■Original Article

Sugar Scrub Effects on Skin Barrier Function and Heat Retention in Low Birth Weight Infants

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Abstract

Objective: This investigation sought to compare changes in body heat after using a sugar scrub to bathe low birth weight infants (< 2,500 g), compared with those bathed using conventional baby soap, and to evaluate the relationship between skin barrier function and changes in body heat.

Design: Non-Randomized clinical trials

Setting: A neonatal intensive care unit in a university hospital in Japan

Participants: 22 Low birth weight infants for whom bathing was permitted

Methods: Sebum quantity and skin temperature were each measured before and after bathing for a control group bathed with conventional baby soap and a group bathed with a sugar scrub skin care product. Ethical approval for this study was obtained from Aino university of Ethics committee review board (Approval number/27)

Results: The results demonstrated that both sebum quantity and skin temperature increased significantly after bathing in the sugar scrub group compared with the baby soap group.

Conclusion: Increases in sebum quantity are thought to influence the normal barrier function of skin and to help retain skin temperature. This study suggests that the use of this skin care product can be expected to effectively help maintain body temperature in low birth weight infants, who are prone to low body temperature.

Key Word : Sugar scrub skin care product, Bathing, Low birth weight infants, Sebum quantity

1. Introduction

In children, particularly infants, the stratum corneum of the skin is very thin and has an unstable ability to secrete sebum, and thus becomes prone to skin problems and allergies. A full 40 weeks of gestation is required for the five layers of the skin, from the basal layer of the epidermis to the stratum corneum, to be established in the fetus. At birth, the skin of premature infants is not fully functional and must develop postnatally, leaving them at risk of complications. Low birth weight infants (birth weight < 2,500 g) in the neonatal intensive care unit (NICU) tend to be of low gestational age, and therefore have an extremely thin immature stratum corneum.

The skin of low birth weight infants has numerous gaps in the connective tissue structure with weak defense against mechanical and external stimuli, and so is easily damaged by stimuli. Additionally, because the barrier function is immature, the skin is vulnerable to invasion by microorganisms. Low birth weight infants are also prone to having skin with an alkaline pH, which allows bacteria to reproduce readily, making the infants vulnerable to infections. When evaluating the barrier function of skin, the following quantifiable features are generally assessed: transdermal water loss, stratum corneum moistness, pH, and sebum quantity[1-3].

The effects of skin care using a sugar scrub (80% beet sugar, 20% essential oils and cooking oil) on heat retention and skin barrier function in infants between three and four months postnatally have been investigated previously[4,9,10]. Another study on low birth weight infants of > 36 weeks' gestation in the NICU compared sebum levels after bathing between a control group bathed with soap and a group bathed with a sugar scrub skin care product and demonstrated a significant increase in sebum in the sugar scrub group[11]. However, there is still much that is not known about the action, maturation, and barrier function of sebum in neonates, and more research is necessary[6].

Thermoregulation is considered an important factor in the care of low birth weight infants in the NICU; heat loss is a very common problem. In addition to the immaturity of core body

temperature regulation, causes of heat loss are thought to include a large surface area to body mass ratio, low amounts of subcutaneous fat, and immature thin skin. Routes of heat loss include radiation, convection, conduction, and transpiration. Skin thinness, moistness, and sebum quantity are thought to influence the rate of transpiration and a possible method of increasing the sebum content of skin is to apply oils externally. However, extending the time during which the body surface is exposed to air causes loss of body heat, and too much oil can trigger other skin problems.

In this study, we investigated the changes in body heat in low birth weight infants bathed with a sugar scrub compared with the typical baby soap. We also considered the relationship with skin barrier function and examined continued use over several days.

2. Research Aim

The aim of this investigation was to elucidate changes in body heat from bathing neonates with a sugar scrub and to consider the relationship between skin barrier function and changes in body heat.

3. Methods

3.1 Participants

This prospective study involved 22 neonates with low birth weight (< 2,500 g) hospitalized in the NICU of a participating facility for whom bathing was permitted. However, potential participants with skin problems, those with life-threatening illnesses, and those for whom the primary attending physician did not permit participation in the study (for any reason) were excluded.

Hospital staff that was not involved in the study was used to recruit participants through discussion with their caregivers. The researchers then gave further written and oral explanations to those caregivers who agreed to receive a more detailed clarification. In all cases, it was explained that participation in the study was voluntary and that not participating would not result in any unfavorable treatment, either in terms of hospitalization or medical treatment. Intention to participate was confirmed with the infants' legal guardians (a parent or person acting in loco parentis) via a consent form.

Infants eligible for the study and for whom consent was obtained were assigned to one of two groups: a group to be bathed with a sugar scrub (Sweet Skin Sucre, Abyssal Japan Co., Ltd., Hokkaido, Japan) and another group to be bathed with the standard hospital baby soap ("sugar scrub group" and "baby soap group", respectively.). Before the study, infants assigned to the sugar scrub group had small quantities of the sugar scrub dissolved in lukewarm water applied to the insides of their upper arms to confirm that irritation or other reactions to the product did not arise.

3.2 Bathing Methods

(1) Children of the sugar scrub group were given a skin test on inside of their upper arm before the bathing. The judgement was done by NICU doctors. When the test result was negative and safety was confirmed, the bathing was given.

(2) Children permitted to be given a bath by the doctor and whose legal guardians agreed with participating in this study were subjected to this study.

(3) Newborns who were 40 weeks old or older have five layers of skin and they were excluded from the study.

(4) The bathing room was 26℃ and its humidity was 50 % (the NICU was air-conditioned).

(5) Chief nurses skillful at NICU nursing and nurses certified by NICU were requested to conduct the bathing.

(6) The bathing method was the one employed by the NICU. First, the babies were weighed, and their whole body was observed carefully. Next the legs were submerged in the warm water. In the following order, the other parts of the body were also submerged: the face, arms, chest, stomach, genitals, and lower legs, and legs.

The nurse held the newborn with its face down and cleaned the back. The same method was applied for the soap and sugar groups. The nurse who conducted the skin care took some sugar scrub on the hands and like a massage applied it gently on the skin of the subject. The bathing time was the same two minutes as the soap group. The nurse poured some warm water on the baby to rinse the scrub and then dried the baby with a large towel by gently pressing it on the baby to avoid any possible damage on the skin.

To estimate the sample size, a simulation was conducted in related to effect size based on alpha-error of 0.05, (5% of statistical probability to reject the null hypothesis) with power of 0.8 (to detect a genuine, actual effect, if it exists). Additionally, difference in temperatures before and after a bath was 0.3° with a standard deviation of 0.17. It would be necessary to collect a minimum sample size of 13 accounting for loss of 10% of participants in the study.

3.3 Data Measurements

Before and after bathing, skin sebum quantity, moisture, and pH, as well as body surface temperature and epidermal bacterial

counts, were measured. Basic attribute data including weight, age in days, birth weight, and gestational age were also collected. Experienced nurses performed wiping during and after bathing using a unified maneuver. For both the sugar scrub group and the soap group, a thin layer of the bathing agent was applied to the skin and then washed off. To avoid the confounding influence of wetness, post-bathing data were collected 15 min after baths. Participants assigned to the sugar scrub group were bathed with the sugar scrub for five consecutive days; data measurements were repeated in both groups on the fifth day.

Details of the measurements are as follows:

Skin Data (Sebum Quantity, Moisture, and pH) Measurements

Sebum quantity, moisture, and pH of the skin of the infants were measured using a Derma Unit SSC3 (produced by Courage+Khazaka electronic GmbH, Cologne, Germany). The probes used for sebum quantity, moisture, and pH were the Sebumeter® SM815, Corneometer® CM 825, and Skin-pH-Meter PH 905 (Courage+Khazaka), respectively. All measurements were performed on the cheek. This decision was based on the following considerations: measurements could be taken without removing clothing, participants could have measurements taken while they were in a resting posture, and the influence of body hair was minimal.

Skin Temperature Measurement

Skin temperature data were captured using the infrared thermography camera (Nippon Avionics Co., Ltd., Tokyo, Japan) and analyzed with the InfReC Analyzer NS9500 (Nippon Avionics). Average temperature readings were measured on the forehead, cheek, chest, back, fingers, and feet. The average of the forehead and cheek, chest and back, and fingers and feet were considered as the “face”, the “trunk”, and the “periphery”, respectively.

Epidermal Bacterial Counts

Before and 15 min after bathing, 10-cm2 standard agar growth media (Petan Check® 10 standard agar growth media, Eiken Chemical Co., Ltd., Tokyo, Japan) was applied to the left and right sides of the upper back. Samples were obtained by sterile swab and incubated at 37 °C for 24 hr. The number of colonies were counted and the average of the left and the right sides were calculated and used as the data point for each infant.

Table 1. Participant attributes

	Sugar scrub				Soap	
			(Exc 1d olds)			
	n = 12		(n = 7)		n = 10	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Age (days)	12.6	(10.1)	20.5	(6.4)	32.3	(26.0)
Body weight (g)	2235.1	(230.0)	2168.8	(259.6)	2111.2	(286.0)
Birth weight (g)	2147.8	(341.8)	1934.3	(291.4)	1711.2	(570.4)
Gestational Age	36w1d	(15.6d)	35w1d	(14.8d)	33w0d	(22.5d)

Exc 1d olds: excluding one-day olds

Table 2. Changes in skin data from bathing: comparison of the initial treatment and the fifth day

n=11

		Initial treatment		Fifth day		*p*
		mean	(SD)	mean	(SD)	
Sebum ($\mu g/cm^2$)	Pre-bathing	1.6	(2.0)	2.8	(2.5)	.121
	Change	25.3	(35.2)	33.2	(33.4)	.393
Moisture (U)	Pre-bathing	25.8	(21.4)	21.8	(16.9)	.646
	Change	2.5	(33.3)	17.3	(21.9)	.327
pH	Pre-bathing	5.3	(1.0)	5.1	(0.7)	.482
	Change	0.1	(2.1)	-0.2	(0.8)	.729

（paired t-test）

3.4 Methods of Analysis

Descriptive statistics were calculated from the collected data, and statistical tests were performed. Shapiro-Wilk tests were performed to test for normality, and non-parametric methods were employed for data sets that could not be confirmed as normal; parametric methods were used for the remaining data sets. Statistical analyses were performed in IBM SPSS Statistics 24 (IBM Corp., Armonk, NY); a threshold of 0.05 was used to test for statistical significance.

3.5 Ethical Consideration

Ethical approval for this study was obtained from Aino university of Ethics committee review board (Approval number/27)

4. Results

Data collection was performed in an environment with an average temperature of 25.7 ℃ (SD, 1.6) and an average humidity of 60.0% (14.2).

The attributes of the participants are shown in Table 1. Five

Table 3-1. Comparison of sugar scrub (initial treatment) and baby soap

				Sugar scrub	Baby soap		
				n=12	n=10	*P*	
Sebum ($\mu g/cm^2$)		Post-bathing	median	15.0	0	*<.001*	**
			(range)	(4 to 109)	(0 to 0)		
		Change	median	14.0	-2.0	*<.001*	**
			(range)	(0 to 109)	(-6 to 0)		
Moisture (U)		Post-bathing	median	24.6	68.0	*.017*	*
			(range)	(10.2 to 98)	(26.6 to 92)		
		Change	mean	9.0	28.2	*.199*	
			(SD)	(39.0)	(25.9)		
pH		Post-bathing	median	5.1	4.9	*.674*	
			(range)	(3.9 to 9.6)	(3.9 to 5.9)		
		Change	median	-0.3	0.2	*.159*	
			(range)	(-1.9 to 5.8)	(-0.3 to 1.6)		
Skin Temperature (℃)	Face	Post-bathing	mean	34.68	34.13	*.183*	
			(SD)	(0.95)	(0.90)		
		Change	mean	-0.78	-0.79	*.995*	
			(SD)	(1.11)	(1.43)		
	Trunk	Post-bathing	mean	36.27	35.56	*.036*	*
			(SD)	(0.76)	(0.70)		
		Change	mean	-0.23	-0.57	*.474*	
			(SD)	(0.89)	(1.29)		
	Periphery	Post-bathing	mean	33.14	33.66	*.322*	
			(SD)	(1.27)	(1.08)		
		Change	mean	-0.66	0.638	*.108*	
			(SD)	(1.49)	(2.12)		
Bacterial Count ($CFU/10cm^2$)		Post-bathing	median	29.0	122.3	*.002*	**
			(range)	(0 to 253)	(31.5 to 419)		
		Change	median	21.0	23.0	*.974*	
			(range)	(-1 to 231.5)	(-28.5 to 388)		

* p<0.05 ** p<0.01 *t* test or Mann–Whitney *U* test

one-day-old infants were included in the sugar scrub group. Values excluding the data for those infants are also shown.

Comparisons of skin data for the group that was bathed using the sugar scrub after the initial use and after five days of continued use are shown in Table 2. Results are reported for 11 participants because, of the 12 participants in the sugar scrub group, one could not have measurements taken under the same conditions. For all data, there were no significant changes observed over the four consecutive days.

The results of comparisons between the sugar scrub group and the soap group for skin data, skin temperature, and bacterial count are shown in Tables 3-1, 3-2, and 4. On both the first day and after five days of continued use, the test group and the control group showed significant differences in the following measurements: sebum quantity, post-bathing trunk temperature, and post-bathing bacterial count. Compared with a sebum

Table 3-2. Comparison of sugar scrub (initial treatment) and baby soap (excluding one-day olds)

				Sugar scrub	Baby soap		
				n=7	n=10	*P*	
Sebum ($\mu g/cm^2$)		Post-bathing	median	10.0	0	*<.001*	**
			(range)	(4 to 31)	(0 to 0)		
		Change	mean	10.9	-2.4	*.012*	*
			(SD)	(10.0)	(1.84)		
Moisture (U)		Post-bathing	mean	23.6	66.1	*<.001*	**
			(SD)	(13.9)	(20.6)		
		Change	median	-0.5	23.9	*.019*	*
			(range)	(-73.8 to 21.5)	(-14.1 to 69.9)		
pH		Post-bathing	mean	4.7	4.9	*.423*	
			(SD)	(0.66)	(0.67)		
		Change	median	-0.1	0.2	*.315*	
			(range)	(-1.9 to 0.6)	(-0.3 to 1.6)		
Skin Temperature (℃)	Face	Post-bathing	mean	34.93	34.13	*.090*	
			(SD)	(0.88)	(0.90)		
		Change	mean	-0.62	-0.79	*.814*	
			(SD)	(1.35)	(1.43)		
	Trunk	Post-bathing	mean	36.51	35.56	*.008*	**
			(SD)	(0.50)	(0.70)		
		Change	mean	-0.16	-0.57	*.475*	
			(SD)	(-0.84)	(1.29)		
	Periphery	Post-bathing	mean	33.70	33.66	*.944*	
			(SD)	(1.32)	(1.08)		
		Change	mean	-0.18	0.638	*.417*	
			(SD)	(1.81)	(2.12)		
Bacterial Count ($CFU/10cm^2$)		Post-bathing	median	29.0	122.3	*.019*	*
			(range)	(11 to 253)	(31.5 to 419)		
		Change	median	19.0	23.0	*.962*	
			(range)	(2 to 231.5)	(-28.5 to 388)		

* p<0.05 ** p<0.01 *t* test or Mann–Whitney *U* test

quantity of nearly zero for the soap group, sebum was maintained compared with pre-bathing levels in the sugar scrub group. Skin temperature on the trunk was significantly lower after bathing with baby soap. Post-bathing bacterial counts were significantly higher in the baby soap group. However, there was no significant difference observed in the change in either trunk temperature or bacterial count. Comparisons of the data pre-bathing are shown in Table 5.

Table 4. Comparison of sugar scrub (Fifth day) and baby soap

			Sugar scrub n=12	Baby soap n=10	*P*	
Sebum ($\mu g/cm^2$)	Post-bathing	median (range)	38.0 (3 to 94)	0 (0 to 0)	*<.001*	**
	Change	mean (SD)	36.9 (34.0)	-2.4 (1.84)	*.003*	**
Moisture (U)	Post-bathing	mean (SD)	39.1 (15.8)	66.1 (20.6)	*.791*	
	Change	mean (SD)	17.2 (21.9)	28.2 (25.9)	*.003*	**
pH	Post-bathing	mean (SD)	4.9 (0.64)	4.9 (0.67)	*.308*	
	Change	median (range)	-0.3 (-1.5 to 1.2)	0.20 (-0.3 to 1.6)	*.173*	
Skin Temperature (°C) Face	Post-bathing	mean (SD)	34.64 (0.46)	34.13 (0.90)	*.133*	
	Change	mean (SD)	-0.68 (1.16)	-0.79 (1.43)	*.391*	
Trunk	Post-bathing	mean (SD)	36.28 (0.79)	35.56 (0.70)	*.043*	*
	Change	mean (SD)	-0.16 (0.90)	-0.57 (1.29)	*.410*	
Periphery	Post-bathing	mean (SD)	33.15 (1.51)	33.66 (1.08)	*.851*	
	Change	mean (SD)	-0.05 (1.77)	0.638 (2.12)	*.429*	
Bacterial Count (CFU/10 cm^2)	Post-bathing	median (range)	54.5 (12 to 275)	122.3 (31.5 to 419)	*.013*	*
	Change	median (range)	39.0 (-50.5 to 231)	23.0 (-28.5 to 388)	*.863*	

t test or Mann–Whitney *U* test. * $P < 0.05$. ** $P < 0.01$.

Table 5. Pre-bathing data (comparison of the sugar scrub and baby soap groups)

		Baby soap	Sugar scrub					
		(n = 10)	**Initial treatment**" (n = 12)		**Initial treatment** (exc. 1d olds) (n = 7)		Fifth day (n = 11)	
				P		*P*		*P*
Sebum ($\mu g/cm^2$)	mean (SD)	2.4 (1.8)	-		2.1 (2.4)	*.806*	2.8 (2.5)	*.672*
	median (range)	2.0 (0 to 6)	1.0 (0 to 6)	*.107*	-		-	
Moisture (U)	median (range)	36.3 (21.9 to 60.1)	18.9 (7.6 to 85.4)	*.017* *	28.1 (7.6 to 85.4)	*.315*	22.9 (2 to 67.1)	*.024* *
pH	mean (SD)	4.6 (0.4)	5.3 (0.96)	*.041* *	5.01 (0.59)	*.097*	5.0 (0.7)	*.090* *
Skin temperature (℃) Face	mean (SD)	34.91 (0.85)	35.46 (0.77)	*.230*	35.55 (0.75)	*.134*	35.32 (1.04	*.353*
Skin temperature (℃) Trunk	mean (SD)	36.13 (0.79)	36.5 (0.72)	*.268*	36.67 (0.82)	*.189*	36.4 (0.72)	*.363*
Skin temperature (℃) Peripher y	mean (SD)	33.02 (1.97)	33.80 (1.03)	*.280*	33.88 (1.33)	*.332*	33.20 (1.45)	*.815*
Bacterial count ($CFU/10cm^2$)	median (range)	45.5 (7.5 to 274.5)	7.8 (1 to 51)	*.003* **	9.0 (2 to 45.5)	*.019* *	14.0 (1 to 115)	*.036* *

* p<0.05 ** p<0.01 Exc 1d olds: excluding one-day olds *t* test or Mann–Whitney *U* test

Table 6. Relationship between sebum and skin temperature groups

(n = 33)

				Skin temperature (℃)					
				Post-bathing			Temperature change		
				Face	Trunk	Periphery	Face	Trunk	Periphery
			mean	34.50	35.09	33.22	-0.75	-1.28	-0.06
			(SD)	(0.80)	(5.27)	(1.35)	(1.19)	(5.56)	(1.81)
Sebum ($\mu g/cm^2$)	Pre-bathing	mean (SD)	2.2 (2.1)	0.27 *.127*	0.00 *.999*	0.14 *.435*	0.25 *.168*	0.01 *.961*	0.03 *.856*
Sebum ($\mu g/cm^2$)	Post-bathing	mean (SD)	23.2 (30.9)	-0.04 *.843*	0.12 *.513*	-0.19 *.299*	0.10 *.571*	0.14 *.449*	-0.11 *.542*
Sebum ($\mu g/cm^2$)	Change	mean (SD)	20.4 (31.7)	-0.06 *.748*	0.11 *.541*	-0.17 *.365*	0.09 *.646*	0.14 *.461*	-0.11 *.543*

Top row: Pearson correlation coefficient

Bottom row: *P* value

Pre-bathing bacterial counts were significantly higher in the baby soap group compared with the sugar scrub group. No difference in trunk temperature was observed.

To show the relationship between sebum quantity and skin temperature, correlation coefficients between the two were calculated (Table 6). A value indicating a weak positive correlation between pre-bathing sebum quantity and face temperature was obtained (not statistically significant); however, almost no correlation was observed for other body parts or between post-bathing sebum quantity and skin temperature.

5. Discussion

After birth, neonates are removed from the amniotic environment inside the mother's body and enter a dry extra-uterine environment. This carries a risk of skin problems. The stratum corneum, in particular, is thin, and the neonates have little subcutaneous fat. Consequently, the surface of the skin is easily wounded and the infants are at risk of infection by bacteria and other microorganisms[7].

To maintain the health of neonates, it has been reported that it is necessary to provide care to maintain sufficient barrier function[8]. Immediately post birth, neonates' skin is protected by the mothers' sex hormones; however, bathing using soap causes sebum level values to go nearly to zero, rendering the skin vulnerable to damage. In utero, the skin requires 40 weeks of term gestation for the five layers to develop from the basal layer of the epidermis to the stratum corneum. Thus, low birth weight neonates in the NICU, in particular, also have extremely thin stratum corneum. Additionally, the skin has numerous gaps in the connective tissue and weak defenses against mechanical and external stimuli, and therefore are more easily damaged by stimuli. The natural barrier function of the skin is lacking, and thus is vulnerable to invasion by microorganisms[12].

The bathing performed as part of nursing care in the NICU is done for the purposes of maintaining cleanliness to prevent infection, maintain warmth, and promote sleep. However, when left with wet skin at a room temperature of 25 °C for 30 min, neonatal body temperature declines by 2.1 °C. It has been reported that this temperature drop can be limited to 1.0 °C simply by wiping the infants dry and wrapping them in blankets and that further wiping can prevent loss through radiant heat[5].

Thus, measurement of skin temperature after bathing using thermography has been employed to measure the effects of immediate wrapping with bath towels after bathing and minimizing time skin is exposed before the infant is clothed, to minimize a drop in body temperature.

Because it can be expected that increasing sebum quantity in infants hospitalized in the NICU will influence the barrier function of the skin, and because one function of the skin barrier is to help maintain body temperature, we hypothesized that that preventing sebum loss would help maintain body temperature in low birth weight neonates of less than 2,500 g. The purpose of the study was to investigate the relationship between sebum levels, body temperature, and bathing with a sugar scrub versus standard baby soap. Like the results of a previous study[11], the results of this study demonstrated a significant increase in sebum levels after bathing in the group whose skin was cared for using a sugar scrub. There was also a significant rise in trunk skin temperature. Therefore, we believe that the use of the sugar scrub can be anticipated to have an effect of preventing low body temperatures.

This study considered an investigation into the barrier function effect attendant with increases in sebum quantity in low birth weight infants. The findings of this study show that the sugar scrub group had significantly higher post-bathing sebum quantity and trunk skin temperature compared with the baby soap group, and that the increased sebum quantity, via the mechanism of increasing skin barrier function, is likely responsible for the increase in body temperature. Therefore, the results suggest that the type of care studied is an effective method to help maintain sufficient skin barrier function, as described above[8], and that the method is effective as a preventive nursing care routine for maintaining body temperature.

Because the correlation coefficients shown in Table 6 did not indicate a correlation between oil quantity and trunk skin temperature, it may be difficult to determine the effects of sebum quantity from a short duration of only three to five days. Thus, there is a need to consider data in detail after a longer period of continued use.

Moreover, the results demonstrated that post-bathing bacterial counts were significantly lower in the sugar scrub skin care group versus the baby soap group. These results suggest that the sugar scrub is also effective in terms of promoting cleanliness. In Japan, soap is considered a necessary product for cleanliness. However, for neonates, skin care using a sugar scrub has been shown to influence skin barrier function by increasing sebum levels; furthermore, because of demonstrated lower bacterial levels, it is conceivable that the scrub could contribute to lower risk of infection.

In addition, other skin problems may be prevented by the substitution of sugar scrub for soap. The results of a study by Imamura et al.[4], in which a sugar scrub was used for one month on infants with skin problems, demonstrated that scratches, sores on the buttocks, sweat rashes, eczema around the joints (diagnosed as atopic dermatitis), and other problems resolved and that skin improved to a healthy state. Additionally, mothers

reported that buttock sores were gone even following bouts of diarrhea, and when the investigators made actual observations, all infants who had had skin problems showed resolution and developed healthy skin after use of the sugar scrub instead of soap.

Taken together, the data from this and previous studies indicate that in addition to an increase in sebum quantity having positive effects on skin barrier function and heat retention, the fragile skin of low birth weight neonates (< 2,500 g) is prone to wounding from mechanical stimuli, which the use of a sugar scrub for skin care during bathing seems to be effective for preventing.

6. Conclusion

This investigation on the effects of skin care using a sugar scrub on skin barrier function and heat retention in low birth weight infants shows that bathing neonates with sugar scrub could be expected to result in higher levels of sebum and improved skin barrier function compared with the use of baby soap. Also, the use of a sugar scrub can be expected to result in higher trunk temperature, and thus to help to prevent a drop in body temperature compared with the use of baby soap. These findings are based on data showing that the use of the sugar scrub increased sebum quantity and consequently influenced skin barrier function and heat retention. Nonetheless, correlation coefficients were not significant and the relationships remain unclear. Therefore, further research is required to clarify the relationship between these effects.

Conflicts of interest

There are no conflicts of interest.

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