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Effect of Infant Massage (Balabhyanga) on Health: Evidences from Ayurveda

Nisha Kumari Ojha*, **Ankita Mishra**

Department of Kaumarbhritya, National Institute of Ayurveda, Jaipur, India

ABSTRACT

Introduction: Massage (Balabhyanga) is one of the consequential ayurvedic procedures. It has again captured its central place amongst the way for healing, preventing diseases and promoting health.

Methodology: This review covers a wide range of ayurvedic classics and contemporary textbooks, publications, research articles from pubmed, medline database, and research published in scientific journals related to massage and balabhyanga.

Result: Analyzing ancient sources and several experiments reveal that (massage) balabhyanga increases the strength, nourishes body, improves skin texture and accelerates the healthy growth and development of newborn and infants. Abhyankar (massage) is beneficial and provides multifaceted positive health outcomes to infants.

Conclusion: Current article suggests that the Abhyankar is considered a safe practice and there are no significant harmful effects, if performed appropriately. Abhyanga is cost effective, culturally acceptable, traditional practice is an effective use of time. With proper selection of oil and with certain precaution under medical supervision and advice one can practice Abhyanga from birth to infantile age without any harm is the key message to modern health world.

Keywords: Abhyanga; Ayurveda; Massage; Evidences; Infant health

INTRODUCTION

The act of massaging infants is not a recent development. Mammals massage their babies by licking and grooming them during birth in order to help their body systems return to normal. Around the world, infant massage with oil is common and is similar to the ayurvedic abhyanga technique. Ayurveda described jatamatra paricharya as a very rational approach to newborn care. Infants who receive abhyanga reap numerous advantages, including nourishing, health protection, emotional well-being, and aesthetic benefits. Depending on the amount of pressure applied, the procedures and materials utilized it has a significant importance. Although abhyanga is one of the most crucial auxiliary medical actions, it has been neglected by practitioners and parents alike. Abhyanga can be performed with special caution in neonates who are vitally stable while taking into account the criteria and contraindications. Infant massage has been increasingly

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Corresponding author: Nisha Kumari Ojha, Department of Kaumarbhritya, National Institute of Ayurveda, Jaipur, India; E-mail: drankitam29@gmail.com

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popular in western states quite recently; the belief that it provides health benefits is a contributing factor. Several benefits of massage include weight gain, improved sleep-wake patterns, enhanced neuromata development, improved emotional bonds, lower incidence of nosocomial infections, and a consequent decrease in mortality in hospitalized patients [1-6].

The atharvaveda provides an in-depth description of the procedure that has been used for a long time. As a consequence, since the vedic era, the process has through numerous stages and phases of metamorphosis. Finally, Ayurveda scholars have framed and developed a more logical and rational process in accordance with the nature and variation of dosha. As a result, providing for infants is a crucial aspect of health care, which has been done all over the world since the dawn of human civilization. Infants undergo tremendous growth throughout the first year of life, necessitating special care. Therefore, abhyanga, a highly sensitive and comprehensive procedure for infants, was explained by Ayurveda. According to "abhyangamacharetnityam," astang samgraha, everyday practice of the therapy evidently delays ageing, treats exhaustion and vata diseases, enhances vision and complexion, nourishes, leads to a healthy life, restful sleep, and beautiful skin, among other benefits. All these advantages are possible thanks to abhyanga's excellent dhatu poshana [7-11].

LITERATURE REVIEW

Needs of Abhyanga in Infant

Abhyanga is very elementary care in the infant care practices. There are several benefits of abhyanga worldwide with different considerations like:

- Health and protection.
- Emotional wellbeing.
- Beauty purposes.

Abhyanga in infant is a way of comforting skin inputs and nourishment for the healthy development of mind, body and spirit (**Figure 1**).

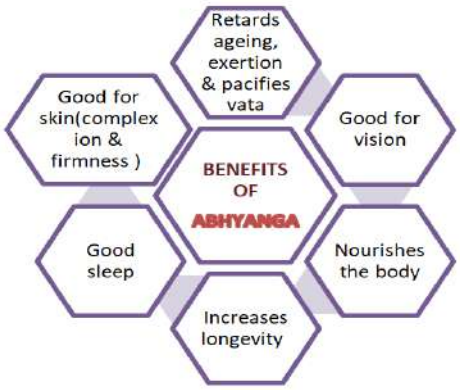

Figure 1: Showing the benefits of abhyanga.

Indication

It is a safe procedure which can be done on everyone who is vitally stable.

Contraindication

- Immediately after feeding.
- Baby with hypoglycemia.
- **Sick newborn or infant:** Baby with lethargy, refusing to feed, and infant having signs of sepsis.
- Newborn with congenital heart diseases.
- Vitally unstable infant.
- Infant with respiratory distress or asphyxia requiring oxygen.
- Exaggerated neonatal hyperbilirubinemia.

Ayurvedic Review

Abhyanga technique: The technique of abhyanga is not elaborated in the major classics of ayurveda. First indication about the technique of abhyanga is found in rigveda in which abhyanga is told to be done by hands and digits and the stroke or touch should be gentle. Here, gentle touch should not be taken as the non-application of pressure and rubbing but it implies that these processes should be limited to a point that is easily tolerated by the individual [12-15].

Direction of abhyanga: Abhyanga should be performed in anulomagati (in the direction of hairs) for the appropriate absorption of the oil by follicles. According to dosha predominance.

- Vata dosha-anuloma gati.
- Pitta dosha-alternate anulona gati and pratiloma gati.
- Kapha dosha-pratiloma gati.

Extent of Abhyanga

Dalhana has decoded the relation of time of abhyanga with the nourishment of the seven tissues of the body. According to acharya Dalhana, the sneha (oil) used in abhyanga reaches to the hair follicle in 300 matra (65 sec, one matra=16/60 sec). So, in accordance with these calculations for a certain part of the body, at least 5 min are required to perform Abhyanga so that sneha may enter the deepest tissue layer. In children, daily abhyanga is advised (**Table 1**).

Table 1: Showing timing of sneha used in abhyanga reaches in different dhatu.

Root of hair of skin	300 Matras (95 sec)
Twaka	400 Matras (133 sec)
Rakta	500 Matras (160 sec)
Mamsa	600 Matras (190 sec)
Meda	700 Matras (228 sec)
Asthi	800 Matras (240 sec)
Majja	900 Matras (285 sec)

Mode of Action of Taila Abhyanga

Acharya Dalhana has elucidated about the absorption of sneha used in abhyanga procedure, accordingly the oil used in abhyanga can reaches upto the different dhatu if it is applied for the sufficient time. Drugs used in the abhyanga get absorbed by the skin. As snehana drug reaches to the particular dhatu it subsides or cures the diseases of that particular dhatu. Thus, abhyanga should be done at least 5 minutes if wants to get its effect in deeper tissue like majja.

Achaya Charaka advocated that sparshanendriya (tactile sense organ) connects with mind, gives rise to pleasure and pain experiences. According to Charaka, Vayu is predominant in sparshanendriya (tactile sense organ) which is located in twacha (skin), Charaka also described an important link between mana (mind), sparsha touch, and all the indriya (senses). Out of all the indriya (senses), the sparshanendriya (tactile sense) alone pervades all the indriya (senses) and is also associated inherently with mana (mind). So, due to pervading of sparshanendriya (tactile sense organ), mana (mind) also pervades. Therefore, abhyanga is the most beneficial therapy for skin and balancing mind, hence one should use it regularly.

The mode of action of abhyanga can also be understood by the properties of Sneha *i.e.*, Snigdha and guru acts as Vatahara, Snehana, Balya and Pustikara, Mriduguna reduces the stiffness due to kathinyaguna and sukshma guna helps the drug to reach up to minute channel. Susruta advocates, abyanga imparts a glossy softness to the skin, guards against the aggravation of vata and kapha, improves color and strength and gives tone to the tissues of the body.

Due to rubbing the oil on skin, rubbing and friction tend to dilate the orifice of the (superficial) ducts and increase the temperature of the skin. Rubbing specifically improves the complexion of females and gives a lovely appearance, cleanliness, beauty, and suppleness to the female form. Friction pacifies vata, cures itches, rashes, and eruptions [16-20].

Selection of Oil or Unctuous Substances for Abhyanga

Acharya Vagbhata told that “tila taila possesses the properties like penetrating deep into the tissues, and spreading throughout the body fast, capable of entering into even minute pores, hot in potency, not increasing kapha, it makes lean persons fatty and fat persons lean, is constipating, kills worms; with appropriate processing it cures all diseases”. Acharya Dalhana states that tila taila pierces into the deepest level of tissues in only 5-10 min. Bala taila increases the strength and nutrition of tissues and is helpful to prevent hypothermia.

Whereas other investigators have observed benefits for the use of sunflower oil in massage, sunflower oil contains high levels of essential fatty acids, particularly linoleic acid which then provides positive effect on life-quality parameters. Massage with sesame oil has also shown to improve the circulation to massaged area as documented by femoral artery blood velocity, diameter and flow.

Massage

Systematic application of touch is called massage. Massage of newborn can be done with or without a lubricant to reduce the friction between the surfaces. The lubricant used can be oil or a powder. Neonatal massage has been a traditional practice in India, Bangladesh, Nepal and other neighboring countries. In a survey conducted among women in Nepal about this traditional practice, it was observed that 89.5% of women give oil massage. Mustard oil was the most common (99.7%) oil used for massage. The massage is usually started within 12 hours of birth.

Approximately 15 ml-20 ml of oil is heated and garlic and spices are occasionally added. The baby is massaged with oil over the entire body and the massage is done 1-3 times in a day. The perception of the society about massage in newborn is that it prevents cold, cough, provides warmth, keeps the skin smooth and makes the bones stronger. It was observed that massage was more prevalent in home delivered infants as compared to those born at a health care setting.

Results

Effects of Infant Massage

Effect on weight gain: 44 healthy preterm infants of gestational age of 30-36 weeks were randomly assigned to the trial where study group receiving body massage with sunflower oil and the control group receives only routine NICU care. The massage was performed three times per day, each session including three consecutive five minute stages, for five days. Our findings suggest that even a short course of body massage with sunflower oil for only five days increases preterm infants' weight gain and decreases their duration of NICU stay significantly. There is evidence that infant massage has beneficial effects on preterm infants in the NICU, including shorter length of stay; reduced pain; and improved weight gain, feeding tolerance, and neurodevelopment. Parents who performed massage with their infants in the NICU reported experiencing less stress, anxiety, and depression. A single-blinded randomized clinical trial of 54 neonates admitted to NICU with gestational age of 33-37 weeks and birth weight of 1500 g-1999 g, without birth asphyxia and medically stable were randomly assigned to two groups to receive moderate pressure massage alone or the same massage with sunflower oil by their mothers, three times a day for 14 consecutive days. The primary variables were increases in mean of growth parameters (weight, height and head circumference) that were evaluated 14 days after intervention, at ages 1 and 2 months. Sunflower oil massage might be used as an effective and safe intervention for weight gain in LBW preterm neonates.

In a randomized controlled trial in NICU of a level II hospital, 48 Neonates with birth weight <1800 g, gestation <35 weeks and <48 hours of age at enrolment were included. Eligible neonates were randomized to one of the two groups:

- Oil massage along with standard care of low birth weight.
- Standard care of low birth weight without massage.

At 28 day, weight gain in the oil massage group (476.76 ± 47.9 g) was higher compared to the control group (334.96 ± 46.4 g) ($p<0.05$). At 7^{th} day, less weight loss (7.80 ± 9.8 g) was observed in babies in oil massage group compared to control group (21.52 ± 19.4 g) (p=0.003).

Promote bone mineralization and growth: Evidence suggests that Mechanical Tactile Stimulation (MTS) in early life decreases stress hormones and improves bone mineralization. Insulin-like Growth Factor (IGF1) is impacted by stress and essential to bone development. MTS intervention increased Bone Mineral Content (BMC) and tibial growth plate width compared to stress. MTS also resulted in higher osteocalcin and in males, lower TRAP ($p<0.05$). MTS resulted in three fold, two fold, and six fold higher bone specific IGF1, IGF1R, and GHR, respectively ($p \leq 0.001$) compared to stress. MTS in early postnatal life improves long-term bone mineralization. IGF1 and related pathways may explain improved Bone Mineral Content (BMC).

In a study by Aly, et al., on preterm infants (28-35 weeks gestation), the degree of bone formation was measured in terms of serum type I collagen C-terminal propeptide (PICP). It was observed that there was a significant increase in PICP levels in infants who received combined massage and physical activity. In another study, DEXA (Dual Energy X-ray Absorptiometry) scan was performed as a marker of bone mineralization, and infants who received massage therapy by mother and trained professionals showed a greater score when compared to controls.

Effect on colic pain: This randomized clinical trial among 100 infants of <12 weeks of age with infantile colic. They were randomly assigned to either infant massage (n=50) or rocking groups (n=50). Rocking group parents was recommended to rock their infants three times a day for 1 week. Parents recorded the pattern of crying (numbers, length, and severity of crying). This trial of massage treatment for infantile colic showed statistically significant or clinically relevant effect in comparison with the rocking group.

Reduced sepsis and neonatal mortality: Topical treatment with Sunflower Seed Oil (SSO) or aquaphor reduced sepsis and neonatal mortality in hospitalized preterm infants <33 weeks gestational age in Bangladesh. The Psychomotor Development Index (PDI) in the BSID II showed significantly lower disability rates in the aquaphor group (23.6%) compared to the control (55.2%). Emollient massage of very preterm, hospitalized newborn infants improved some child neurodevelopment outcomes over the first 2 years of follow up. Findings warrant further confirmatory research.

Infant massage is considered to reduce the length of the hospital stay and hence reduce the cost of medical care. Incidence of late onset sepsis (positive blood cultures and CSF cultures) has been shown to be significantly less among infants (750 g-1500 g) subjected to tactile kinesthetic stimulation.

A population based, cluster randomized, controlled trial conducted in 276 clusters in rural Uttar Pradesh, India from November 2014 to October 2016. Exclusive, 3 times daily, gentle applications of 10 ml of SSO to newborn infants by families throughout the neonatal period were recommended in intervention clusters (n=138 clusters); infants in comparison clusters (n=138 clusters) received usual care, such as massage practice typically with mustard oil. Total 13,478 newborn were enrolled. Per-protocol analysis showed a significant 58% reduction in mortality among infants in the intervention group who were treated exclusively with SSO as intended versus infants in the comparison group who received exclusive applications of mustard oil.

Very Low Birth Weight (VLBW) neonates were randomized at 12 h of age to oil (n=37) or control (n=37) groups. Oil group neonates received twice daily coconut oil application without massage, and control group received standard care. Trans-Epidermal Water Loss (TEWL) was measured every 12 h using an evaporimeter till day 7 when skin swabs were obtained for bacterial growth and skin condition was assessed using a

validated score. Coconut oil application reduced TEWL without increasing skin colonization in VLBW neonates.

Emollient therapy was associated with improved weight gain, reduced risk of infection and associated newborn mortality in preterm neonates and is a potentially promising intervention for use in low resource settings.

In a randomized controlled trial conducted at Bangladesh, it was observed that infants born before week 33 of gestation who received topical emollient treatment with safflower oil or aquaphor (petrolatum, mineral oil, mineral wax, lanolin alcohol) were 41% less likely to develop nosocomial infections than controls. This resulted in lesser mortality in the study group. It was concluded that skin application of sunflower seed oil provides protection against nosocomial infections in preterm very low birth weight infants.

Effect on sleep-wake pattern: Infants who receive massage therapy appear more alert and spend less time in sleep. In a study by Kelmanson, et al., infants less than 36 weeks of gestation (birth weight <2.5 kg) subjected to massage till 8 months of age, had improved quality of sleep with less awakening during sleep. These infants were more active during the day. It also hastened the onset of sleep.

Effect on infant behavior: Preterm infants receiving massage therapy scored better on the Brazelton behavior assessment scale in terms of 'orientation', 'range of state' 'regulation of state' and 'autonomic stability'. Improved scores on mature habituation, orientation, motor, and range of state behavior were observed in another study. Preterm infants (mean gestational age 30 weeks) who received moderate pressure therapy (5 days) were less fussy, cried less and showed less stress behavior. Infants who received oil massage were seen to show fewer stress behavior in the form of grimacing and clenched fist. Massage treatment improves the mother infant interaction and thus enhances their bonding.

Nutritional effect: Topically applied oil to preterm skin (thin and vascular) can be absorbed systemically and serve nutritional purposes. Serum triglyceride levels were significantly raised in preterm infants (less than 34 week gestation) who received oil massage with safflower oil and coconut oil 4 times a day for 5 days. An increase serum level of linoleic acid (essential fatty acid) was reported from soybean oil (vegetable oil) massage on SGA infants that resulted in improved anthropometric parameters. However, serum triglyceride levels were comparable in another study comparing massage with or without oil.

Local effects on skin: Oil massage results in improved thermoregulation by decrease in the convection losses through skin. In a study in Nepal, the incidence of early hypothermia in the first 2 hours after delivery was reduced by nearly 50% and the incidence of late hypothermia in the first 24 hours after birth was reduced by 30% by implementing one of three interventions after delivery (kangaroo care, traditional mustard oil massage under a radiant heater, or plastic swaddling). Greater increase in temperature has been noted in preterm infants who receive massage therapy. Oil massage has also been shown to remove the dead cells of skin and improve the texture of skin by preventing the dryness and cracking of the skin. Massage therapy has been shown to improve the skin barrier function.

Other benefits: Level of energy expenditure was significantly lower among preterm infants who received the standard massage therapy for 5 days. This could apparently explain the better somatic growth seen in infants receiving massage therapy. It was traditionally thought that infant massage makes the bones stronger. Massage has also been used for short term benefits of decreasing the pain before heel stick injury.

Underlying Mechanisms: Physiological Effects

Various mechanisms are postulated for the weight gain shown by the infants who receive massage therapy. It was initially thought that weight gain from massage therapy was secondary to increase in caloric consumption resulting from altered sleep-wake pattern. However, in a study by Dieter, et al., it was observed that although infants who received massage therapy for 5 days spent less time sleeping, the caloric consumption was same and did not contribute to the observed weight gain. In a study conducted by Diego, et al., a significant increase in vagal activity was noticed during the period of 15 minute massage therapy. The vagal activity was interpreted from ECG as a measure of heart rate variability. It was also seen that there was a significant increase in gastric motility in post massage period. It was postulated that massage causes increase in vagal activity, hence improved gastric motility; this leads to better absorption of nutrients resulting in better weight gain. Preterm infants who received massage therapy (15 min for 5 days) showed an increase in serum insulin and serum IGF-1 levels. Neonatal massage has been suggested to decrease the levels of stress by decreasing the serum cortisol and norepinephrine, and increasing urinary excretion of epinephrine and norepinephrine. Elevated levels noted in this study could represent improved sympathetic maturation which might in turn hasten the lung maturation. Authors have also suggested that immune function improves with neonatal massage which apparently acts by enhancing the Natural Killer cells (NK cells).

DISCUSSION

Present review reveals that, infant massage therapy has multidimensional health benefits to infant. Massage therapy has led to weight gain, in infants when moderate pressure massage was provided. The use of oils including coconut oil and safflower oil enhanced the average weight gain. Studies affirm that massage promotes bone mineralization and growth, improved sleep-wake patterns, provides relief in infantile colic pain and results in a consequent decrease in mortality in hospitalized patients. Based on previous RCT (Randomized Controlled Trial) massage improves the mother infant interaction and thus enhances their bonding. Additionally, massage facilitates the release of meconium and reduces the reabsorption of bilirubin into the blood. Therefore, an increase in bowel movements through massage therapy can increase bilirubin excretion. Studies have also

suggested that immune function improves with neonatal massage which apparently acts by enhancing the Natural Killer cells (NK cells) [21,22].

In ayurveda, massage is called as abhangya which is known to improve the body complexion (varna prada), restore the natural immunity (yadhi kshamatva), relax the muscle and useful in eliminating fatigue (shramhar), improve physical strength (balvan), promote excellence of body tissue (dhatu pusthi janan), induce sound sleep (swapnkar), by nourishing the body tissues. Abhangya prolongs life span (ayushaykara). Discussing the classical texts of ayurveda, the care of newborn includes abhyanga, snana, jatakarma etc., as part of routine care of newborn. Due to abhyanga, skin becomes soft and beautiful. Abhyanga increases strength and reduces stress. The guru (heavy), snigdha (unctous) properties of taila (oil) may take care of dhatupushti (tissue nourishment). Jeevaneeya (life promoting action) property of massage oil is indicative of its capability to bring out cell division *i.e.,* generate the healthier tissues. Hence, Abhyanga (massage) is beneficial and provides multifaceted positive health outcomes to infants.

CONCLUSION

Ayurveda newborn care protocols are very logical; investigators of current era demonstrate the scientific background of all these procedures. Abhyanga (massage) is one of these protocols and very effective to gain weight, reduces pain, enhances immunity and accelerates the healthy growth and development of baby as well as benefits of massage include stimulation of circulatory and gastrointestinal systems, better weight gain, lesser stress behavior, optimistic effects on neurological and neuromata development and infant-parent closeness, and improved sleep pattern. Massage with oil results in improved skin condition (increased hydration and surface lipid content) and barrier function, resulting in reduced loss of trans-epidermal water and improved thermoregulation, transcutaneous absorption of fatty acids contributing to improved nutrition and better somatic growth. Abhyanga is considered a safe practice and there are no significant harmful effects, if performed appropriately. Abhyanga is cost effective, culturally acceptable, traditional practice is an effective use of time. With proper selection of oil and with certain precaution under medical supervision and advice one can practice. Abhyanga from birth to infantile age without any harm is the key message to modern health world.

CONFLICTS OF INTEREST

None.

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Nill.

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