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UMBILICAL CORD CARE – FACT AND FALLACIES – A REVIEW

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ABSTRACT :

Neonatal mortality and morbidity due to neonatal sepsis is a global burning health issue. Umbilical cord stump is a great source of infection for sepsis in newborn. Since very long time in modern era no any strong evidence based medicine has been introduced for umbilical cord care that which has global acceptance. Nowadays, in developed as well as developing countries dry care and application of some antimicrobial agents are in use. Till date health professionals are struggling with the standard cord care protocol which prevent the colonization of bacteria causing sepsis, protect the bacterial colonies useful for healing the wound after cord fall, help in early separation of cord and to prevents the future complications like omphalocoele. Ayurveda defines a standard protocol for neonatal care and umbilical cord care is explained as *Nabhi Upakrama*. The *Nabhi Upakrama* achieves the all above mentioned goals of umbilical cord care. Use of the topical medicine which are antimicrobial and wound healing such as Kushtha Taila and Jatyadi Taila are useful in umbilical cord care. This *Nabhi Upakrama* is scientific, time tested, safe and effective. Present article is an effort to promote the Ayurveda neonatal umbilical cord care practices to reduce the neonatal mortality and morbidity and globally mainstreaming the fundamentals of Ayurveda with today's health care system.

Key words :*Jatyadi Taila, Kushtha Taila, Nabhi Upakrama*, Umbilical cord care

INTRODUCTION: Neonatal sepsis takes life of millions of newborn worldwide, a substantial proportion of deaths are due to umbilical cord (UC) infections and the number is alarmingly high in developing countries, which points to a common cause i.e. unclean delivery and UC care practices.[i] Current standards of UC care are based on the principles of asepsis, the aim of which is to decrease the likelihood of UC infections. In developing countries, where most deliveries take place at home, some traditional practices such as applying unclean substances to the UC stump conflict with principles of cleanliness and greatly increase the risk of UC infection. Globally there is cultural, social, geographical, racial and economical variation in the population; similarly, there is difference in the UC care practices in developed and developing countries[1]. There is considerable debate among health care professionals on the most effective newborn UC care and researches abandoned the *traditional use of antimicrobial soap* and water or natural healing[ii]. Despite many studies of different UC care regimens, the treatment options recommended and practiced vary from hospital to hospital; it includes triple dye, isopropyl alcohol (alcohol), povidone-iodine (Betadine), chlorhexidine, antibiotic ointments, soap and water, or no treatment i.e. natural healing[2]. Therefore health care system should adopt the useful practices explained in ancient or traditional care, which are acceptable for community as well as health professionals. Ayurveda

explained the care of UC as *Nabhi Upakrama* which includes the safe cutting and tying of UC, encircling the thread around neck which is tied to UC, and application of antimicrobial and wound healing agents to the UC stump. This *Nabhi Upakrama* is very rational as well as scientific and justifiable even in today's technical era of medicine.There is no exclusive evidence based guideline for UC care which has global acceptance because of different lacunas of existing health care system. In such scenario Ayurveda *Nabhi Upakrama* appears very useful, which are in practice since ancient times and there are no any adverse effects if applied in the proper manner. In addition, these protocols are scientific and time tested; therefore it may be applied in large scale in the community to improve the neonatal health and reducing the neonatal morbidity and mortality. This review is an attempt to highlight the facts and fallacies of UC care in neonatal health.

AIMS AND OBJECTIVES:

1. To evaluate the appropriateness of current UC care practices and implications for changing those practices along with the benefits and risks of the various cleansing agents used.
2. To discuss the promising role of Ayurveda *Nabhi Upakrama* (UC care) in current scenario.

MATERIALS AND METHODS: Data and information regarding UC care is collected from different Ayurveda Samhita and realted texts, reference book, e-books, journals, health magazines, news paper, opinions of different traditional birth attendees (TBAs), folk as well as traditional routine care practices, AIIMS guidelines of neonatal care[iii], various research articles from different journals, web and e-books, and References from the different kinds of journals, articals, papers and websites. Research papers, dessertations and thesis from different insitutes. Reference and text books on pediatrics and neonatology.

Historical Background:

In the 1950s, frequent outbreaks of staphylococcus in newborn nurseries cited cases septicemia, and omphalitis lead to neonatal deaths[iv]. "Rooming in" was not the standard of care, while "no bathing technique" was a standard of care[2]. Nursery personnel were wearing scrubs, gowning, wearing caps and masks, and washing hands[4]. In the 1960s, hexachlorophane wash or powders became a standard of care in newborn nurseries[4]. In late 1971, because of toxic effects, hexachlorophane was discontinued from routine newborn bathing and skin care, but within a month of discontinuation, the staphylococcal colonization reappeared in the nurseries[4]. This instigated immediate studies to determine a safe alternative for skin and UC care; *triple dye* was evaluated, which was able to significantly reduce microbial colonization[v]. After 1980, use of the other topical antimicrobials such as povidone-iodine (Betadine) and other antibiotic ointments also found to be significantly reducing microbial colonization. Thus, variance in standards of care was often based on physician and staff preference. Since the 1970s, it has been widely accepted to use some form of topical antimicrobial to treat the UC[5]. Other accepted UC care practices include assessment of the UC for signs of infection, good hand washing before handling newborn, folding down the diaper to avoid unnecessary friction or soiling, avoidance of tub baths until separation of the UC stump, and *avoiding the use of oils, lotions, and creams* on the

UC[5]. Recurrent epidemics of streptococcal infections have also been reported with the practice of dry care or the use of alcohol alone, suggesting these regimens are insufficient. Hence no single method of UC care has proven superior in limiting bacterial colonization and disease.[1] Even with the fact that several researchers recommend natural healing over antimicrobial treatment of the umbilical stump[1], it is important to be certain that the risks of not using prophylactic treatment for infection are not forgotten.

WHO GUIDELINES ON UC CARE[1]:

UC care at birth and in postnatal period includes washing of hands with clean water and soap before delivery, laying the newborn on clean surface, washing the hands again before tying and cutting the UC, and cutting the UC with sterile instrument. Keeping the UC dry and exposed to air or loosely covered with clothes (if custom demand binding of the abdomen a sanitary method such as the use of clean piece of gauze can be recommended). The UC should be washed when necessary with clean water and soap (cleaning with alcohol seems to delay healing), and the napkin should be folded below the umbilicus. Following 24-hour rooming-in practices; skin-to-skin contact with mother at birth to promote colonization of the newborn with the non pathogenic bacteria from the mother's skin flora. Antimicrobial should be used against the known flora, if this is unknown; the chosen antiseptic should have a broad spectrum of activity and should be culturally acceptable, affordable, and available. An antimicrobial can be recommended to replace the harmful substances such as putting cow dung on the stump. There is not enough evidence to recommend the widespread use of topical antimicrobials on the UC stump. The decision to use them will depend on the circumstances.

AYURVEDA NABHI UPAKRAMA:

Ayurveda explained the newborn care in a very scientific and sophisticated manner under the heading of Jatakarma Paricharya[vi]. All protocols of this care are sequential, safe and effective.

1. **Tying of the UC** [vii] [viii] –UC should be tied with silk or cotton thread.
2. **Cutting of UC** – UC should be cut to separate the baby from placenta and mother.
3. **Appropriate timing to cut the UC** – Acharya Charaka has mentioned the term *Swasthibhutasya* i.e. when baby gets *Pranapratyagamana* (resuscitation) and stable so that, can able to survive without the supply of oxygen and nutrient from mother through UC.
4. **How to cut the UC** – different authorities have different opinion about the methods for cutting of UC. According to Acharya Charaka and Acharya Sushruta UC should be tied at the distance of eight *Angula* i.e. approximately 10-12 cm from the abdomen with two threads of silk or cotton. After the tying, UC should be cut between two tied threads. While Acharya Vagbhata mentioned the distance of 4 *Angula* i.e. approximately 6-8 cm from the abdomen to tie the UC before cutting. Dalhana commented that, UC should be tied with thread not too tightly or too loosely.
5. ***Shastra* (instrument) to be use for cutting the UC** – Charaka specifically mentioned the *Ardhadhara Shastra* which is made up of *Raukma* (Stone), *Rajata* (silver) and *Ayasa* (Iron) for cutting the UC. While Acharya Vagbhata indicates the use of *Tikshna Shastra*.

6. **Thread which is tied with UC should be encircled around the neck of baby** – so that UC should get prevented from soiling with the urine and stool of the baby.

7. **Interventions for easy and timely natural fall of UC without complication** – application of different oils and powders is mentioned in Ayurveda for natural fall of UC without complications.

7.1. **Charaka** – Medicated oil prepared with *Lodhra* (*Symplocos racemosa* Roxb.), *Madhuka* (*Madhuca indica*), *Priyangu* (*Callicapra macrophylla* Vahl), *Suradaru* (*Cedrus deodara* Lamb), *Haridra* (*Curcuma longum*) and powders of the same herbs for dusting on the UC.

7.2. **Vagbhata –** Medicated oil prepared with *Kushtha* (*Saussura leppa*).

7.3. **Ayurveda hospitals** [ix] **–** *Jatyadi Taila*[x] (Polyherbal medicated oil)

8. **Time limit for the natural fall of UC** – Vagbhata mentioned that UC should be naturally fall within five days after the birth. If not measures to detach it without any complications too are mentioned.

9. **Interventions to be done for the fall of UC after time limit** – if UC not get fall within 5-8 days; some interventions should be applied, like application of jiggery with water rubbed on earth. Also one can apply the ash of animal dung on the UC.

10. **Cause for complication** – *Asamyak Nabhi Nadi Kartana* (faulty UC cutting practices) -

10.1. **Use of improper instruments** – either not enough sharp or unsterile one

10.2. **Faulty tying** – too loose or too tight tying of UC with thread

10.3. **Lack of aseptic precautions** – unclean hands and threads

10.4. **Excessive pulling or traction of UC** – while encircling the thread around the neck of baby.

11. **Complications** – if UC is not handled or treated properly or there is any fault in UC care practice it can lead to different complications called as ***Nabhi Upadrava***.

11.1. ***Unnata Nabhi*** **(distended umbilicus)** – the ash of goats dung can be applied on the umbilicus if it gets distended after the fall of UC.

11.2. ***Anunnata Nabhi*** **(depressed umbilicus)** – the ash of goats or sheep dung along with the powder of *Ashwagandha* (Whetania Somnifera), *Anjana, and Yashtimadhu* should be applied on umbilicus if it looks depressed after the fall of UC.

11.3. ***Nabhi Paka*** – whenever there is a pus formation in the UC and decaying of the healthy tissue it leads to necrosis.

DISCUSSION: Ready access of the bacteria into the systemic circulation through umbilicus places neonates at high risk for infections. In developed countries, individual cases and epidemics of UC infections continue to occur, even in supposedly aseptic nurseries for newborns[1]. Omphalitis is a serious infection that needs aggressive treatment. In many instances, the diagnosis of UC infection is uncertain: the UC may appear unusually moist or smelly, with or without discharge, but there are no other signs. Sometimes there are no obvious outward signs of infection, and the diagnosis can be made only at autopsy. One-third of neonates with septicaemia due to UC infection had no obvious external sign of the infection.[1] The index of suspicion should therefore always remain high. Therefore UC care is an important issue that needs to be

addressed, and research on UC care has focused more often on interventions such as the use of topical antimicrobials on the stump and much less on practices that are based on "natural" or physiological processes.[1] Literature review was conducted; to study the evolution of UC care, to evaluate the scientific evidence used to guide practice changes, and to make recommendations from Ayurveda perspective. Even though there are a multitude of studies regarding UC care, it is clear that many of the historical practice decisions were based on reactionary responses to epidemics rather than evidence-based research. Due to the reactionary nature of these studies, most have focused on individual facets of the technique and it is unclear which technique is the most beneficial. Historically, there has been a wide range of recommended practices related to UC care that have included a variety of cleansing agents and techniques (Table 1). Alcohol has been proven to prolong the length of UC attachment. It is also reasonable to generalize that other antimicrobials lengthen the time of UC attachment.[xi] Topical usage of human milk on UC stamp decreased separation time and incidence rate of omphalitis and it can be used as an easy, cheap and non invasive way for UC care.[xii xiii xiv] Natural drying of UC is a safe and effective means of UC care in infants.[xv] If there is no special need to treat a specific nosocomial outbreak; duration of UC attachment and satisfaction of staff and parents can help clinicians decide on a UC care regimen.[xvi] Contrary to common belief bacterial colonization of the umbilical stump is beneficial to the healing process and cannot necessary be correlated with infection[1]. UC separation is most likely mediated through leukocyte infiltration and subsequent digestion of UC. Interventions such as antimicrobials will impede or inhibit migration and activity of leukocytes[xvii]. The presence of bacteria in wound does not necessarily have to be associated with detrimental outcome. The stimulatory effect of bacteria on the wound healing has long been recognized. All wounds are colonized, but not all wounds are infected. Therefore, colonization does not necessarily lead to infection[4]. Bacteria are believed to help initiate the inflammatory or first stage of wound healing. Some of the major functions of this stage include removal of cellular debris and the attack and removal of infectious agents[4]. Chemical mediators and chemo-attractants are considered important to guide the neutrophils and macrophages to the site. Based on this body of knowledge the cessation of routine antimicrobial (Betadine, chlorhexidine) treatment of the UC can be recommended[4].

"Considering all these facts and fallacies about UC care it's clear that one should weigh the benefits against the risk while applying any antimicrobial agent to the UC." Standard antimicrobial should protect the colonies of the bacteria which are useful to start the UC separation process and prevent the colonization of the harmful microbe's leading to sepsis. Also it should promote the wound healing after the separation of UC. Till date researches proves that no such standard preparation has been developed. It suggests the lacuna and reactionary nature of research strategies rather than fundamental one.

NEED AND SIGNIFICANCE OF RESEARCH ON AYURVEDA UC CARE "Ayurveda has potential drugs and protocols to meet this demand of UC

care. Ayurveda *Nabhi Upakrama* covers the all guidelines mentioned by WHO UC care viz. - Clean UC care practices, use of topical antimicrobial which is safe, cheap and acceptable by the communities and health workers. Ayurveda antimicrobials such as, medicated oils (*Lodhradi Taila*[xviii], *Kushtha Taila*[xix], *and Jatyadi Taila*[xx]) and powders of the same mentioned in UC care have all above mentioned properties and are very useful in natural healing and to prevent the complications. Ayurveda topical agent's for the UC care are traditionally in used since long time and possess all the gold standards of ideal antimicrobial agents like - potent antimicrobial, anti-inflammatory[18], and wound healing properties[xxi]. Secondly there is no development of resistance to particular bacterial flora. Therefore these preparations are very useful for UC care" In addition Ayurveda explained the complications during UC care and the treatment of those complications too. Therefore today's health care system should promote the Ayurveda UC care practices. Therefore research and review on Ayurveda Nabhi Upakrama (UC care) is useful to open new dimensions of UC care practices".

CONCLUSION: UC care is a key factor in the newborn care to reduce the mortality and morbidity globally. Incidence and prevalent of omphilitis or umbilical sepsis is alarmingly high in developing countries like India and intervention with antimicrobials weighs the benefits against the risks. Multiple studies with single dimension has been carried out in last 6-7 decades, but till date no concrete protocol has been established which can overcome all scenario and proving its global acceptance. India have rich heritage of newborn care in the form of Ayurveda. Ayurveda *Nabhi Upakrama* is very elaborative, scientific, time tested and applicable even today with certain precautions. Application of antimicrobial agent which preserving the useful bacterial colonies with the elimination of harmful bacteria flora, along with wound healing property is the gold standard of UC care. Ayurveda had explained such antimicrobial preparations in the form of medicated oils and powders. Therefore, integration of Ayurveda with today's newborn care system and application of *Nabhi Upakrama* (UC care practices) with the omission of some inconvenient part looks to be helpful to overcome the risk of umbilical sepsis and other complications.

Table 1: COMPARATIVE STUDY OF THE ANTIMICROBIALS USED IN UC CARE[xxii]

Antimicrobial agent	Contents	Effective against	Disadvantage	Adverse reaction	Used in
Alcohol	70% ethanol or isopropanol	Gram positive and negative bacteria, less virucidal and fungicidal	Delay the UC separation, only 70% protection not able to prevent colonization completely, no sporicidal effect	hemorrhagic skin necrosis, dysfunction of the central nervous system, metabolic acidosis, and hypoglycemia	As cheaper source and easy to administer is used in all developing countries widely
Chlorhexidine	1% solution, 4% solution, and 7% solution	*gram-positive and gram-negative bacteria*	*Resistant to species of Pseudomonas and Proteus*	Local hypersensitive reactions,	Used in some developed and developing countries as

			weakly virucidal and no sporicidal delay UC separation		cheap and effective agent. Government of Nepal include in the national newborn care protocol
Hexachlorophene	3% solution	*gram-positive and gram-negative bacteria, specifically S. aureus*	Delay UC separation and healing after separation	Local hypersensitive reactions, severe systemic toxicity including fatal neurotoxicity	Nowadays not in use globally
Iodine tincture	2% iodine and 2.4% sodium iodide diluted in 50% ethanol	Gram-positive and gram-negative bacteria, *sporicidal, cysticidal and virucidal*	Delay UC separation	Non specific	Widely used as very low toxic to tissue
Povidone-iodine/ iodophor agent	10% povidone-iodine	Gram-positive and gram-negative bacteria, *cysticidal and virucidal*	No *sporicidal effect*	transient hypothyroidism, interfering with congenital hypothyroidism	Predominantly used in developed countries
Silver sulphadiazine	Ionic silver with sulphonamides	Gram-positive and gram-negative bacteria, *prominent action against Pseudomonas and gonococci.*	Bacterial resistance and allergic reaction	Hypersensitivity	Not frequent in use
Topical antibiotics	Bacitracin and nitrofurazone	gram-positive and gram-negative bacteria, including clostridia	Delay UC separation and healing, resistance	Systemic toxicity like auditory	Used in particular conditions with obvious signs of omphilitis
Triple Dye	brilliant green (0.2%), proflavine hemisulfate (0.1%) and gentian violet (0.1%)	bacteriostatic against gram-positive bacteria but less effective against gram-negative bacteria	Weak fungicidal and virucidal, Delay UC separation	necrotic skin reactions	Used in developed countries
Dusting powder	talc, starch or alum and zinc oxide	No specific germicidal action	Poor protection against microbes	Not specific	Using globally

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[i]**Care of the Umbilical Cord** A review of the evidence **World Health Organization** Reproductive Health (Technical Support) Maternal and Newborn Health / Safe Motherhood Geneva © World Health Organization, 1999 WHO/RHT/MSM/98.4

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[xxii]**Care of the Umbilical Cord** A review of the evidence **World Health Organization** Reproductive Health (Technical Support) Maternal and Newborn Health / Safe Motherhood Geneva © World Health Organization, 1999 WHO/RHT/MSM/98.4