

Is Vernix Caseosa a Protective Material to the Newborn? A Biochemical Approach

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Abstract. Twenty random samples of vernix caseosa were collected from immediately born neonates, in Jamahiriya Hospital, Benghazi. Biochemical studies of these samples revealed presence of lipids (62.5%), proteins (36%) and carbohydrate (1.5%). Also we could observe inhibition of staph. aureus and klebsiella growth on nutrient agar by this vernix. This observation could be explained either by its higher asparagine content or by its elevated lipid component. In addition tripalmitin was found to be the major lipid constituent, responsible for its hydrophobic property. So we recommend leaving this vernix layer on newborn skin until spontaneous drying. (Indian J Pediatr 1995; 62 : 237-239)

Vernix caseosa is a white cream cheese like substance. It is a product of the foetal sebaceous glands which secrete sebum, from which vernix is formed.^{1,2} Although it plays a significant role in foetal protection in utero, it is usually removed during immediate newborn care.³ Recently it was recommended to leave the newborn without removing this vernix, because of its proposed protective value.⁴ According to these facts some biochemical and bacteriological studies on that substance stimulated our interest and in the literature available to us no such study has been so far conducted. A study which could throw some light on vernix structure, and could explain its biological as well as its protective value.

MATERIALS AND METHODS

A random sample of 20 immediately born neonates delivered at the delivery room of Jamahiriya Hospital, Benghazi were

separately collected.

A. Fractionation of the vernix. A total weight of 0.5 g fresh vernix sample was extracted three times with 5 ml chloroform, methanol mix (3 : 1 v/v) for lipids. The remaining part (protein) was dried at 105°C in an oven and weighed. The lipid fraction was similarly treated and weighed.

B. Protein hydrolysis and amino acids identification. A fresh sample of lipid free protein of vernix (0.2 g) was subjected to acid hydrolysis. It was refluxed with 10 ml 6N HCl for 8 hours. Neutralisation of excess HCl was performed by addition of sodium bicarbonate crystals till effervescence stopped. The final volume was reduced on a boiling water bath to be one milliliter. Thin layer chromatography using n-butanol, acetic acid, water (12 : 3 : 5 v/v) and isopropanol, ammonia (8 : 3 v/v) in an ascending system for identification of free amino acids were respectively conducted.

TABLE 1. Chemical Composition of Vernix Caseosa of 20 Neonates in Benghazi

Constituents	% Fresh weight
Lipids	62.4 ± 3.6
Protein	36.0 ± 2.8
Sugars	1.5 ± 0.45

±Standard deviation.

Extraction of ninhydrin stained spots for quantitative analysis was performed using methanol (2 ml). The colour extracted was measured in a spectrophotometer at 550 nm, using standard amino acids.

C. Lipid hydrolysis and identification. The lipid fraction extracted by chloroform methanol mixture was subjected to TLC using two solvent systems Pet. ether, chloroform, acetone (1 : 1 : 1 v/v) and methanol chloroform, ethyl acetate (13 : 7 : 3 v/v) respectively. Standard tripalmitin, triolein, cholesterol, palmitic and stearic acid were used as standards against the lipid fraction. Saponification of this fraction by alcoholic potassium hydroxide (5%) was performed. The liberated free fatty acids were identified by the same system.

D. Effect of the vernix on bacterial growth in vitro. Fresh samples of vernix were spread on Petri dishes containing nutrient agar and in presence of *Staph. aureus* and *Klebsiella*, for 24 hours and 37°C.

DISCUSSION

The biochemical study performed on vernix caseosa revealed presence of lipids (62.5%), protein (30.6%) and sugar (1.5%) respectively. Accordingly we can consider

TABLE 2. Free Amino Acids in Vernix Caseosa Hydrosylate

Amino acid	%
Asparagine	34.7 ± 3.2
Glutamine	22.7 ± 2.5
Cystine	7.9 ± 1.2
Alanine	7.4 ± 1.4
Proline	14.9 ± 1.6
Methionine	3.4 ± 0.6
Valine	3.7 ± 0.4
Leucine	5.3 ± 0.96

± Standard deviation.

this material as a proteolipid.⁵

Its protein amino acid composition revealed the presence of asparagine, glutamine as a major constituents (57.4%). This finding supports a possible role of this vernix protein as immunoactive; as asparagine was found to be massively required by lymphoblasts synthesizing immunoglobulins. Furthermore, presence of glutamine as another major amino acid in vernix protein could be explained by its role as a direct precursor of asparagine synthesis.⁵

Finally, tripalmitin was found to be the major vernix lipid. this finding could be explained by the fact that palmitic acid is the only fatty acid synthesized in human cells.⁶ A fact which adds another protective value of this vernix as a strong hydrophobic substance, besides its bacterial growth inhibition. It has been reported that dry skin with cracking and peeling of superficial layer is common in infants who are post term, since vernix decreases in amount as term approaches.⁷