systematic review and meta-analysis of randomized controlled trials. Complementary Therapies in Clinical Practice. 2020;39:101168.

ÖZDEMİR S, YILDIZ S. The effects of massage on theweight gain of preterm infants: A systematic review. Journal of Traditional Medical Complementary Therapies. 2019;2(1):33-41.

Mohini KJ MB, Surender & Tyagi, Amita. A randomised comparative study of coconut oil massage for effect on weight change in low birth weight neonates. International Journal of Contemporary Pediatrics. 2021;8:1575.

Chen S-C, Yu J, Yuen SC-S, Lam JC-S, Suen LK-P, Yeung W-F. Massage therapy in infants and children under 5 years of age: protocol for an overview of systematic reviews. Systematic reviews. 2021;10(1):127.

Chen S-C, Lin S-L, Wang M, Cheung DS-T, Liang J-G, Cheng Z-Y, et al. Pediatric massage therapy in infants and children under 5 years: An umbrella review of systematic reviews. Heliyon. 2024.

Kumbhojkar SM, Akbani AAR. Effect of Coconut Oil Massage on Weight Gain in Low Birth Weight Newborns: A Randomised Controlled Clinical Trial. Journal of Medical Science And Clinical Research. 2020;8(02):236-45.

Pupala SS, Rao S, Strunk T, Patole S. Topical application of coconut oil to the skin of preterm infants: a systematic review. European journal of pediatrics. 2019;178:1317-24.

Garbi A, Armand M, Beltran-Anzola A-A, Sarté C, Brévaut-Malaty V, Tosello B, et al. Effect of Massage with Oil Balanced in Essential Fatty Acids on Development and Lipid Parameters in Very Premature Neonates: A Randomized, Controlled Study. Children. 2022;9(4):463.

Badhan, I. A., Hasnain, M. N., & Rahman, M. H. (2023). Advancing Operational Efficiency: An In-Depth Study Of Machine Learning Applications In Industrial Automation. Policy Research Journal, 1(2), 21-41.

Badhan, I. A., Neeroj, M. H., & Chowdhury, I. (2024). The Effect Of Ai-Driven Inventory Management Systems On Healthcare Outcomes And Supply Chain Performance: A Data-Driven Analysis. Frontline Marketing, Management and Economics Journal, 4(11), 15-52.

Ahmed, A., Rahman, S., Islam, M., Chowdhury, F., & Badhan, I. A. (2023). Challenges and Opportunities in Implementing Machine Learning For Healthcare Supply Chain Optimization: A Data-Driven Examination. International journal of business and management sciences, 3(07), 6-31.

Rahman, S., Alve, S. E., Islam, M. S., Dutta, S., Islam, M. M., Ahmed, A., ... & Kamruzzaman, M. (2024). Understanding The Role Of Enhanced Public Health Monitoring Systems: A Survey On Technological Integration And Public Health Benefits. Frontline Marketing, Management and Economics Journal, 4(10), 16-49.

Taslima, N., Islam, M., Rahman, S., Islam, S., & Islam, M. M. (2022). Information system integrated border security program: A quantitative assessment of AI-driven surveillance solutions in US immigration control. Journal of Business Insight and Innovation, 1(2), 47-60.

Nayak HS. A Comparative Study to Assess the Effectiveness of Olive Oil v/s Coconut Oil Massage in Weight Gain of Preterm Babies at Selected Hospital in Udupi: Rajiv Gandhi University of Health Sciences (India); 2018.