
THE IMPORTANCE OF VERNIX CASEOSA IN THE CONTEXT OF CONTEMPORARY MIDWIFE LED CARE ¹

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Abstract: *The paper disusses immediate newborn care practices and the aspects of bathing after brth in regard to pros and cons considering its delay. A review of scientific papers and literature has been offered and the results are interpreted. The importance of vernix caseosa and all its functions is explored and discussed in the context of delayed bathing and its benefits for the newborn. Some strategies for optimising immediate newborn care practice have been offered.*

Keywords: *Vernix Caseosa, Immediate Newborn Care Practices, Midwife-led Care, Early Adaptation, Termoregulation*

INTRODUCTION

Modern practices in regard to immediate newborn care are the subject of many discussions due to the dynamic development of neonatology in recent years. A distinct tendency for optimizing newborn care with a focus on natural processes is noted. Newborn`s physiology needs to be fully recognized, so that a better understanding of evidence based practices and procedures can be achieved. Vernix caseosa is the subject of a growing number of scientific studies, which aim to acquire a better understanding of its significance and functions. On the other hand, in Bulgaria, vernix is traditionally removed in the first minutes after birth, which leads us to investigate what are parents` attitudes and to review existing medical literature on midwife care in the context of Vernix caseosa.

EXPOSITION

Functions and significance of vernix caseosa. Vernix caseosa is a white, creamy, naturally occurring biofilm covering the skin of the fetus during the last trimester of pregnancy (Gurcharan Singh, G Archana, 2008). It performs various functions which are crucial to the well being of the newborn and also to his adaptation from intrauterine to extrauterine life. These functions are not limited to its protective qualities for the skin, although it structurally originates from it. It is mainly composed of water (80.5%), proteins (10.3%) and lipids (9.1%). Earlier reports have focused primarily on its lipid components, derived from sebaceous glands and stratum corneumm, but recent ones have revealed that vernix also contains antimicrobial polypeptides (Nordstrand, K., 2005). When swallowed with the amniotic fluid by the fetus, vernix has potential effects on the developing due to the glutamine present in it. Through this mechanism of influence, it can be

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concluded vernix is a known trophic factor for the developing gut and is generally required by rapidly proliferating cells such as intestinal epithelium and lymphocytes (Gurcharan Singh, G Archana, 2008). On the other side, this biofilm performs an epidermal barrier function in utero to facilitate epidermal growth underneath it and acts as a hydrophobic barrier against amniotic fluid maceration and loss of fluids and electrolytes or TEWL (Trans Epidermal Water Loss) (Gurcharan Singh, G Archana, 2008). During birth it also acts as a protective biofilm by minimizing friction of fetal parts through delivery and as an antimicrobial cover against the bacteriologically rich environment of the mother's genital tract (Gurcharan Singh, G Archana, 2008). Full term neonatal skin is well prepared to immediately protect the infant from water loss, light, irritants, and infectious agents and provide innate immunity, tactile discrimination, thermal regulation and acid mantle formation (Visscher, M., Narendran, V., 2014). Also critical to neonatal adaptation is the development of a relatively impermeable cutaneous barrier, the stratum corneum – structurally, vernix is similar to this outermost layer of the epidermis (Stokowski, Laura A., 2005).

During the early neonatal period, the newborn faces many challenges regarding his adaptation to extrauterine life. The necessity to better understand the significance and functions of vernix caseosa is justified by the opportunity it gives us to acquire better competence and skills for optimizing newborn care associated with this adaptation. We review the main qualities of vernix in regard to the process of adaptation of the newborn, and respectively, in regard to the necessary midwife care, as per recent scientific literature.

Thermoregulation in the early neonatal period. This aspect remains largely unclear as the conclusions of various studies are not consentient. Several studies conclude that leaving vernix on the newborn's skin does not significantly change his thermoregulation (Nordstrand, K., 2005, Visscher M., Narendran V, 2005). In this regard, more in-depth research on the qualities of vernix is necessary

Skin adaptation in the early neonatal period. Newborns undergo a progressive adaptation immediately after birth, including a slow reduction in surface hydration, decrease in skin PH, and stratum corneum dehydration and desquamation with formation of a dry skin surface (Gurcharan Singh, G Archana, 2008). According to some studies Vernix may have a role in modulating these processes. Vernix loses its exogenous water slowly and leaving it on the skin after birth results in significantly more hydrated skin surface with higher moisture accumulation rate and higher baseline hydration (Gurcharan Singh, G Archana, 2008). Another group of scientists, Visscher *et al* suggest, conclude in their 2005 research that skin surface acidification appears to occur earlier in the presence of vernix retention (Visscher M., Narendran V., 2005). In their 2008 scientific study, Gurcharan Singh and G. Archana quote various researches which conclude an acidic stratum corneum is believed to inhibit the growth of pathogenic bacteria and facilitate colonization with commensal organisms on the skin surface (Gurcharan Singh, G Archana, 2008).

Antioxidant qualities. The presence of vitamin E and melanin in vernix determine its antioxidating function. As birth marks a time of high oxidative stress, the antioxidant properties of vernix may help in coping with the pro-oxidant environment as suggested by a decrease in vitamin E levels in vernix on exposure to ultraviolet light which is a pro-oxidative stressor (Gurcharan Singh, G Archana, 2008).

Anti-infective qualities. Some scientific studies discuss this biologic role of vernix caseosa due to its functioning as a mechanic barrier and therefore protecting the newborn as a first line defense against microbial invasion, through stratum corneum (Stokowski, Laura A., 2005). Recent studies have shown that vernix, like the epidermis, contains antimicrobial peptides and has a direct role in defense against bacteria. (Gurcharan Singh, G Archana, 2008). The same study discusses the presence of various proteins in vernix which have antimicrobial qualities (Gurcharan Singh, G Archana, 2008).

Vernix is also associated with surfactant-associated protein A and surfactant-associated protein D implicated maintenance of airway bacterial homeostasis and also against intra-uterine

infection (Gurcharan Singh, G Archana, 2008). Lysozyme and lactoferrin are the other innate immune proteins present in vernix (Gurcharan Singh, G Archana, 2008).

Another defense mechanism connected to vernix is its influence on skin pH. At birth, the skin surface is relatively neutral (pH about 6.5) and gradually becomes more acidic over the first few postnatal weeks (Hoath SB, 2004). The acid mantle forms as a result of changes on the skin surface following birth (sweat, sebum, microorganisms) and lactic acid and free fatty acids from metabolic processes within the stratum corneum. The skin pH falls to about 5.5, a level that is beneficial for antimicrobial defense by inhibiting the growth of pathogenic bacteria (Stokowski, Laura A., 2005). It has been demonstrated that leaving vernix on the skin of the newborn produces earlier skin acidification although this process usually takes some more time (Stokowski, Laura A., 2005).

Hydrating newborn`s skin. This quality of the biofilm stems from its high water content, which provides moisturizing for stratum corneum. A study conducted with 430 newborns concluded that the group of infants who had their vernix retained on the skin had a significantly better hydration as compared to the group that had the vernix removed immediately after birth (Visscher M., Narendran V, 2005). A growing number of research on the possibility of implementing vernix incorporated in dermatological emollient products for adult dermatologic patients is carried out because of its hydrating qualities (Gurcharan Singh, G Archana, 2008).

Improved wound healing. Vernix has shown to increase skin metabolism *in vitro* by increasing glucose consumption and lactate production (Gurcharan Singh, G Archana, 2008). The regulation of transepidermal water gradient is known to be important in the epidermal barrier formation and regeneration following wounding and so also the effects of its trophic effects of increased glutamine content (Gurcharan Singh, G Archana, 2008). These factors may account for its healing properties in treating adult patients with trophic ulcers of lower extremities and perineal wounds following delivery. It may also hence be used in atopic dermatitis against bacterial skin infections (Gurcharan Singh, G Archana, 2008). The possibility of vernix application for grafting burn areas is being researched as of the moment of the quoted research (Gurcharan Singh, G Archana, 2008).

Endogenous skin cleansing. In experiments performed using human skin soiled with carbon particles, vernix had comparable efficacy to standard commercial skin cleansers (Gurcharan Singh, G Archana, 2008). And unlike commercial soaps, it is capable of providing physiologically relevant lipids to the skin surface with additional moisturization, antioxidation, and infection control, all so important for skin surface integrity (Gurcharan Singh, G Archana, 2008).

All of this mounting evidence, quoted in various scientific studies, points us to the importance of vernix caseosa and the significance of leaving it on the newborn`s skin. The lack of consistency and universality in current practices regarding vernix and its place within immediate postnatal care is notable. Some authors advise on the necessity of leaving vernix on the skin even if the newborn is bathed immediately after birth – i.e. not taking any extra measures to remove it (Serbezova I, 2014). Simultaneously, a lot of data, anecdotal evidence from parents, clinical experience and The Medical Standard for Neonatology in Bulgaria testify for the opposite – often postnatal midwife care includes rubbing off, cleaning, removing the vernix, using gauze and swabs, sometimes soaked with oil or another liquid (Bulgarian Ministry of Healthcare, 2014). Providing optimal and modern midwife care requires the medical staff to be familiar with all the aspects, benefits and risks of practices included within the postnatal care algorithm. At the same time, in order safe and high-quality health care to be ensured, it is necessary to practice according to the rules of evidence based medicine. These highlights further accentuate the necessity to modernize and rethink the time and way of performing the first bath postnatally, so we can guarantee the principle of „Primum non nocere”.

Survey on the knowledge and attitudes of parents in Rousse area – methods and demographic data.

The method of research is an online survey, consisting of short questions, which is designed to engage parents, predominantly mothers, from Rousse, Bulgaria. It comprises of three main questions regarding vernix caseosa, and all three are multiple choice type of questions. The objective is for the survey to reveal respondents` knowledge and attitudes towards the significance of vernix caseosa and the pros and cons of the practice of removing it entirely immediately after birth. The survey is conducted online in the time frame of 7 days – from the 13th of March until the 20th of March 2019. It is anonymous and voluntary and includes a total of 153 respondents, participating in a closed Facebook group for online support amongst mothers from Rousse and the area. Results from the survey are graphically presented and observed tendencies and attitudes are discussed.

Survey on the knowledge and attitudes of parents in Rousse area. Results.

This stage of the research aims to establish the extent of women`s knowledge what vernix caseosa actually is and what is the optimal midwife care related to the biofilm, according to their own views and opinion.

The first of the questions provokes women to define the extent to which they consider themselves familiar with the essence and functions of vernix caseosa (Fig. 1).

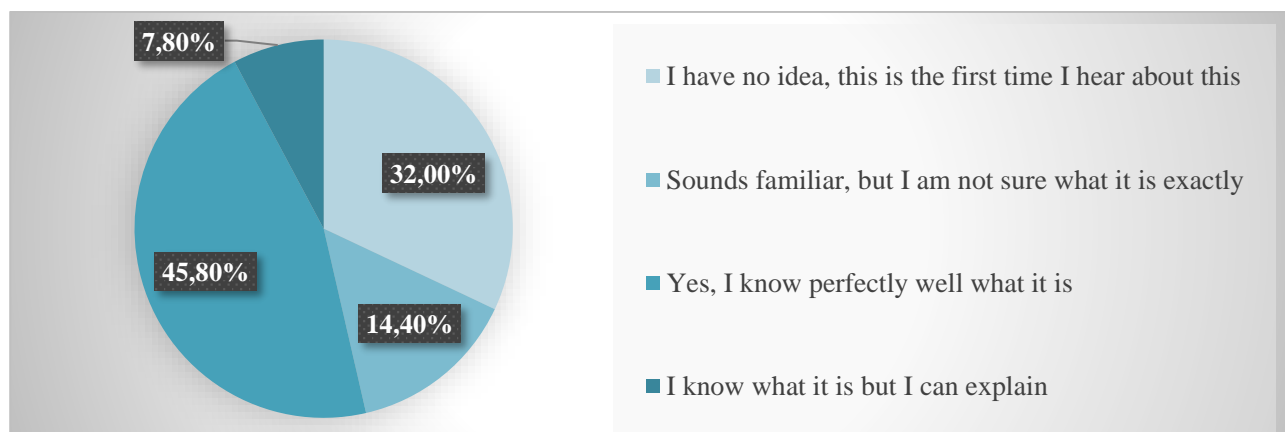


Fig. 1. The graphic shows how respondents define their own awareness regarding vernix caseosa

It is worth noting a significant percentage of the respondents identify themselves as sufficiently familiar with vernix caseosa and confidently state they are perfectly aware of what it is – 45.80%. However, a small number of respondents state they are not fully aware of the nature of vernix and hesitated about the exact meaning – 22.20% in total. Another 32.00% admit they hear about vernix caseosa for the first time. These results guide us towards the need for more thorough parent training on the topics of newborn's physiology and necessary postnatal care. Midwife`s role in prenatal consultations is traditional and indispensable and, in this context, could be the key to achieving greater awareness and confidence among new parents.

The objective for the next stage of our voluntary survey is to explore whether respondents know of the benefits of vernix and if they think the biofilm should be removed immediately after birth (Fig. 2).



Fig. 2. Respondents' attitudes towards the necessity for vernix to be removed and appropriate timing of this procedure

The graphic demonstrates the largest proportion of respondents, or 35.90%, cannot judge what would be most appropriate for their newborn, as they are not even remotely aware of what vernix caseosa actually is. This trend emphasizes once again the necessity of enough prenatal consultations with a midwife, so that women can be optimally prepared for motherhood.

We encouraged those women who have stated they believe it is necessary for vernix to be removed immediately to explain their point of view. Possible survey answers are designed based on tendencies observed by the authors, and also building on the conclusions of a similar study conducted among African women. The aforementioned research addresses in detail women's attitudes towards the presence of vernix at birth and some cultural characteristics that motivate women's need to clean up the biofilm immediately due to superstitions and fears that it would harm their child and his skin or bring negative connotations. The authors report that presence of vernix at birth was the strongest motive for immediate first bath; in some cases, women were embarrassed because the presence of vernix at birth was attributed to having sexual intercourse while pregnant, also, part of the society generally associated it with poor maternal behavior and lack of adequate child care (Ebunoluwa Aderonke Adejuyigbe, Bee, M., et al., 2015). Within this survey, respondents are presented with the opportunity to share their opinion freely, in their own words, shall not any of the predesigned responses fit their viewpoint. The graphic lists those as "other" and in the section, discussing survey results, a selection of quotations is offered (Fig. 3).

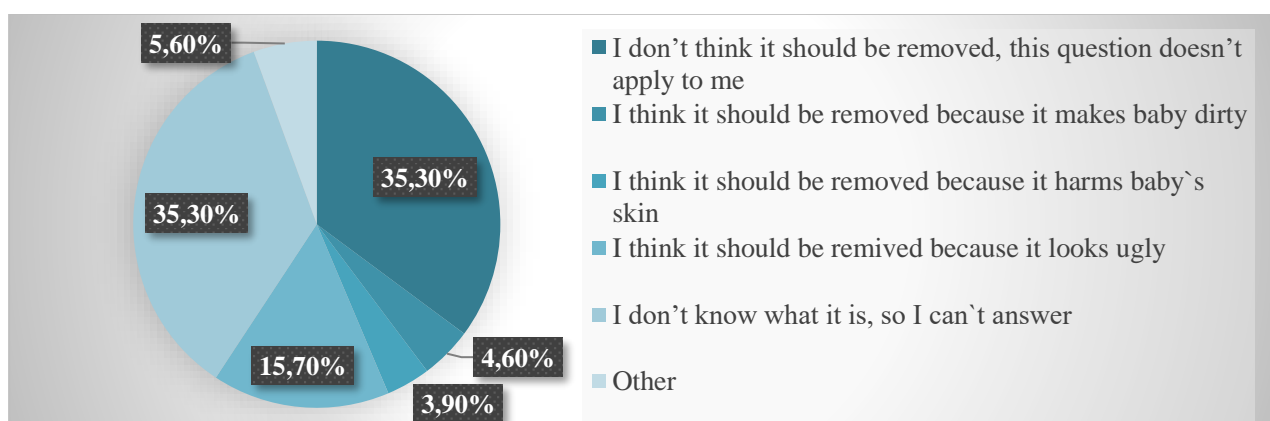


Fig. 3. Reasons respondents think it is necessary vernix be removed immediately

The graphic demonstrates some discrepancy in respondents' feedback. While only 20.90% reported they think vernix caseosa should not be removed while answering the previous question, here, 35.30% state this question doesn't apply to them because they did not think removing was needed. 3.90% state they considered vernix harmful to the newborn's skin, and this is the reasoning behind their opinion vernix should be cleaned immediately. 4.60%, however, describe the biofilm

as "dirty", despite its aforementioned endogenous cleaning properties, which further highlights the need to raise parental awareness about vernix caseosa.

It is obvious we can conclude by comparing data from both studies that some women still perceive the normal presence of vernix as non-physiological and associated with negative connotations. This is also demonstrated by some of the respondents' opinions, shared under the option "other" with their own words.

Quotations of shared opinions are offered in their original form:

„The child has already spent some time in “our” world, and this lubricant, mucus, or whatever it is called, no longer plays a signofocant role for him.”

„Vernix is an environment which harbours the growth of pathogenic flora. Yes, some new studies state it creates a barrier against staphilococci and greases the skin, but I still prefer removing it as much as possible at least during the first 12 hours.”

CONCLUSIONS

Neonatal care inevitably involves contact with the skin of the newborn. This leads us to search for optimal practices and techniques for providing midwife care which promotes the preservation of newborn's skin integrity and supports his adaptation. Vernix Caseosa may be seen as a key factor for securing optimal comfort for the newborn's skin. Although a seemingly simple solution, and currently not covered by routine practices in the country, not removing the vernix from the newborn's skin can provide the necessary hydration and protection against harmful influences, as the studies have shown. Of course, it is necessary to take into account both the cultural context and parents' attitudes in order to develop a sufficiently effective strategy for midwife care with delayed first bath and not removing the vernix.

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