


Comparison of lichen sclerosus in boys and girls: A systematic literature review of epidemiology, symptoms, genetic background, risk factors, treatment, and prognosis

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Abstract

Background: Studies concerning pediatric lichen sclerosus are limited, and, to date, there have been no studies comparing the course of lichen sclerosus in boys and girls. We sought to examine all publications on boys and girls with lichen sclerosus and assess and compare epidemiology, symptoms and signs, genetic background, risk factors, treatment, and prognosis.

Methods: A systematic search was performed in the Embase, Medline, Cochrane, and Web of Science databases. Inclusion criteria were information on children ages 0–18 years and a clinical or histologic diagnosis of lichen sclerosus. Literature from 1985 to 2021 was reviewed.

Results: A total of 1780 articles were retrieved from the search, of which 90 articles were eligible for inclusion. Boys and girls present similarly on many aspects; nonetheless, treatment and follow-up are approached differently.

Conclusions: Though the clinical approach is often different, lichen sclerosus in boys and girls demonstrates many similarities. More research is needed, especially on follow-up, to gain a better understanding of the course of lichen sclerosus and establish an advanced management plan for children.

KEYWORDS

balanitis xerotica obliterans, children, lichen sclerosus, pediatric lichen sclerosus, phimosis

1 | INTRODUCTION

Lichen sclerosus (LS), first described by Breisky (1885) and Hallopeau (1887), is a chronic inflammatory skin disease which predominantly affects the anogenital region.^{1,2} LS is relatively common in postmenopausal women, with an estimated prevalence between 1:1000 and 1:60.^{3,4} In men, LS seems less common⁵; the reported ratio between men and women varies from 1:10 to

1:6.^{6,7} The disease is well-documented in adults; less is known regarding LS in children. In addition, many publications address LS in either boys or girls, but not both. Therefore, we aim to assess the literature on LS in both boys and girls. LS has been known by various synonyms such as white spot disease, kraurosis vulvae, lichen sclerosus et atrophicus vulvae or, in men, balanitis xerotica obliterans (BXO). For consistency, in this review, we uniformly use the term lichen sclerosus.

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2 | METHODS

In collaboration with a medical information specialist, a systematic literature search was performed in Embase, Medline, Cochrane, and Web of Science, using the terms shown in [Appendix 1](#). We reviewed all articles from 1985 to July 2021. Articles were appraised according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines (PRISMA).⁸ Screening was independently performed by two individuals (K.K. and E.M.). Publications were included based on title and abstract if they involved children up to age 18 with a clinical or histologic diagnosis LS. Discrepancies were discussed before inclusion. In the second round, inclusion was based on full-length manuscripts. Exclusion criteria included commentaries, brief abstracts, case reports, expert opinions, full text unavailable, and unclear study methodology, not available in English or Dutch.

3 | RESULTS

A total of 1780 articles were retrieved. After screening based on titles and abstracts, full texts of 300 publications were read. 89 articles met the inclusion criteria. The references in these articles were checked for relevant studies, yielding one additional publication, resulting in 90 included publications ([Figure 1](#)). Included articles were subsequently categorized into the following categories based on focus of content: epidemiology, clinical presentation, genetic background, risk factors, treatment, and prognosis ([Table 1](#)).

3.1 | Epidemiology

Data on the epidemiology of pediatric LS are limited. The true prevalence is difficult to estimate considering that many patients are asymptomatic, unaware, misdiagnosed, or hesitant to report their condition.⁴ The incidence of pediatric LS (0–20 years old) in the general population is estimated at 0.04–0.06%,^{9,10} compared with 0.1–0.6% in adults.^{3,4} In adulthood, the incidence ratio for LS in women relative to men is higher (from 6:1 to 10:1); in children the female:male ratio is 1:1.7.¹¹

The estimated prevalence of LS in girls aged 2–16 years is 1:900,¹² with a mean age of onset of 6.6 years.¹¹ Girls aged 0–19 years comprise 4.1% of females with LS.¹³ In boys age 0–14 years, the incidence is estimated at 1:200, with most cases found in 9–11 years old (mean age at onset 8.6 years).^{7,11,14–18}

3.2 | Clinical features

In girls with LS, 94.6% present with anogenital lesions. The remaining 5.4% either have extragenital lesions only or have genital and extragenital involvement.¹¹ The most common symptoms in girls

are pruritus, pain, dysuria, and a burning sensation in the anogenital area.^{11,19} In 58–89% of the cases, constipation and gastrointestinal complaints are reported.^{11,19–21} Clinical signs are hypopigmentation, erythema, fissures, hyperpigmentation, atrophy, ecchymosis, and/or keratotic papules. Often a “figure-of-8” pattern is reported affecting the labia minora, clitoris, and perianal region.^{19,22} Erosions and can be present, often due to scratching. Vascular lesions such as angiokeratomas and telangiectasias are occasionally described and are usually asymptomatic.^{23–26} In a later stage, anatomic changes can be seen, such as labial fusion.^{27,28} Genital LS may be mistaken for sexual abuse. However, LS and sexual abuse are not mutually exclusive and, if suspected, abuse should be investigated.^{20,29,30}

The referral diagnoses for boys with LS are mostly clinical features such as phimosis (52%), balanitis (13%), or buried penis (10%), regardless of whether or not the LS has been recognized.¹⁴ The incidence of LS in non-circumcised boys with phimosis ranges from 2 to 95%,³¹ the largest cohort studies reporting 10–50%.^{15,18,32,33} Boys with an acquired phimosis may have a greater risk of having LS than boys with congenital phimosis.^{17,31,34} Frequent symptoms subsequent to phimosis include urine retention, ballooning of the foreskin, dysuria, other urinary tract symptoms, and erectile pain.^{6,11} Hypopigmentation of the distal portion of the prepuce, seen as a white (sclerotic) ring, mostly results in progressive phimosis.³⁵ Furthermore, erythema, pigmentary changes, telangiectasia, purpura, and scarring may be present.^{11,36} We found no mention of scrotal skin being affected. The perianal region of boys is rarely affected. Therefore, secondary constipation is uncommon.^{6,11,32,37,38} Extragenital LS is present in 0.4–6% of boys with LS.^{6,11}

In both girls and boys, the diagnosis is based on clinical signs and/or symptoms. In girls, clinical findings are paramount, and biopsies are generally not necessary.³⁹ In boys, histology is more often performed, but the correlation between the clinical and histopathological diagnosis varies, ranging from 53 to 88%,^{33,40–42} often due to lack of recognition of LS in boys. Ghidini⁴² found that an abnormal foreskin appearance together with a positive clinical history has a positive predictive value of 100% in boys with LS. A positive clinical history included the presence of autoimmune or allergic disease, having experienced at least one episode of balanitis or a lower urinary tract infection and the lack of improvement after steroids. Clinical examination alone led to an underestimation of LS in boys.⁴²

3.3 | Histopathology

A large cohort study showed the histopathological characteristics of adult vulvar LS are also present in juvenile vulvar LS.⁴³ The main histopathological changes seen in girls are hyperkeratosis (96%), basal vacuolization of keratinocytes (88%), lymphocytic exocytosis (91%), dermal sclerosis (99%), and epidermal atrophy (50%).⁴³

Microscopic specimens of penile foreskin in boys with LS are comparable with vulvar LS.³² Dermoepidermal clefts can be found in 87% of specimens due to lymphedema in the upper dermis.⁴⁴

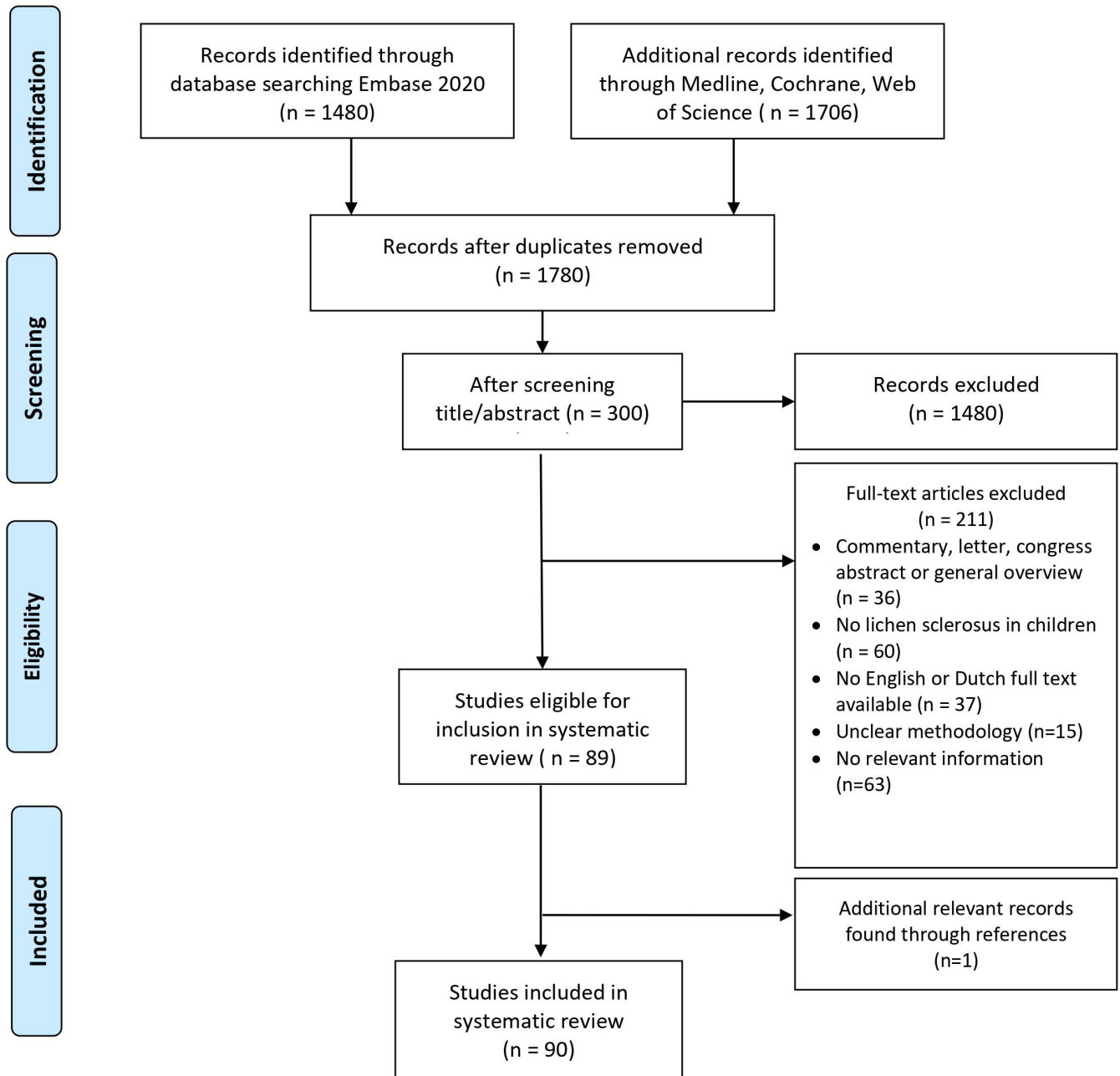


FIGURE 1 Flowchart of inclusions and exclusions in the systematic review of pediatric lichen sclerosis

3.4 | Genetic background and risk factors

Several factors suggest that LS is an autoimmune disease with a genetic predisposition.⁴⁵ In 11–12% of LS cases a positive family history was reported, supporting a genetic component.⁴⁶ Most genetic studies have been conducted in adults, though several case-control studies found HLA-DQ7 (HLA-DQ-B1*301/04/09/10) in 50–66% of prepubertal girls with LS compared with 25–31% in controls.^{45,47–49} Furthermore, LS is frequently seen in patients with Turner syndrome, with a prevalence of 17.3%.⁵⁰ In boys, the molecular evidence of specific gene expression patterns was found in congenital phimosis associated with LS, which is comparable with the existing literature on adult LS.^{51,52}

The association between LS and autoimmune disease is well-established in women but less so in men.⁴⁵ In girls the most common concomitant autoimmune diseases that are reported are vitiligo, thyroid disease, localized scleroderma, alopecia areata, and rheumatic diseases.^{11,12,53,54} One case series on 3 girls suggested a possible association with celiac disease.⁵⁵ Intriguingly, HLA-DRB113 is more prevalent in LS patients without autoimmune disease compared with LS patients with autoimmune disease, suggesting a protective role of HLA-DRB113 against autoimmune diseases in the presence of LS.⁴⁹ Baldo et al⁵⁶ detected circulating basement membrane zone protein antibodies in girls with LS.⁵⁶ Other factors associated with LS in children include a history of urinary tract symptoms and urinary incontinence in girls,^{21,27} atopic constitution in both girls and boys,^{12,57} and obesity in boys.⁵⁸

TABLE 1 Systematic review of the literature: comparison in outcome measures between boys and girls with lichen sclerosus

	Girls	Boys
Average age at onset	6.6 years ¹¹	8.6 years ¹¹
Prevalence	1:900 (2–16 years) ¹²	1:200 (0–14 years) ⁷
Symptoms	94.6% anogenital lesions ¹¹ 5.4% anogenital and/or extragenital ¹¹ Pruritus, pain, dysuria, burning sensation ¹¹ Constipation or gastrointestinal complaints relatively common (58–89%) ^{19,21}	Mainly genital lesions, 0.4–6% extragenital ^{6,11} Ballooning of the foreskin, urine retention, dysuria, other urinary tract symptoms, and erectile pain. Pruritus is rare in boys ^{6,11} Secondary constipation uncommon ¹¹
Clinical features	Hypopigmentation, hyperpigmentation, erythema, fissures, atrophy, keratotic papules ^{19,22} Telangiectasias/purpura, angiokeratomas (rare) ^{23–25} Labial fusion ^{27,28}	Hypopigmentation distal portion of the prepuce ³⁵ Phimosis, scarring, secondary buried penis, balanitis Erythema, telangiectasias/purpura ^{11,35,36}
Histopathology	Hyperkeratosis (96%), basal vacuolization of keratinocytes (88%), lymphocytic exocytosis (91%), dermal sclerosis (99%) and epidermal atrophy (50%) ⁴³	Hyperkeratosis (82.9%), hyalinization (100%), basal cell degeneration (56.1%), lymphocytic infiltration (100%), fibrin deposition (7.3%) ³² In 67% dermoepidermal clefts ⁴⁴
Diagnosis	Usually based on clinical features ³⁹	Usually based on histopathology ^{33,40–42}
Genetic background	Turner syndrome with LS (prevalence 17.3%) ⁵⁰ HLA-DQ 7 in 50–66% ^{45,47–49}	Unknown
Risk Factors	Atopic constitution, vitiligo, thyroid disease, localized scleroderma, alopecia areata and rheumatic diseases ^{11,12,53,54} Celiac disease (case report) ⁵⁵ History of urinary tract symptoms/urinary incontinence ^{21,27}	Atopic constitution ⁵⁷ Obesity ⁵⁸
Treatment	Emollients ⁴ Ultrapotent topical corticosteroids: mainly clobetasol propionate 0.05% ointment (CP 0.05%) ⁵⁹ Tacrolimus 0.03–0.1% (combined with CP 0.05% or as maintenance therapy). ^{11,65–68} Tacrolimus (and other topical calcineurin inhibitors), sometimes giving a brief burning sensation at initiation of treatment (16%) ¹¹ Alternatively, for maintenance potent corticosteroid ointment intermittently or less potent corticosteroids ^{59,69} Surgery for scarring not advised. (Seldom in adolescents in cases of introital stenosis) ²⁸	Emollients ^{4,6} Circumcision with complete resection of foreskin ^{6,70} Preputioplasty ^{71,72} Urethral strictures: Single stage buccal mucosal inlay grafting ⁷³ Preoperative/ postoperative therapy: Moderate or potent corticosteroids e.g., mometasone furoate 0.05% ointment or betamethasone ointment ^{74,84} or tacrolimus 0.1% ⁷⁷
Prognosis	20–97% have recurrent signs and/or symptoms despite therapy (0–18 years) ⁷⁸ Untreated LS may lead to scarring and possibly labial fusion ^{27,28}	Recurrent phimosis, urethral strictures, and meatal stenosis Subsequent meatus surgery in 7–20% (urethral dilatation, meatoplasty) ^{33,35,82–84} When untreated, LS can lead to obstructive urinary tract complications or renal failure ^{85,87}

3.5 | Treatment

In both girls and boys, moisturizing practices with emollients are crucial to reduce irritation and restore the skin barrier.^{4,6}

In girls, a systematic review of pediatric LS concluded that ultrapotent topical corticosteroid ointment, generally clobetasol propionate 0.05% (CP 0.05%), is the most effective treatment to induce remission, with improvement of symptoms and signs in 99% of patients within 4–12 weeks.⁵⁹ In most cases, treatment is applied for up to 3 months, after which intermittent maintenance therapy is often required or advised. Despite the initial therapy with CP 0.05%, overall recurrences in girls were reported in 67% within 1 year, and additional treatment was required in 37% after

3 months of therapy.^{59–64} Tacrolimus 0.03%–0.1% ointment is reported to produce improvement in signs and symptoms but may be less effective than CP 0.05%.⁶⁵ Tacrolimus is often used along with CP 0.05% or bridged during remission.^{11,65–68} Anderson⁶⁵ found that tacrolimus 0.1% showed promise as an option for maintenance therapy. Initially tacrolimus can sometimes briefly cause a burning sensation upon application.¹¹ After treatment with potent topical corticosteroids (TCS), Ellis and Fischer⁶⁹ prescribed individualized maintenance regimes with moderate- or mild-potency TCS. Scarring and progression was prevented in subjects adherent to maintenance.⁶⁹ Surgery is not advised for girls with LS. In adolescence, there might rarely be an indication for introitus-plasty in non-active LS.²⁸

In boys, circumcision with complete resection of the foreskin is still considered the ultimate treatment.^{6,70} Two studies found preputioplasty combined with intralesional steroid injection to be an effective alternative, though with a higher relapse rate than circumcision.^{71,72} In a study of 5 boys with urethral strictures secondary to LS, single stage buccal mucosal inlay grafting was effective, with a significant improvement of urinary flow rates.⁷³ Few studies have addressed corticosteroids as preoperative or postoperative therapy. In a double blind, placebo controlled trial ($n = 40$) of boys with histologically diagnosed early and intermediate stage LS, pre-circumcision treatment with mometasone furoate 0.05% (MF 0.05%) resulted in clinical improvement in 41% after 5 weeks.⁷⁴ Folaranmi et al⁷⁵ conducted a literature search and included 89 boys with LS who were treated with topical corticosteroids with various regimes for an average of 2 years. In this study, the use of topical corticosteroids preoperatively (mainly MF 0.05% or betamethasone cream) prevented circumcision in up to 35% of the cases.^{75,76} Furthermore, Ebert et al⁷⁷ showed treatment with tacrolimus 0.1% postoperatively twice daily for 3 weeks is a safe option for disease control (median follow-up 13 months).

3.6 | Prognosis

Little is known about the long-term prognosis of pediatric LS. In a systematic review by Morrel et al,⁷⁸ the majority of girls experienced continued signs and symptoms after puberty, along with architectural changes and scarring. Overall, the results fluctuate between 20% and 97%.^{69,78-81} Maintenance treatment with topical corticosteroids might improve long-term sequelae.^{69,78}

In boys with LS, findings following circumcision include meatal stenosis, urethral strictures, and phimosis. Cohort studies show 7–20% of boys circumcised for LS subsequently need a meatal procedure in the form of a meatomy or meatoplasty within weeks to several months.^{33,35,82-84} Arena et al⁸⁵ using uroflowmetry (UF) to evaluate the outcome of 75 circumcised patients with LS, found that 13.3% had a pathological UF after 1 year requiring progressive urethral dilatation or meatoplasty.⁸⁵ Neither an abnormal appearance of the meatus nor meatal intervention during the first surgery seems to have a significant effect on the need of a subsequent operation.⁸² Snodgrass et al⁸⁶ found 40% of patients who had circumcision for meatal LS (complete excision, including total replacement of the involved urethra) still had a recurrence of the disease at a median of 2 years. The progression of LS in boys can lead to obstructive urinary tract complications, and in severe cases, even renal failure.^{85,87}

Regarding possible malignant transformation, squamous cell carcinoma (SCC) in pediatric LS has never been reported. However, adults LS patients are at risk for developing genital SCC later in life, as described by Spekrijse et al, the absolute risk in men with LS being between 0.00 and 0.91%, and in women between 0.21 and 3.88%.⁸⁸ This is particularly so for patients with a delayed diagnosis or partial treatment or response to topical corticosteroids.⁸⁸⁻⁹⁰

It is unknown whether this risk is applicable when LS develops in childhood.⁸⁸ However, six pediatric cases of vulvar melanoma have been described in conjunction with LS.⁹¹⁻⁹⁴ Clinicians should also be aware of the diagnostic pitfalls of pigmented vulvar lesions, especially in a background of LS where melanoma may be over-diagnosed.⁹⁵

4 | DISCUSSION

This review systematically assessed available literature on pediatric LS and, to our knowledge, is the first study focusing on and comparing girls and boys, as the literature tended to consider LS in girls and boys as separate entities. In published reports, boys are almost exclusively studied by urologists and girls by gynecologists and dermatologists. However, as this review shows, there are fewer differences between LS in girls and boys than generally assumed. Therefore, we propose to use the term lichen sclerosus in both sexes (discontinuing the term BXO in boys) and encourage multidisciplinary research.

To date, only one epidemiologic study has been performed to assess the prevalence of LS in girls,¹² whereas for boys many studies have been performed.^{7,11,14-18} While in adulthood, the incidence ratio for LS in women is higher than in men, in children the female:male ratio is 1:1.7.¹¹ This reversal might be caused by detection bias, since boys are often referred due to clinical symptoms of phimosis.⁷ Furthermore, circumcision at a young age might lead to less cases of LS in the adult male population. This is supported by evidence that the absence of childhood circumcision and presence of chronic inflammation (leading to phimosis) are risk factors for penile SCC.⁹⁶ Li et al³¹ observed LS in asymptomatic boys undergoing circumcision for religious beliefs. It would be interesting to know the incidence of male LS in regions where circumcision is routinely performed versus regions where it is generally done for medical reasons.

Remarkably, one study found LS in 39.5% of failed hypospadias repairs.⁹⁷ We conjecture this might either be a consequence of the Koebner phenomenon from surgery or pre-existing urethral epithelial inflammation. Other studies found incidences of LS after hypospadias repairs ranging between 0.4 and 2.7%.^{98,99}

Little is known about the prognosis of LS in both girls and boys. LS can be a chronic disease, as seen in the recurrence rate in both sexes after either initial topical therapy in girls or circumcision in boys.^{33,35,69,72,78-88,97-99} As discussed earlier, literature often refers to meatal and urethral strictures post-surgery as complications of the circumcision. In our practice, however, we note the meatus is involved prior to circumcision in nearly all cases. Therefore, meatal stenosis should not simply be regarded as a complication of circumcision in initial or recurrent LS. Furthermore, in our practice boys are treated with corticosteroids for a limited period of weeks to months following circumcision. Sometimes permanent maintenance therapy is required. In girls, maintenance treatment is generally prescribed.

More research is needed regarding several concepts: the scope of LS at time of diagnosis or surgery, disease course and the role of maintenance therapy in children.⁸²⁻⁸⁴ The strengths of this study include: literature was found through a comprehensive systematic search of all publications addressing pediatric LS. Limitations are that most included studies were of level III-IV evidence. However, a placebo controlled RCT would not be ethical. Therefore, systematic reviews are invaluable. Etiology and histopathology of LS are relatively well-researched in adults, and some of these data may also be applicable to children, but that is a topic for further study.

5 | CONCLUSION

Lichen sclerosus in childhood seems to develop in a similar fashion in both sexes, though the clinical approach is often different partly due to the division of care according to the patient's sex. Follow-up is crucial to avoid future complications. More collaborative research is needed to improve understanding of the course of LS and to establish an advanced management plan for children.

ACKNOWLEDGEMENTS

The authors wish to thank Dr. W.M. Bramer, information specialist, from the Erasmus MC Medical Library for developing and assisting with the search strategies.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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How to cite this article: Kumar KS, Morrel B, van Hees CLM, van der Toorn F, van Dorp W, Mendels EJ. Comparison of lichen sclerosus in boys and girls: A systematic literature review of epidemiology, symptoms, genetic background, risk factors, treatment, and prognosis. *Pediatr Dermatol.* 2022;39:400–408. doi:[10.1111/pde.14967](https://doi.org/10.1111/pde.14967)

APPENDIX

Embase.com	1480	1458
Medline ALL ovid	1071	193
Web of science core collection	574	108
Cochrane CENTRAL register of trials	61	21
Total	3186	1780

Embase.com

('lichen sclerosus et atrophicus'/de OR 'vulva kraurosis'/de OR PhimosiS/de OR ((lichen NEAR/3 (sclerosus OR sclerosis OR atrophicus OR scleroatrophic* OR sclera-atrophic*)) OR (white-spot* NEAR/3 disease*) OR kraurosis OR csillag OR (balanitis NEAR/3 (sclerotica OR xerotica) NEAR/3 obliterated*) OR (skin NEAR/3 papillary NEAR/3 degenerat*) OR PhimosiS OR ParephimosiS:ab,ti) AND (child/exp OR adolescent/exp OR adolescence/exp OR 'child behavior'/de OR 'child parent relation'/de OR pediatriCS/exp OR childhood/exp OR 'child nutrition'/de OR 'infant nutrition'/exp OR 'child welfare'/de OR 'child abuse'/de OR 'child advocacy'/de OR 'child development'/de OR 'child growth'/de OR 'child health'/de OR 'child health care'/exp OR 'child care'/exp OR 'childhood disease'/exp OR 'child death'/de OR 'child psychiatry'/de OR 'child psychology'/de OR 'pediatric ward'/de OR 'pediatric hospital'/de OR 'pediatric anesthesia'/de OR 'pediatric intensive care unit'/de OR 'neonatal intensive care unit'/de OR 'prematurity'/de OR (adolescen* OR preadolescen* OR infan* OR newborn* OR (new NEXT/1 born*) OR baby OR babies OR neonat* OR prematur* OR pre-matur* OR child* OR kid OR kids OR toddler* OR teen* OR boy* OR girl* OR minors OR underag* OR (under NEXT/1 (age* OR aging OR ageing)) OR juvenil* OR youth* OR kindergar* OR puber* OR pubescen* OR prepubescen* OR prepubert* OR pediatric* OR paediatric* OR school* OR preschool* OR highschool* OR suckling* OR PICU OR NICU OR PICUs OR NICUs OR premenarch*):ab,ti,kw) NOT [conference abstract]/lim AND [english]/lim NOT ([animals]/lim NOT [humans]/lim).

Medline ALL ovid

(exp Lichen Sclerosus et Atrophicus/OR PhimosiS/OR (lichen ADJ3 (sclerosus OR sclerosis OR atrophicus OR scleroatrophic* OR sclera-atrophic*)) OR (white-spot* ADJ3 disease*) OR kraurosis OR csillag OR (balanitis ADJ3 (sclerotica OR xerotica) ADJ3 obliterated*) OR (skin ADJ3 papillary ADJ3 degenerat*) OR PhimosiS OR ParephimosiS:ab,ti.) AND (exp Child/OR exp Infant/OR exp Adolescent/OR exp "Child Behavior"/OR exp "Parent Child Relations"/OR exp "Pediatrics"/OR "Child Nutrition Sciences"/OR "Infant nutritional physiological phenomena"/OR exp "Child

Welfare"/OR "Child Development"/OR exp "Child Health Services"/OR exp "Child Care"/OR "Child Rearing"/OR exp "Child development Disorders, Pervasive"/OR "Child Psychiatry"/OR "Child Psychology"/OR "Hospitals, Pediatric"/OR exp "Intensive Care Units, Pediatric"/OR (adolescen* OR preadolescen* OR infan* OR newborn* OR (new ADJ born*) OR baby OR babies OR neonat* OR prematur* OR pre-matur* OR child* OR kid OR kids OR toddler* OR teen* OR boy* OR girl* OR minors OR underag* OR (under ADJ (age* OR aging OR ageing)) OR juvenil* OR youth* OR kindergar* OR puber* OR pubescen* OR prepubescen* OR prepubert* OR pediatric* OR paediatric* OR school* OR preschool* OR highschool* OR suckling* OR PICU OR NICU OR PICUs OR NICUs OR premenarch*):ab,ti,kw.) AND english. la. NOT (exp animals/NOT humans/).

Web of science core collection

TS=(((lichen NEAR/2 (sclerosus OR sclerosis OR atrophicus OR scleroatrophic* OR sclera-atrophic*)) OR (white-spot* NEAR/2 disease*) OR kraurosis OR csillag OR (balanitis NEAR/2 (sclerotica OR xerotica) NEAR/2 obliterated*) OR (skin NEAR/2 papillary NEAR/2 degenerat*) OR PhimosiS OR ParephimosiS)) AND ((adolescen* OR preadolescen* OR infan* OR newborn* OR (new NEAR/1 born*) OR baby OR babies OR neonat* OR prematur* OR pre-matur* OR child* OR kid OR kids OR toddler* OR teen* OR boy* OR girl* OR minors OR underag* OR (under NEAR/1 (age* OR aging OR ageing)) OR juvenil* OR youth* OR kindergar* OR puber* OR pubescen* OR prepubescen* OR prepubert* OR pediatric* OR paediatric* OR school* OR preschool* OR highschool* OR suckling* OR PICU OR NICU OR PICUs OR NICUs OR premenarch*)) AND DT=(article) AND LA=(english).

Cochrane CENTRAL register of trials

((lichen NEAR/3 (sclerosus OR sclerosis OR atrophicus OR scleroatrophic* OR sclera NEXT atrophic*)) OR (white NEXT spot* NEAR/3 disease*) OR kraurosis OR csillag OR (balanitis NEAR/3 (sclerotica OR xerotica) NEAR/3 obliterated*) OR (skin NEAR/3 papillary NEAR/3 degenerat*) OR PhimosiS OR ParephimosiS:ab,ti) AND ((adolescen* OR preadolescen* OR infan* OR newborn* OR (new NEXT/1 born*) OR baby OR babies OR neonat* OR prematur* OR pre NEXT matur* OR child* OR kid OR kids OR toddler* OR teen* OR boy* OR girl* OR minors OR underag* OR (under NEXT/1 (age* OR aging OR ageing)) OR juvenil* OR youth* OR kindergar* OR puber* OR pubescen* OR prepubescen* OR prepubert* OR pediatric* OR paediatric* OR school* OR preschool* OR highschool* OR suckling* OR PICU OR NICU OR PICUs OR NICUs OR premenarch*):ab,ti).