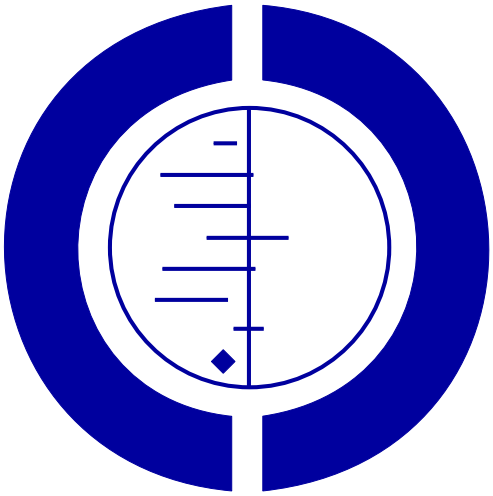
Topical Vitamin A, or its derivatives, for treating and preventing napkin dermatitis in infants (Review)

Davies MW, Dore AJ, Perissinotto KL



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This record should be cited as:
Davies MW, Dore AJ, Perissinotto KL. Topical Vitamin A, or its derivatives, for treating and preventing napkin dermatitis in infants. *The Cochrane Database of Systematic Reviews* 2005, Issue 4. Art. No.: CD004300.pub2. DOI: 10.1002/14651858.CD004300.pub2.

This version first published online: 19 October 2005 in Issue 4, 2005.
Date of most recent substantive amendment: 18 August 2005

ABSTRACT

Background
Napkin dermatitis (nappy or diaper rash) is a non-specific term used to describe inflammatory eruptions (rashes) in the napkin area. Most infants develop napkin dermatitis at least once during their infancy. Topical vitamin A has been suggested as a treatment for napkin dermatitis.

Objectives
To determine if treatment with topical vitamin A is successful in either preventing napkin dermatitis, or producing resolution or decreasing the severity of napkin dermatitis.

Search strategy
We searched the Cochrane Skin Group Specialised Register (May 2005); Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* Issue 3, 2005); Ovid MEDLINE from 1966 to August 2005; EMBASE (2003 to May 2005); Ovid OLDMEDLINE (1950 to 1965); and CINAHL (1982 to August 2005). We also searched reference lists of articles.

Selection criteria
Randomised controlled trials, where the topical application of medication containing vitamin A (or its derivatives) was compared with either placebo, no treatment or other topical medication, for the prevention or treatment of napkin dermatitis in infants aged from zero to two years.

Data collection and analysis
Two authors (AJD and MWD) identified and checked titles and abstracts obtained from the searches, and reviewed the full text where necessary. They decided which trials met the inclusion criteria, and recorded their methodological quality. They assessed studies as either adequate, unclear or inadequate using the following key criteria: (a) randomisation (method of generation and concealment of allocation); (b) blinding; (c) loss to follow-up.

Main results
We did not find any studies for the treatment of napkin dermatitis. We found only one study comparing the use of topical application of medication containing vitamin A, with another topical medication or placebo, to prevent napkin dermatitis. This included study, of 114 newborn infants, reported no significant differences between groups with regard to the severity or duration of napkin dermatitis.

Authors' conclusions
For the treatment of napkin dermatitis there is no evidence to support or refute the use of topical vitamin A preparations. For the prevention of napkin dermatitis there is no evidence to suggest that topical vitamin A alters the development of napkin dermatitis. Further RCTs are required to determine whether topical vitamin A is efficacious in treating or preventing napkin dermatitis.

PLAIN LANGUAGE SUMMARY

There is not enough evidence to support the use of vitamin A to treat nappy rash.

Nappy or diaper rash is a term used to describe inflammation in babies' napkin area. Whilst nappy rash does not make babies very sick, it is very common and it causes varying levels of discomfort to infants and concern to parents. Ointments that contain vitamin A have been suggested as possible treatments for napkin rash. Our review found that there is not enough evidence to say whether vitamin A is effective for treating or preventing napkin rash; more research is needed. One small trial found that applying vitamin A in the first three months of life did not prevent napkin rash.

BACKGROUND

Definition

Napkin dermatitis (also known as nappy rash or diaper rash) is a non-specific term used to describe inflammatory eruptions in the napkin area. Nappy rash is most commonly characterised by confluent erythema (i.e. joined patches of redness) of the convex surfaces of the buttocks, the areas of skin in closest contact with the nappy (Atherton 1998).

Impact

Most infants develop such an eruption at least once during their infancy, and napkin dermatitis is the most common cause for dermatological consultation in infancy (Concannon 2001). Napkin dermatitis is most commonly seen between six and 12 months of age (Lane 1990).

Causes

The exact cause of napkin dermatitis remains unclear (Atherton 1998). Friction and maceration (i.e. the softening of skin by soaking) are recognised as key causative factors in the pathogenesis of napkin dermatitis (Atherton 1998). Increased hydration increases the risk of frictional damage and impairs the skin's barrier function, increasing its susceptibility to irritants. Increased skin wetness allows growth of micro-organisms on the surface of the skin (Lane 1990). Friction may produce the initial breach in the protective coating of the skin. The preterm infant is more vulnerable to mechanical injury because of its thin stratum corneum, lack of dermal papillary projections and a thinner, less collagenised dermis (Williams 2001). Contact with components of urine and faeces and the contribution of micro-organisms in the napkin area have also been considered as possible causative agents in napkin dermatitis (Atherton 1998). Faeces contain a variety of bacteria, some of which contain urease, which releases ammonia from the urine and raises the pH (Lane 1990). Ammonia is considered a contributory cause in the aetiology of napkin dermatitis as it is only irritant when applied to a damaged stratum corneum (Lane 1990). Faeces contain other enzymes such as proteases and lipases which also irritate the skin of infants (Lane 1990). Faecal enzymes also increase the permeability of the skin to bile salts, which act as irritants to the skin (Wong 1992). Occlusion of the skin, by means such as napkins, elevates the surface pH (Lane 1990). Increased urinary pH is a contributory factor in napkin dermatitis through its action in increasing the activity of irritant faecal enzymes (Fischer 2002).

Treatment

Numerous treatments have been tried for napkin dermatitis, with varying success. Current treatment regimens emphasise the type of nappies used and the skin care of the napkin region (Atherton 1998). It is suggested that good quality disposable napkins and frequent nappy changes may decrease the incidence of maceration and thus the incidence of nappy rash (Atherton 1998). Specific therapies aimed at reducing the inflammation of the napkin area may also be employed. Traditional topical napkin rash treatments included topical corticosteroids used in isolation and combination preparations of anticandidal and antibacterial agents with corticosteroids. Topical vitamin A has been suggested as a possible treatment for napkin dermatitis and is contained in many preparations available for the treatment of napkin dermatitis. Vitamin A deficiency can cause skin changes and subclinical deficiency of vitamin A has been associated with increased infections (including skin) (Soni 1999).

Adverse effects

Consideration must be given to potential side effects as a result of systemic absorption of topical preparations in infants and neonates. The keratinised stratum corneum is the skin's major protection against absorption (Evans 1986). Keratinisation begins at 22 weeks gestation (Haake 1999) and infant skin demonstrates barrier function similar to that of an adult by 32 weeks gestation (Rutter 1988). Barrier function of the stratum corneum develops rapidly after birth (regardless of gestation), achieving the epidermal development of the term infant at two weeks of age (Rutter 1988). The penetration of the skin is altered by site, reflecting the varying thickness of the stratum corneum (Shupack 1999).

The absorption of retinoic acid (an oxidized metabolite of vitamin A) through the skin is limited (approximately 2%), and is not increased despite long term administration (Latriano 1997; Shapiro 1998). Differing formulations of retinoic acid did not alter percutaneous absorption (Latriano 1997). No rise in retinoic acid levels has been demonstrated regardless of the surface area of application (Latriano 1997). Minimal percutaneous absorption of retinoic acid suggests that the adverse effects of oral retinoid

therapy (e.g. teratogenicity, mucocutaneous and gastrointestinal disturbances) are unlikely with topical applications. Topical application of retinoic acid has been associated with some local adverse effects (predominantly in adults for the treatment of acne). Common adverse effects of topical retinoic acid include increased solar sensitivity and local irritation, causing erythema and peeling (Skov 1997).

OBJECTIVES

The primary objectives were to determine if treatment with topical vitamin A is successful in either preventing napkin dermatitis, or producing resolution or decreasing the severity of napkin dermatitis.

A secondary objective was to establish if topical application of vitamin A in infants is associated with adverse outcome.

The protocol for this review was for treatment of napkin dermatitis with Vitamin A . Since the only study found dealt with prevention we decided (after discussion with the editors) to change the title and objectives of this review to include both treatment and prevention . All searches were re-run to reflect the new objectives.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

Randomised controlled trials including cross-over studies. For cross-over studies, we would only have used data regarding outcomes assessed at the end of the first randomisation period (before the first cross-over). We intended to exclude quasi-randomised trials.

Types of participants

Infants aged from zero to two years.

Types of intervention

Topical application of medication containing vitamin A (or its derivatives) compared with placebo or no treatment or other topical medication.

Types of outcome measures

(1) Primary outcome measures
(a) Number of infants with any rash at seven days, two, four or eight weeks;
(b) Number of infants with complete resolution of rash at seven days, two, four or eight weeks;
(c) Number of infants with a decrease in the severity of the rash. The severity of the eruption being assessed by the following scale:

- severe: skin breakdown;
- mild/moderate: presence of any rash;
- absent: nil rash.

(2) Secondary outcome measures
(a) Number of infants with increased severity of rash.
(b) Duration of napkin dermatitis (days).
(c) Serum vitamin A level at seven days, two, four and eight weeks.
(d) Number of infants with clinical signs of vitamin A toxicity (e.g. poor feeding, poor weight gain, generalised pruritus, dry cracked skin (not of napkin area), hepatomegaly i.e. enlarged liver).

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: Skin Group methods used in reviews.

(1) Electronic databases
(a) We searched The Cochrane Skin Group Specialised Register (May 2005) using the following terms:
(napp* or napkin* or diaper* or infant* or bab*) and (rash* or dermatitis or erythema*) AND (retinoid* or acetretin or etretinate or fenretinide or isotretinoin or retinaldehye or (vitamin and A) or tretinoin).

(b) We searched the Cochrane Central Register of Controlled Trials (CENTRAL) *The Cochrane Library* Issue 3, 2005 using the search strategy displayed in Table 01.

(c) We searched Ovid MEDLINE(R) from 1966 to 18th August 2005 using the following search strategy:
1. (infant or baby).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
2. ('DIAPER RASH' or ' napkin rash' or 'napkin dermatitis' or 'diaper dermatitis' or 'nappy rash').mp. [mp=title, original title, abstract, name of substance word, subject heading word]
3. ('RETINOIDS' or 'Acetretin' or ' Etretinate' or 'Fenretinide' or 'Isotretinoin' or 'Retinaldehyde' or 'Vitamin A').mp. [mp=title, original title, abstract, name of substance word, subject heading word]
4. 1 and 2 and 3

(d) We searched EMBASE from 2003 to May 2005 using the search strategy displayed in Table 02.

(e) We searched OLDMEDLINE (Ovid) from 1950 to 1965 using the search strategy displayed in Table 03.

(f) We searched CINAHL (Cumulative Index to Nursing & Allied Health Literature) 1982 to August Week 2 2005 using the search strategy displayed in Table 04.

(2) References from published studies
We checked references from published studies for further trials.

(3) Unpublished literature

We attempted to identify unpublished trials, ongoing trials, and grey literature using reference lists of studies, reviews and book chapters.

(4) Language
We did not impose any language restrictions.

METHODS OF THE REVIEW

(1) Study selection
Two authors (AJD and MWD) identified and checked the titles and abstracts obtained from the searches. The same two authors obtained the full text of all studies of possible relevance for independent assessment. Two authors (AJD and MWD) decided which trials met the inclusion criteria, and recorded their methodological quality. Any disagreement was resolved by discussion between the authors.

(2) Assessment of methodological quality
We assessed studies using the following key criteria:
(a) randomisation (method of generation and concealment of allocation)
(b) blinding (blinding of observers / participants to the treatment allocation)
(c) loss to follow-up (presence of dropouts and withdrawals, and the analysis of these).

We categorised each component as adequate, unclear or inadequate.

Randomisation (allocation generation): adequate when the allocation sequence protects against biased allocation to the comparison groups

Randomisation (allocation concealment): adequate when the clinicians and participants are unaware of future allocations

Blinding: adequate when the outcome assessor is unaware of the allocation

Loss to follow-up: adequate when more than 80% of participants are followed up, and analysed in the groups to which they were originally randomised (intention to treat).

(3) Data extraction
Two authors (AJD and MWD) independently extracted the data. Differences would have been resolved by discussion and consensus between the authors.

(4) Analysis
If sufficient studies had been identified and included in this review we would have performed a sensitivity analysis based on the methodological quality of the studies.

For individual trials, where possible, mean differences (and 95% confidence intervals) are reported for continuous variables such as duration of rash. For categorical outcomes such as 'resolution of rash', the relative risk and risk difference (and 95% confidence intervals) are reported.

For the meta-analysis, where possible, we would have reported weighted mean differences (and 95% confidence intervals) for continuous variables, and the pooled relative risk and risk difference (and 95% confidence intervals) for categorical outcomes. We would have used a random effects model.

For cross-over studies we would only have used data regarding outcomes assessed at the end of the first randomisation period (before the first cross-over).

Subgroup analyses were planned to determine whether results differed for the following groups.

I. Population
(a) preterm neonates;
(b) term neonates;
(c) infants.

2. Intervention
(a) cream;
(b) ointment.

3. Adjunct therapy used
(a) other topical preparations used;
(b) types of napkins used (reusable versus disposable and type of disposable used).

DESCRIPTION OF STUDIES

Using the above search process we found only one study (Bosch-Banyeras 1988).

For treatment of napkin dermatitis:

- no studies were found comparing the use of topical application of medication containing vitamin A with placebo, no treatment or other topical medication.

For prevention of napkin dermatitis:

- no studies were found comparing the use of topical application of medication containing vitamin A with placebo or no treatment;
- one study (Bosch-Banyeras 1988) was found comparing the use of topical application of medication containing vitamin A with another topical medication.

114 newborn infants were allocated to the use one of two creams. The control group (N = 56) received topical application of a cream with the following ingredients: Lassar's plain zinc paste 30 grams, lanolin 20 grams, petrolatum 10 grams. The study group (N = 58) received topical application of a cream with the following ingredients: Lassar's plain zinc paste 30 grams, lanolin 20 grams,

petrolatum 10 grams, vitamin A ester palminate 1000 IU/gram. The two creams were indistinguishable (Bosch-Banyeras 1988).

Upon discharge from hospital after the birth of their child, mothers were advised to apply the cream when changing diapers and to clean the diaper area with a moist sea-sponge. Infants were examined every 15 days for six follow up visits. At each visit they were assessed for the presence or absence of diaper rash. Diaper rash severity was graded as follows: 0 = absence of diaper rash; 1 = minimal, no contiguous spotty erythema and no swelling; 2 = slight, rather contiguous erythema and slight evidence of swelling; 3 = moderate continuous erythema and swelling, and lesions present; 4 = severe erythema and swelling with multiple lesions and excoriated areas.

Infants were excluded from the study if other topical or systemic medication were prescribed for the rash. The control and treatment groups were similar in terms of frequency of diaper change and bowel motions. There was also no reported difference in the percentage of breastfed infants in either intervention group. One infant in the study group was excluded because the paediatrician had prescribed topical and systemic medication for napkin rash.

METHODOLOGICAL QUALITY

In the Bosch-Banyeras 1988 study:

- randomisation (allocation generation) was unclear - group allocation was randomised but the method of randomisation was not described;
- randomisation (allocation concealment) was adequate - sealed opaque envelopes were used;
- blinding was adequate - treatment was blinded for both observers and participant's caregivers;
- loss to follow-up was adequate - all infants were accounted for at the end of the study.

RESULTS

Treatment of napkin dermatitis

We did not find any studies comparing the use of topical application of medication containing vitamin A with placebo, no treatment or other topical medication.

Prevention of napkin dermatitis

We did not find any studies comparing the use of topical application of medication containing vitamin A with no treatment.

We found one study (Bosch-Banyeras 1988) comparing the use of topical application of medication containing vitamin A with another topical medication.

The single included study (Bosch-Banyeras 1988) of the use of Vitamin A containing cream for the prevention of napkin dermatitis reported that there were no significant differences between groups with regard to the severity or duration of napkin dermatitis. The trial authors reported the frequency distribution for mean rash scores over all six follow-up visits and the frequency distribution of the number of visits at which they had any rash. See Additional Table 01 and Table 02 for reproductions of the tables from Bosch-Banyeras 1988. Our specific outcome 'the number of infants with any rash' was not reported. None of the following relevant outcomes were included in this study: number of infants with any rash; duration of napkin dermatitis; serum vitamin A levels; number of infants with clinical signs of vitamin A toxicity. Therefore, there are no quantitative data available on any outcomes that we considered relevant.

DISCUSSION

There is no information available from RCTs on the efficacy of vitamin A for the treatment of napkin dermatitis.

There is one small, poorly reported, RCT on the use of vitamin A containing cream for preventing napkin dermatitis. This study was randomised and its major strength is that the two creams used in the study (one with and one without vitamin A) were indistinguishable, allowing adequate blinding of the treatment for both caregivers and investigators. The group allocation was adequately concealed. 114 infants were studied and they were only followed up for three months: napkin dermatitis is most commonly seen between six and 12 months of age. Nevertheless, the trial authors report that the incidence and severity of napkin dermatitis did not differ between groups. Given the population studied there is no information on differences with regard to the gestational age of the infant. There was also no assessment of systemic side effects or the relative efficacy of ointments versus creams.

We can only speculate on the reasons for the dearth of studies using topical vitamin A to prevent or treat napkin dermatitis. It may well be because of the perceived lack of adverse effects of topical vitamin A. This of course ignores the cost of such treatments and the false reassurance given to parents of affected infants.

AUTHORS' CONCLUSIONS

Implications for practice

- There is no evidence to support or refute the use of vitamin A for the prevention or treatment of napkin dermatitis.
- The review found only one single, small, poorly-reported RCT of topical vitamin A which showed no alteration in the development of napkin dermatitis in the first three months of life.
- For treatment of napkin dermatitis: there is no evidence to support or refute the use of vitamin A for the treatment of napkin dermatitis.

- For prevention of napkin dermatitis: there is no evidence to suggest that topical vitamin A alters the development of napkin dermatitis given that there is only one single, small, poorly-reported RCT of topical vitamin A which showed no alteration in the development of napkin dermatitis in the first three months of life. Given the available data, the usage of preparations containing vitamin A for the prevention of napkin dermatitis cannot be recommended.

Implications for research

Further RCTs are required to determine whether topical vitamin A is efficacious in preventing or treating napkin dermatitis. These studies should also determine if there is any systemic toxicity associated with topical vitamin A application in infants. The relative efficacy of vitamin A derivatives in cream and ointment base should also be considered.

POTENTIAL CONFLICT OF INTEREST

None known.

ACKNOWLEDGEMENTS

The editorial base would like to thank the following people who were the external referees for this review: Hans van der Wouden (content expert) and Amy Godfrey Arkle (consumer).

Thanks also to Finola Delamere for running additional searches.

Thanks to Dr Josep Ma Bosch Banyeras for providing additional information about the methodology of his trial.

SOURCES OF SUPPORT

External sources of support

- No sources of support supplied

Internal sources of support

- Grantley Stable Neonatal Unit, Royal Women's Hospital, Brisbane AUSTRALIA
- Dept of Paediatrics and Child Health, University of Queensland, Brisbane AUSTRALIA
- Cochrane Perinatal Team, Brisbane AUSTRALIA
- Perinatal Research Centre, Royal Women's Hospital, Brisbane AUSTRALIA
- Royal Brisbane Hospital, Brisbane AUSTRALIA

REFERENCES

References to studies included in this review

Bosch-Banyeras 1988 *{published data only}*

* Bosch-Banyeras JM, Catala M, Mas P, Simon JL, Puig A. Diaper dermatitis. Value of vitamin A topically applied. *Clinical Pediatrics* 1988;**27**(9):448–50. 3416548.

Additional references

Atherton 1998

Atherton D. The neonate. In: Champion R, Burton J, Burns D, Breathnach S, editor(s). *Rook, Wilkinson and Ebling's Textbook of Dermatology*. Vol. 2, 6th Edition. Oxford: Blackwell Science Ltd, 1998: 449–518.

Concannon 2001

Concannon P, Gisoldi E, Phillips S, Grossman R. Diaper dermatitis: a therapeutic dilemma. Results of a double-blind placebo controlled trial of miconazole nitrate 0.25%. *Pediatric Dermatology* 2001;**18**(2): 149–55.

Evans 1986

Evans N, Rutter N. Percutaneous respiration in the newborn infant. *Journal of Pediatrics* 1986;**108**:282–6.

Fischer 2002

Fischer G. Nappy rash. *Medicine Today* 2002;**3**(6):37–46.

Haake 1999

Haake A, Holbrook K. The structure and development of skin. In: Freedberg I, Eisen A, Wolff K, Austen K, Goldsmith L, Katz S, Fitzpatrick T, editor(s). *Fitzpatrick's Dermatology in General Medicine*. Vol. 1, 5th Edition. New York: McGraw-Hill, 1999:70–114.

Lane 1990

Lane A, Rehder P, Helm K. Evaluations of diapers containing absorbent gelling material with conventional disposable diapers in newborn infants. *American Journal of Diseases of Children* 1990;**144**:315–8.

Latriano 1997

Latriano L, Tzimzs G, Wong F, Wills R. The percutaneous absorption of topically applied tretinoin and its effect on endogenous concentration of tretinoin and its metabolites after single doses or long-term use. *Journal of the American Academy of Dermatology* 1997;**36**: s37–s46.

Rutter 1988

Rutter N. The immature skin. *British Medical Bulletin* 1988;**44**(4): 957–70.

Shapiro 1998

Shapiro S, Latriano L. Pharmacokinetic and pharmacodynamic considerations of retinoids: retinoin. *Journal of the American Academy of Dermatology* 1998;**39**:s13–s16.

Shupack 1999
Shupack J Washenik K, Pak G. Principles of topical therapy. In: Freedberg I, Eisen A, Wolff K, Austen K, Goldsmith L, Katz S, Fitzpatrick T, editor(s). *Fitzpatrick's Dermatology in General Medicine*. Vol. 2, 5th Edition. New York: McGraw-Hill, 1999:2707–12.

Skov 1997
Skov M, Quigley J, Bucks D. Topical delivery system for tretinoin: research and clinical implications. *Journal of Pharmaceutical Sciences* 1997;**86**(10):1138–43.

Soni 1999
Soni B, McLaren D, Sherertz E. Cutaneous changes in nutritional disease. In: Freedberg I, Eisen A, Wolff K, Austen K, Goldsmith L, Katz S, Fitzpatrick T, editor(s). *Fitzpatrick's Dermatology in General Medicine*. Vol. 2, 5th Edition. New York: McGraw-Hill, 1999:1725–38.

Williams 2001
Williams M. Skin of the premature infant. In: Eichenfield L, Frieden I, Esterly N, editor(s). *Textbook of Neonatal Dermatology*. Philadelphia: W.B. Saunders Company, 2001:46–61.

Wong 1992
Wong DL, Brantly D, Clutter LB, De Simone D, Lammert D, Nix K, et al. Diapering choices: a critical review of the issues. *Pediatric Nursing* 1992;**18**(1):41–54.

* *Indicates the major publication for the study*

TABLES

Characteristics of included studies

Study	**Bosch-Banyeras 1988**
Methods	Design - randomised controlled trial. Method of allocation concealment - sealed opaque envelopes. Method of generating randomisation sequence - unknown. Blinding: participant - yes. Blinding: clinician - yes. Blinding: outcome assessment - yes.
Participants	114 newborn infants. Inclusion criteria: healthy newborn infants. Exclusion criteria: a history of atopic dermatitis, urticaria, allergic disorders, skin sensitivity, or a brother with severe diaper rash; infants receiving systemic or topical medication; being breast fed by mothers taking medication excreted in breast milk. Setting: not specifically stated. Gender: male or female. Duration: Each participant returned once every 15 days for 6 follow-up visits.
Interventions	Each infant was allocated to use one of two creams (below) applied to the napkin area at the time of each diaper change. Control group - topical application of a cream with the following ingredients: Lassar's plain zinc paste 30 grams, lanolin 20 grams, petrolatum 10 grams.

Characteristics of included studies (*Continued*)

	Study group - topical application of a cream with the following ingredients: Lassar's plain zinc paste 30 grams, lanolin 20 grams, petrolatum 10 grams, vitamin A ester palminate 1000 IU/gram.
Outcomes	Each participant returned once every 15 days for 6 follow-up visits. At each visit they were assessed for the presence or absence of diaper rash. Diaper rash severity was graded as follows: 0 = absence of diaper rash; 1 = minimal, no contiguous spotty erythema and no swelling; 2 = slight, rather contiguous erythema and slight evidence of swelling; 3 = moderate continuous erythema and swelling, and lesions present; 4 = severe erythema and swelling with multiple lesions and excoriated areas. A 'mean' score was then calculated for each infant over the six visits.
Notes	
Allocation concealment	A

IU - international units.

ADDITIONAL TABLES

Table 01. Search strategy for CENTRAL

Search strategy

Ovid EBM Reviews - Cochrane Central Register of Controlled Trials 3rd Quarter 2005
1. (infant or baby).mp. [mp=title, original title, abstract, mesh headings, heading words, keyword]
2. ('DIAPER RASH' or ' napkin rash' or 'napkin dermatitis' or 'diaper dermatitis' or 'nappy rash').mp. [mp=title, original title, abstract, mesh headings, heading words, keyword]
3. ('RETINOIDS' or 'Acetretin' or ' Etretinate' or 'Fenretinide' or 'Isotretinoin' or 'Retinaldehyde' or 'Vitamin A').mp. [mp=title, original title, abstract, mesh headings, heading words, keyword]
4. 1 and 2 and 3
Ovid EBM Reviews - Cochrane Central Register of Controlled Trials 3rd Quarter 2005
1. (infant or baby).mp. [mp=title, original title, abstract, mesh headings, heading words, keyword]
2. ('DIAPER RASH' or ' napkin rash' or 'napkin dermatitis' or 'diaper dermatitis' or 'nappy rash').mp. [mp=title, original title, abstract, mesh headings, heading words, keyword]
3. ('RETINOIDS' or 'Acetretin' or ' Etretinate' or 'Fenretinide' or 'Isotretinoin' or 'Retinaldehyde' or 'Vitamin A').mp. [mp=title, original title, abstract, mesh headings, heading words, keyword]
4. 1 and 2 and 3

Table 02. Search strategy for EMBASE

Search strategy

EMBASE (2003 to May 2005)
1. random$.mp.
2. factorial$.mp.
3. crossover$.mp.
4. placebo$.mp. or PLACEBO/
5. (doubl$ adj blind$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
6. (singl$ adj blind$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
7. assign$.mp.

Table 02. Search strategy for EMBASE (*Continued*)

Search strategy

8. volunteer$.mp. or VOLUNTEER/
9. Crossover Procedure/
10. Double Blind Procedure/
11. Randomized Controlled Trial/
12. Single Blind Procedure/
13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14. (infant or baby).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
15. exp DERMATITIS/ or dermatitis.mp.
16. 14 and 15
17. exp Diaper Dermatitis/ or nappy rash.mp.
18. erythema.mp. or exp ERYTHEMA/
19. 14 and 18
20. 16 or 17 or 19
21. vitamin A.mp. or exp Retinol/
22. retinoid$.mp. or exp RETINOID/
23. exp acetretin/ or exp Retinoid Derivative/ or acetretin.mp. or exp Etretinate/
24. (fenretinide or isotretinoin or retinaldehyde or tretinoin).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
25. 21 or 22 or 23 or 24
26. 13 and 20 and 25
27. limit 26 to yr=2003 - 2005

Table 03. Search strategy for OLDMEDLINE

Search strategy

Ovid OLDMEDLINE(R) 1950 to 1965
1. (infant or baby).mp. [mp=title, keyword heading, keyword heading word]
2. ('DIAPER RASH' or ' napkin rash' or 'napkin dermatitis' or 'diaper dermatitis' or 'nappy rash').mp. [mp=title, keyword heading, keyword heading word]
3. ('RETINOIDS' or 'Acetretin' or ' Etretinate' or 'Fenretinide' or 'Isotretinoin' or 'Retinaldehyde' or 'Vitamin A').mp. [mp=title, keyword heading, keyword heading word]
4. 1 and 2 and 3

Table 04. Search strategy for CINAHL

Search strategy

CINAHL - Cumulative Index to Nursing & Allied Health Literature 1982 to August Week 2 2005
1. (infant or baby).mp. [mp=title, subject heading word, abstract, instrumentation]
2. ('DIAPER RASH' or ' napkin rash' or 'napkin dermatitis' or 'diaper dermatitis' or 'nappy rash').mp. [mp=title, subject heading word, abstract, instrumentation]
3. ('RETINOIDS' or 'Acetretin' or ' Etretinate' or 'Fenretinide' or 'Isotretinoin' or 'Retinaldehyde' or 'Vitamin A').mp. [mp=title, subject heading word, abstract, instrumentation]
4. 1 and 2 and 3

Table 05. from Bosch-Banyeras 1998, Table 1

Mean severity	**Group A [vit. A]**	**Group B [control]**
Table 1. Severity of symptoms observed during the six follow-up visits		
Mean severity	Group A [vit. A]	Group B [control]
	N = 58	N = 56
0.00	29	34
0.16	9	9
0.33	8	4
0.50	3	-
0.55	-	4
0.66	3	2
0.83	2	2
1.16	1	-
1.33	1	-
1.33	1	-
2.00	1	1
Mean	0.2650	0.1775
SD	0.4221	0.3370
Mann-Whitney U test = 1423, standardized U = 1.14<1.96.		

Table 06. from Bosch-Banyeras 1998, Table 2

Follow-up visit No.	**Group A [vit. A]**	**Group B [control]**	**Total**
Table 2. Distribution of infants according to the number of follow-up visits in which symptoms were present.			
Follow-up visit No.	Group A [vit. A]	Group B [control]	Total
	N = 58	N = 56	
0	29	34	63
1	13	11	24
2	8	5	13
3	4	3	7
4	0	2	2
5	3	0	3
6	1	1	2
Mean (2 weeks)	1.06	0.78	-

Table 06. from Bosch-Banyeras 1998, Table 2 (*Continued*)

Follow-up visit No.	Group A [vit. A]	Group B [control]	Total
SD (2 weeks)	1.48	1.28	-

Chi-square test = 1.505; df = 3; p > 0.5.

GRAPHS AND OTHER TABLES

This review has no analyses.

COVER SHEET

Title	Topical Vitamin A, or its derivatives, for treating and preventing napkin dermatitis in infants
Authors	Davies MW, Dore AJ, Perissinotto KL
Contribution of author(s)	Link with editorial base and co-ordinate contributions from co-authors - MWD Draft protocol - AJD Run search - AJD and MWD Identify relevant titles and abstracts from searches - AJD and MWD Obtain copies of trials - AJD Select which trials to include - AJD and MWD Extract data from trials - AJD and MWD Carry out analysis - AJD and MWD Interpret analysis - AJD and MWD Draft final review - MWD Revised review - KP and AJD Consumer co-author - KP
Issue protocol first published	2003/3
Review first published	2005/4
Date of most recent amendment	25 August 2005
Date of most recent SUBSTANTIVE amendment	18 August 2005
What's New	Information not supplied by author
Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author
Date new studies found and included/excluded	Information not supplied by author
Date authors' conclusions section amended	Information not supplied by author
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DOI 10.1002/14651858.CD004300.pub2

Cochrane Library number CD004300

Editorial group Cochrane Skin Group

Editorial group code HM-SKIN