ABSTRACT

Genital psoriasis affects approximately 63% of psoriasis patients at least once in their lifetime. More than any other area on the body, genital lesions significantly impair patients’ psychological well-being and quality of life. We aimed to systematically review the published evidence on the safety, efficacy, and tolerability of treatments of genital psoriasis and synthesize the available clinical data. A total of 1 randomized controlled trial, 11 open-label studies, and 26 case reports were included in our analysis, representing a total of 458 patients, of which 332 were adults and 126 were children. Topical corticosteroids were commonly used first-line for genital psoriasis and were well tolerated. Nonsteroidal agents, such as topical calcineurin inhibitors or vitamin D analogs, were also efficacious, but were often irritating. One systemic agent, ixekizumab, demonstrated efficacy in reducing genital psoriasis symptoms in a large, randomized, placebo-controlled trial. Various systemic and topical medications may improve genital psoriasis lesions, but there is a lack of high-quality evidence to guide clinical decision-making. Specific reporting of efficacy for genital psoriasis in larger controlled studies of psoriasis treatments are necessary to improve the available evidence regarding the optimal treatment regimen for genital psoriasis.

Keywords: Genital psoriasis; Psoriasis; Therapy; Treatment

INTRODUCTION

Sixty-three percent of adults with psoriasis develop psoriatic lesions in the genital area at least once during their lifetime [1]. In the presence of inverse psoriasis, the prevalence of genital psoriasis increases to approximately 79% [2, 3]. In 2–5% of psoriasis patients, lesions only occur in the genital region [3]. Genital psoriasis can occur in all age groups, from newborns to geriatric patients, with a slight predilection for younger male patients with relatively severe disease [4]. In children under 2 years of age, genital psoriasis typically presents as intense well-demarcated erythema in the diaper area, termed napkin psoriasis [5, 6].

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Patients with psoriasis lesions in their genital area experience significantly worse quality of life than patients with psoriasis on any other areas, particularly with respect to pruritus, sexual function, sexual health, sexual distress, avoidance of sexual relationships, embarrassment, shame, and psychologic depression [4, 7–9].

Despite the high prevalence of genital psoriasis, almost half of patients with genital lesions do not discuss their symptoms with their physician [8, 10, 11]. Lack of communication and awareness about genital psoriasis in the healthcare environment may result in underdiagnosed and under-treated genital psoriasis, subsequently increasing the risk of inappropriate self-treatment [10].

Although there are many effective treatments in the therapeutic armamentarium for psoriasis, treatment of lesions on the genitalia and surrounding skin folds remains challenging. Topical treatments have increased penetration through the thin, sensitive, and often occluded genital skin, increasing the risk of side effects from common psoriasis medications [12]. A review of the literature in 2011 found a lack of evidence regarding the efficacy and safety of various treatments for genital psoriasis [3]. This review summarizes the most current literature regarding the efficacy and safety of available therapies for psoriasis affecting the genital skin.

METHODS

A literature search using the MEDLINE and Embase health literature databases was conducted using the terms (“psoriasis”) AND (“penile” OR “penis” OR “genital*” OR “glans” OR “scrotal” OR “scrotum” OR “anal” OR “diaper” OR “napkin” OR “shaft” OR “foreskin” OR “prepuce” OR “perianal” OR “vulva*” OR “labia” OR “labium” OR “groin” OR “preputial” OR “penoscrotal”). Two independent reviewers identified the included articles (EY, IS) and extracted information. The review methods were established prior to the conduct of the review and did not deviate during the course of the study. Articles were included if they included patients with psoriasis or psoriasiform napkin dermatitis affecting the genital area, discussed the results of treatment with respect to the genital lesions, and were published prior to 31 July 2018. Studies were excluded if they did not study genital psoriasis, did not discuss the results of treatment in the genital region, were in a foreign language, were conference abstracts, or were a review or meta-analysis. Study results were extracted using a standardized data form recording information on the publication date, type of psoriasis, site, age and gender of patients, and reported efficacy and adverse events. In addition, the quality of all studies was rated based on the Oxford Centre for Evidence-Based Medicine Levels of Evidence rating scheme [13].

The article is based on previously conducted studies and does not contain any studies with human participants or animals performed by any of the authors.

RESULTS

A total of 1964 potentially relevant unique citations were identified from our literature search (Fig. 1). Of these, 128 articles were selected for further evaluation based on the relevance of their title and abstract. A total of 32 articles examining the treatment of genital psoriasis were ultimately included in this study. Table 1 summarizes the data for adults. Table 2 summarizes the findings for infants and children.

Treatments for Genital Psoriasis in Adults

A total of 21 articles examined treatment outcomes for adults with genital psoriasis (Table 1), including 1 randomized controlled trial (grade 1), 8 open-label studies (grade 4), and 16 case reports (grade 5), representing a total of 332 patients. Of these, topical corticosteroids were used in the regimen of 201 patients for successful treatment (Table 2). Low-potency topical steroids were used in 132 patients, moderate-potency steroids were used in 120 patients, and high-potency steroids were used in 15 patients. Antifungal medications were used as part of...
successful treatment in 3 patients, while coal tar preparations were effective in clearing genital lesions in 126 patients. Topical tacrolimus 0.1% ointment resulted in significant improvement in genital lesions in 38 patients across 4 open-label studies (grade 4) and 2 case reports (grade 5). Tacrolimus was fairly well tolerated by most patients, with side effects of mild pruritus and/or burning sensation of limited duration. However, use precipitated extreme irritation in one case report, requiring discontinuation of therapy [14]. Other agents used for successful treatment of genital psoriasis include topical cyclosporine, which was well tolerated in three patients [15].

Vitamin D preparations were used successfully in 40 patients, often in combination with topical corticosteroids for genital psoriasis [16–18]. Additional reports of vitamin D preparation use in genital psoriasis patients exist in the literature; these studies often do not report outcomes specifically for the genital area. A randomized, double-blind, head-to-head comparison (grade 1) of calcitriol ointment 3 µg/g taken twice daily was compared with tacrolimus ointment 0.3 mg/g taken twice daily for 6 weeks in 49 patients with either facial or genital femoral psoriasis [19]. Of these patients, five had genital psoriasis; two were treated with calcitriol, and three were treated with tacrolimus. Both treatments were well tolerated in the study, and tacrolimus treatment resulted in a more significant reduction of target lesion size, but results were not stratified for lesions on the face and genitalia.

In addition to topical treatments, several injectable and oral medications have been reported to successfully clear genital lesions of psoriasis (Table 3). Ixekizumab, an IL-17A inhibitor approved for the treatment of moderate-to-severe psoriasis and active psoriatic arthritis [20], is the first biologic to report formal clinical
### Table 1 Studies on treatments for genital psoriasis in adults

| Sources | Study design, level of evidence | Type of psoriasis | Site | Age (years) | Cohort (M/F) | Successful (side effects) | Unsuccessful (side effects) | Notes |
|---------|--------------------------------|-------------------|------|-------------|--------------|--------------------------|-----------------------------|-------|
| J Fam Pract 2016 [41] | Case report, 5 | Plaque psoriasis | Groin | 45 | 1 M | Triamcinolone cream,eldesmol ointment | 1% hydrocortisone cream, topical antifungals,oral antifungals | 90% improvement after 1 month, 95% improvement after 2 months |
| Albert et al. [14] | Case report, 5 | Plaque psoriasis | Anogenital area, genitocrural folds | 71 | 1 F | Oral doxepin, methotrexate 7.5–10 mg/week (GI disturbance) | Mild to ultra-potent topical corticosteroids, topical tacrolimus, topical doxepin, twice weekly PUVA for 2 months, topical 0.1% tacrolimus (extreme irritation, worsening of pruritus) | Oral doxepin partially helpful in alleviating itching, methotrexate improved genitocrural folds but abandoned because of GI disturbance |
| Albert et al. [14] | Case report, 5 | Plaque psoriasis | Groin, genitalia extending to perianal and natal cleft | 77 | 1 F | – | Clomitrazole 1%, hydrocortisone 1% | Minimal improvement |
| Bissonnette et al. [33] | Open-label case series, 4 | Plaque psoriasis | Penis, scrotum | 42 (29–70) | 12 M | Topical 0.1% tacrolimus twice daily (mild pruritus or burning sensation of limited duration) | – | Mean genital PASI decreased from 15.8 to 1.2 after 8 weeks |
| Cassano et al. [26] | Open-label case series, 4 | Plaque psoriasis | Genitalia | 18+ | 9 | Efalizumab 1 mg/kg weekly | – | Considerable improvement in genital lesions after 12 weeks |
| Fischer et al. [16] | Open-label case series, 4 | Plaque psoriasis | Vulva | 33 (15–56) | 8 F | TCS, 2% LPC, topical calcipotriol | – | Resolution of vulvitis |
| Foureur et al. [39] | Case report, 5 | Napkin psoriasis | Diaper area | 77 | 1 F | Betamethasone 0.05% cream | Bifonazole cream daily | Cured in 1 month |
| Foureur et al. [39] | Case report, 5 | Napkin psoriasis | Diaper area | 87 | 1 M | Bifonazole cream daily | – | Improved in 1 month |
| Foureur et al. [39] | Case report, 5 | Napkin psoriasis | Diaper area | 100 | 1 F | Betamethasone 0.05% cream | – | Cured in 1 month |
| Foureur et al. [39] | Case report, 5 | Napkin psoriasis | Diaper area | 87 | 1 F | Bifonazole cream daily, oral fluconazole 100 mg daily | – | Improved with fluconazole after 1 month |
| Guglielmetti et al. [23] | Case report, 5 | Plaque psoriasis | Vulva, groin, perianal region | 42 | 1 F | Dapsone 100 g daily, mycophenolate mofetil 500 mg twice daily | 20 mg methotrexate weekly (UTI) | Complete clearance after 4 weeks of dapsone, remission for 2 years using topical tacrolimus 0.1% and calcipotriol. Slow improvement with mycophenolate mofetil after 2 months, partial therapeutic response with methotrexate, stopped after 4 months |
Table 1 continued

| Sources          | Study characteristics | Treatments and outcomes |
|------------------|-----------------------|-------------------------|
|                  | Study design,         | Successful (side effects)| Unsuccessful (side effects) | Notes                                      |
|                  | level of evidence     |                         |                           |                                           |
| Jemec et al.     | Open-label case series, 4 | Topical cyclosporine solution | –                         | Mean baseline score a decreased from 4.8 to 0.8 after 8 weeks, cyclosporine well tolerated |
| [15]             | Plaque psoriasis      | 100 mg/ml three times daily |                           |                                           |
| Jesˇe et al.     | Case report, 5        | Adalimumab 40 mg every 2 weeks | Topical pimecrolimus, topical corticosteroids, methotrexate 15 mg weekly (nausea, vomiting, headache, insomnia) | Near complete regression at 90 days, complete clearance at 6 months |
| [24]             | Plaque psoriasis      |                          |                           |                                           |
| Kapila et al.    | Open-label case series, 4 | Methylprednisolone acetonate 0.1% (110), 2% LPC (118), hydrocortisone 1% (94), calcipotriol 0.05% (10), betamethasone dipropionate 0.05% (7), betamethasone dipropionate 0.05% + calcipotriol 0.05% (4), UVB phototherapy (3), clioquinol 1% (1), cloethasol propionate 0.05% (1), methotrexate (1) | Methylprednisolone acetonate 0.1% (7), 2% LPC (5), hydrocortisone 1% (6) | 93.8% responded to topical treatment |
| [18]             | Vulva                  |                          |                           |                                           |
| Martin-Ezquerra  | Open-label case series, 4 | 0.1% tacrolimus ointment twice daily | –                         | Improvement as early as day 15, mean total score a from 688 to 0.37 after 60 days |
| et al. [46]      | Intertiginous folds   |                          |                           |                                           |
| Meeuwis et al.   | Open-label case series, 4 | Low-potency corticosteroid cream with (18) and without (16) vitamin D analog ointment, moderate-potency corticosteroid cream (5), daily tacrolimus with low-potency corticosteroid cream (2), alternating mild and higher potency corticosteroid cream (1) | –                         | Significant improvement in PASI IA, SUM, DLQI, FSDS, sQoL-M |
| [17]             | Genitalia             |                          |                           |                                           |
| Quan et al.      | Case report, 5        | Oral itraconazole 200 mg bid, triamcinolone, desonide, mometasone furoate, baking soda preparation | Hydrocortisone 1%, coal tar 2%, naftifine hydrochloride | Some improvement with itraconazole, minimal improvement with hydrocortisone and coal tar |
| [43]             | Pustular psoriasis    |                          |                           |                                           |
| Rallis et al.    | Open-label case series, 4 | 0.1% tacrolimus ointment twice daily for 10 days, then every 7 days thereafter | –                         | Complete clearance after 3 weeks, 43% still clear at 12 weeks |
| [47]             | Glans penis, scrotum  |                          |                           |                                           |

Notes:
- Mean baseline score a decreased from 4.8 to 0.8 after 8 weeks, cyclosporine well tolerated
- Improvement as early as day 15, mean total score b from 688 to 0.37 after 60 days
- Significant improvement in PASI IA, SUM, DLQI, FSDS, sQoL-M
- Complete clearance after 3 weeks, 43% still clear at 12 weeks
| Study design, level of evidence | Study characteristics | Treatments and outcomes | Successful (side effects) | Unsuccessful (side effects) | Notes |
|--------------------------------|----------------------|------------------------|--------------------------|---------------------------|-------|
| Ryan et al. [50]               | Randomized, placebo-controlled phase III clinical trial | Ixekizumab 160 mg at week 0, then 80 mg every 2 weeks thereafter | Significant improvement in genital psoriasis symptoms compared with placebo as measured by PASI, sPGA-G (74% vs. 8%), GenPS-SFQ item 2 (78% vs. 21%), and ≥ 3 point reduction in genital itch NRS (80% vs. 8%) | Masked regression of the lesions |       |
| Sezer et al. [51]              | Case report, 5 plaque psoriasis | Betamethasone valerate, topical | Marked regression of the lesions |                      |       |
| Shimamoto et al. [25]          | Case report, 5 pustular psoriasis | Oral chlorpromazine 125 mg/day | Resolution of skin symptoms several weeks after initiation of treatment, associated with reduction in manic symptoms |                      |       |
| Singh et al. [22]              | Case report, 5 pustular psoriasis | Dapsone 100 mg daily, doxycycline, metronidazole, penicillin, topical steroid ointments | Complete clearance in 4 weeks with dapsone, maintenance with dapsone 50 mg daily |                      |       |
| Winrauch et al. [41]           | Case report, 5 plaque psoriasis | Betamethasone 17-valerate three times daily | Complete resolution after 3 weeks |                      |       |
| Yao et al. [40]                | Case report, 5 plaque psoriasis | Tacrolimus 0.1% ointment twice daily | Topical ketoconazole cream for 2 weeks |                      |       |
| Zampetti et al. [48]           | Case report, 5 plaque psoriasis | Topical tacrolimus 0.1% ointment daily | Complete resolution after 3 weeks |                      |       |

* PASI: Psoriasis Area and Severity Index, 6-point scale grading redness, scaling, and maceration
* sPGA-G: static Physician's Global Assessment of Genitalia
* GenPS-SFQ: Genital Psoriasis Sexual Frequency Questionnaire
* SQoL-M: Sexual Quality of Life questionnaire for use in men, 8-point scale grading erythema, infiltration, and desquamation of face, genitalia, and intertriginous areas
* FSDS: Female Sexual Distress Scale, 6-point scale grading distress, self-consciousness, and discomfort
* DLQI: Dermatological Life Quality Index, 9-point scale grading effects of skin disease on quality of life
* Measured on a 6-point scale grading redness, scaling, and maceration
* Measured on a 9-point scale grading erythema, infiltration, and desquamation of face, genitalia, and intertriginous areas
* Unspecified sex
| Medication                  | Successful                                      | Unsuccessful                                        |
|----------------------------|-------------------------------------------------|-----------------------------------------------------|
| Zinc paste                 | Fergusson et al. [35]                           | Andersen et al. [28], Baggio et al. [36], Greco et al. [37] |
| Salicylic acid             |                                                 | Andersen et al. [28]                                |
| Aniline dye                |                                                 | Andersen et al. [28]                                |
| Topical antibiotics        |                                                 | Cretu et al. [37]                                   |
| Topical antifungals        | Watanabe et al. [38], Foureur et al. [39]       | Baggio et al. [36], Greco et al. [37], Foureur et al. [39], Yao et al. [40], J Fam Pract 2016 [41] |
| Topical corticosteroids    |                                                 |                                                     |
| Low potency                | Cretu et al. [37], Kapila et al. [18], Meeuwis et al. [17], Kamer et al. [42] | Andersen et al. [28], Baggio et al. [36], Cretu et al. [37], Fergusson et al. [35], Greco et al. [37], Albert et al. [14], Meeuwis et al. [17], Quan et al. [43], Singh et al. [22], J Fam Pract 2016 [41] |
| Mid potency                | Afsar et al. [6], Baggio et al. [36], Kapila et al. [18], Meeuwis et al. [17], Weinrauch et al. [44], J Fam Pract 2016 [41] | Amichai et al. [29], Hernandez et al. [45], Albert et al. [14], Meeuwis et al. [17], Ješe et al. [24] |
| High potency               | Hernandez et al. [45], Foureur et al. [39], J Fam Pract 2016 [41] | Albert et al. [14], Meeuwis et al. [17] |
| Topical calcineurin inhibitors | Amichai et al. [29], Bissonnette et al. [33], Martin-Ezquerra et al. [46], Rallis et al. [47], Zampetti et al. [48], Jemec et al. [15], Yao et al. [40] | Albert et al. [14], Ješe et al. [24] |
| Vitamin D analogs          |                                                 | Amichai et al. [29], Albert et al. [14]             |
| Coal tar                   | Andersen et al. [28]                            | Quan et al. [43]                                    |
| Topical doxepin            |                                                 | Albert et al. [14]                                  |
| Combination therapies      |                                                 |                                                     |
| Topical antifungal and tar | Kapila et al. [18]                              |                                                     |
| Low-potency TCS + topical antifungals | Andersen et al. [28], Rattet et al. [49], Kapila et al. [18] | Albert et al. [14]                                  |
| Low-potency TCS + TCIs     | Kapila et al. [18]                              |                                                     |
| Low-potency TCS + tar      | Kapila et al. [18]                              | Kapila et al. [18]                                  |
| Medication                                      | Successful | Unsuccessful |
|------------------------------------------------|------------|--------------|
| Low-potency TCS + topical vitamin D analog     | Fischer et al. [16] | Kapila et al. [18] |
| Low-potency TCS + mid-potency TCS + tar + vitamin D analog | Kapila et al. [18] | Kapila et al. [18] |
| Mid-potency TCS + tar + vitamin D analog       | Kapila et al. [18] | Kapila et al. [18] |
| High-potency TCS + vitamin D + tar             | Kapila et al. [18] | Kapila et al. [18] |
In this randomized, double-blind, placebo-controlled phase III trial (grade 1), adult subjects with moderate-to-severe genital psoriasis were randomized to receive either placebo (n = 74) or ixekizumab 160 mg subcutaneously at week 0 followed by 80 mg every 2 weeks thereafter (n = 75). The primary outcome of patients achieving static Physician’s Global Assessment of Genitalia score of “clear” or “minimal” (sPGA-G 0/1) by week 12 was met by significantly more subjects on ixekizumab treatment than placebo (74% vs. 8%). Additionally, significantly more patients treated with ixekizumab reported improved sexual activity as measured by Genital Psoriasis Sexual Frequency Questionnaire (GenPS-SFQ) item 2 score 0/1 (78% vs. 21%) and clinically meaningful reduction in genital itch as measured by the genital itch numeric rating scale (NRS) (60% vs. 8%) compared with placebo. Safety outcomes were similar to the overall safety profile of ixekizumab, with the most common adverse events including diarrhea, injection site reactions, nasopharyngitis, upper respiratory tract infections, and headaches.

Two cases (grade 5) reported that oral dapsone given 100 mg daily was found to be successful in clearing psoriasis lesions within 4 weeks, without any reported adverse events [22, 23]. Mycophenolate mofetil and oral doxepin have both been reported as successful treatments for genital psoriasis in one case each [14, 23]. Methotrexate 7.5–20 mg weekly improved genital symptoms in two of four genital psoriasis patients [14, 18, 23, 24]. However, methotrexate use was associated with gastrointestinal disturbance, headache, insomnia, and urinary tract infections. There is one report of genital pustular psoriasis clearance

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### Table 3: Evidence on systemic treatments for genital psoriasis by medication

| Medication          | Successful                                      | Unsuccessful                                      |
|---------------------|-------------------------------------------------|---------------------------------------------------|
| **Phototherapy**    |                                                 |                                                   |
| UVB phototherapy    | Kapila et al. [18]                              |                                                   |
| PUVA                |                                                 | Albert et al. [14]                                |
| **Immunosuppressants** |                                              |                                                   |
| Mycophenolate mofetil | Guglielmetti et al. [23]                        |                                                   |
| Methotrexate        | Albert et al. [14], Kapila et al. [18]          | Guglielmetti et al. [23], Ješe et al. [24]        |
| **Biologics**       |                                                 |                                                   |
| Adalimumab          | Ješe et al. [24]                                |                                                   |
| Ixekizumab          | Ryan et al. [50]                                |                                                   |
| Efalizumab*         | Cassano et al. [26]                             |                                                   |
| **Oral antifungals**| Foureur et al. [39], Meeuwis et al. [17]        | J Fam Pract 2016 [41]                             |
| **Oral antibiotics**| Quan et al. [43]                                | Singh et al. [22]                                 |
| Dapsone             | Guglielmetti et al. [23], Singh et al. [22]     |                                                   |
| Doxepin             | Albert et al. [14]                              |                                                   |
| **Antihistamines**  | Cretu et al. [37]                               |                                                   |
| **Antipsychotics**  | Shimamoto et al. [25]                           |                                                   |
| Calcium gluconate   | Cretu et al. [37]                               |                                                   |

* Formerly available treatment
after initiation of chlorpromazine for treatment of a concurrent manic episode [25]. Adalimumab has also been shown in one case report to result in clearance of genital psoriasis by 6 months without adverse effects [24]. Efalizumab considerably improved genital pruritus in 9 patients (grade 4) given at a dose of 1 mg/kg weekly for 12 weeks [26]. However, 2 of 55 patients in this study experienced adverse events requiring treatment discontinuation within 12 weeks (psoriasis flare and neurologic symptoms), and 7 patients described self-limited treatment-associated papular psoriasis. Efalizumab has since been removed from the market because of safety concerns [27].

**Treatment of Genital Psoriasis in the Pediatric Population**

A total of 12 articles examined treatments for genital psoriasis in infants and children (Table 4). Three of these articles were open-label studies (grade 4), while the remaining ten were case reports (grade 5) describing the effects of treatment on pediatric patients. Treatment outcomes were described for a total of 126 patients. Mild, topical coal tar preparations were effective in clearing genital lesions among 91 pediatric patients from two case series [16, 28].

Topical corticosteroid-based regimens led to successful treatment outcomes in 37 cases. Low-to-mid-potency topical steroids were used in 26 patients; moderate- and high-potency steroids were used in 6 patients and 1 patient, respectively. Successful treatment in six patients also included topical antifungal medications, primarily ketoconazole cream and clotrimazole cream. There was one case report (grade 5) of complete resolution of psoriatic lesions with topical pimecrolimus 1% ointment treatment [29]. All of the therapies used in children were well tolerated, without any significant adverse events reported.

**DISCUSSION**

In the past several years, there has been a moderate increase in studies assessing treatments for genital psoriasis. At the time of the last published review on this topic in 2011, only 6 case reports and 1 open-label study described the effects of therapies for genital psoriasis, while 24 articles reflected expert opinion on treatment for this disease [3]. In our analysis, we found 1 randomized controlled trial (grade 1), 11 open-label studies (grade 4), and 26 case reports (grade 5) describing the efficacy and safety of topical and systemic treatments for genital psoriasis. Various therapies have been shown to be effective for genital psoriasis in case reports and case series, but high-quality evidence in the form of randomized controlled trials remains inadequate for genital psoriasis treatments.

Low-to-mid-potency topical corticosteroids are recommended as the first-line treatment for genital psoriasis [30] (grade of recommendation: D) and are commonly reported in the literature to be a critical component of treatment for these lesions. However, topical corticosteroids are generally approached with great caution for genital psoriasis patients because of the unique environment of the genitalia [31]. The thin skin and constant occlusion of this environment cause topical medications to have increased penetration in the groin area, which is a particular problem for infants, who have a high surface area-to-body mass ratio, predisposing them to systemic side effects. Mild topical corticosteroids may not be potent enough to induce a clinically significant response in some patients [11, 32] and are often used in combination with second-line topical therapies to yield clinical benefit (Table 2). Moderate-to-high-potency corticosteroids have been used effectively in adults and children with genital psoriasis, both as monotherapy and in combination with other topical agents, without reports of significant adverse effects (Table 2). There was a lack of reporting on adverse effects from topical corticosteroids in studies included our analysis; therefore, there is not enough evidence to determine whether there were no side effects with these therapies or if they simply were not mentioned. From the existing evidence, topical corticosteroids continue to be recommended as first-line treatment.
| Sources          | Study characteristics | Treatments and outcomes                           | Result                                                                 |
|------------------|-----------------------|---------------------------------------------------|-------------------------------------------------------------------------|
|                  | Study design, level   |                                                   |                                                                         |
|                  | of evidence           |                                                   |                                                                         |
| Afşar et al. [6] | Case report,5         | 0.05% clobetasone 17-butyrate cream daily, emollient cream | Overall regression with intermittent mild flares                      |
|                  | Napkin psoriasis      |                                                   |                                                                         |
|                  | Diaper area, 5.5      |                                                   |                                                                         |
|                  | months, 1 M           |                                                   |                                                                         |
| Amichai et al. [29] | Case report,5        | 1% pimecrolimus cream Betamethasone 1% cream, calciopotriol ointment | Resolution of psoriatic lesions after 3 weeks of topical pimecrolimus, recurrence treated successfully |
|                  | Plaque psoriasis      |                                                   |                                                                         |
|                  | Glans penis, distal  |                                                   |                                                                         |
|                  | parts of shaft        |                                                   |                                                                         |
|                  | 10 years, 1 M         |                                                   |                                                                         |
| Andersen et al. [28] | Open-label case    | Tar (64), corticosteroid-vioform ointment (3) Zinc paste, salicylic ointment, steroid ointment, or aniline dye solutions | Tar effective in 64 patients, corticosteroid-vioform ointment effective in 3 patients |
|                  | label case series, 4  |                                                   |                                                                         |
|                  | Psoriasiform napkin   | 35 M/32 F                                       |                                                                         |
|                  | dermatitis            | (0–21)                                           |                                                                         |
|                  | Diaper area, 2.1      |                                                   |                                                                         |
|                  | months, 35 M/32 F     |                                                   |                                                                         |
|                  | (0–21)                |                                                   |                                                                         |
| Baggio et al. [36] | Case report,5        | Fluticasone propionate cream Zinc oxide-based ointments, antifungal creams, desonide cream | Complete resolution at 1 week                                           |
|                  | Psoriasiform napkin   |                                                   |                                                                         |
|                  | dermatitis            | 1 F                                              |                                                                         |
|                  | Diaper area, 18       |                                                   |                                                                         |
|                  | months, 1 F           |                                                   |                                                                         |
|                  | Anogenital area,      |                                                   |                                                                         |
|                  | buttocks, upper       |                                                   |                                                                         |
|                  | 1/3 thighs            |                                                   |                                                                         |
| Cretşu et al. [37] | Case report,5        | Systemic antihistamines, nonspecific desensitization treatment, rigorous hygiene, non-fluorinated topical corticosteroids Antibiotic ointment for 5 days, calcium gluconate, topical corticosteroids | Significant improvement by day 2 of treatment                           |
|                  | Napkin psoriasis      |                                                   |                                                                         |
|                  | Anogenital area,      |                                                   |                                                                         |
|                  | buttocks, upper       |                                                   |                                                                         |
|                  | upper 1/3 thighs      |                                                   |                                                                         |
| Sources                  | Study characteristics | Treatments and outcomes |
|-------------------------|-----------------------|-------------------------|
| **Study design, level of evidence** | **Type of psoriasis** | **Site** | **Age** | **Cohort (M/F)** | **Successful** | **Unsuccessful** | **Result** |
| Fergusson et al. [35]   | Open-label case series, 4 | Psoriasiform napkin dermatitis | Diaper area | Infants | 22$^a$ | Zinc-oxide paste | Topical steroids | Complete clearance |
| Fischer et al. [16]     | Open-label case series, 4 | Plaque psoriasis | Vulva | 6 years (2–12) | 27 F | LPC and topical calcipotriol with 1% hydrocortisone (23) or methylprednisolone aceponate 0.1% ointment (4) | – | Symptom remission, LPC well tolerated |
| Greco et al. [37]       | Case report, 5 | Napkin psoriasis | Diaper area | 18 months | 1 F | – | Zinc oxide paste, nystatin, hydrocortisone acetate 2.5% ointment | Minimal improvement |
| Hernandez et al. [45]   | Case report, 5 | Vulvar psoriasis | Vulva, perianal area | 5 years | 1 F | Clobetasol 0.05% ointment twice daily | Triamcinolone 0.1% ointment twice daily | Significantly improved erythema on inner labial and perianal areas at 2 weeks, complete resolution at 4 weeks |
| Kamer et al. [42]       | Case report, 5 | Napkin psoriasis | Diaper area | 10 weeks | 1 F | Low-potency topical corticosteroids | – | Clearance of lesions at 2 weeks |
| Sources          | Study characteristics | Treatments and outcomes                                                                 |
|------------------|-----------------------|----------------------------------------------------------------------------------------|
|                  | Study design, level   | Successful | Unsuccessful | Result | evidence |
|                  | of psoriasis          |            |             |        |          |
| Rattet et al.    | Case report, 5        | Clomitrazole 1% cream, hydrocortisone 1% cream three times daily                        | –                        | Clearance of lesions at 2 weeks with mild erythema |
| [49]             | Psoriasiform napkin    |            |             |        |          |
|                  | dermatitis            |            |             |        |          |
|                  | Diaper area 12 months |            |             |        |          |
| Rattet et al.    | Case report, 5        | Clomitrazole 1% cream, hydrocortisone 1% cream three times daily                        | –                        | Clearance of lesions at 4 weeks                      |
| [49]             | Psoriasiform napkin    |            |             |        |          |
|                  | dermatitis            |            |             |        |          |
|                  | Diaper area 5 weeks   |            |             |        |          |
| Watanabe et al.  | Case report, 5        | 0.2% ketoconazole cream daily                                                          | –                        | Complete clearance at 1 month                         |
| [38]             | Pustular psoriasis    |            |             |        |          |
|                  | Diaper area 4 months  |            |             |        |          |

*LPC* liquor picis carbonis

* Unspecified sex
for genital psoriasis (grade of recommendation: C).

The data in this analysis do not show superior efficacy for nonsteroidal topical treatments compared with topical corticosteroids for the treatment of genital psoriasis (Table 2). Topical calcineurin inhibitors did improve genital psoriasis in several patients and were fairly well tolerated. Mild burning or pruritus can be associated with using these treatments in the sensitive groin region, but these symptoms are often manageable and limited in duration [33]. Topical coal tar preparations demonstrate efficacy in both adults and children with genital lesions and are not associated with significant adverse effects. Vitamin D analogs are sometimes recommended for patients with general psoriasis (grade of recommendation: D), but this is less reported in the literature [11, 30]. However, these nonsteroidal topical therapies may increase the risk for lymphoma, be more irritating, and be more costly than topical corticosteroids [34]. Topical calcineurin inhibitors, coal tar preparations, and vitamin D analogs may thus be used as second-line therapies for psoriasis lesions in the genital area (grade of recommendation: C).

Systemic therapies such as dapsone and methotrexate can work well for patients with genital lesions and should be considered for patients with debilitating quality of life impairment (grade of recommendation: C) [30]. Our analysis did not find any evidence on the use of other traditional systemic agents, such as oral cyclosporine, acitretin, or apremilast, specifically for genital psoriasis. Although numerous effective biologics are available for the treatment of psoriasis, there is only one published clinical trial result on the efficacy of currently approved biologics specifically for genital psoriasis.

A recent study has shown ixekizumab to have high efficacy specifically for genital psoriasis, with rapid improvement seen as early as 1 week into treatment [21]. This medication significantly improves genital lesion appearance, genital itch, sexual health, and quality of life and may be a promising solution for patients suffering from recalcitrant genital psoriasis. Ixekizumab is currently the only medication with FDA labeling specifically mentioning genital psoriasis (grade of recommendation: B).

Although not specifically addressed in the majority of articles in our analysis, good hygiene and reduction of friction are essential first-line measures for the treatment of genital psoriasis patients (grade of recommendation: D) [11]. Gentle, non-soap cleansers are recommended to keep the genitals clean without irritating the area, and patients should be advised to wear loose-fitting, unrestrictive clothing to avoid koebnerization and further irritation [30]. Patients with genital psoriasis should always use lubricant or lubricated condoms with any sexual activity to avoid exacerbation of genital symptoms. In combination with proper pharmacologic therapy, these supportive measures are necessary for minimizing the impact of genital psoriasis.

Despite increased research into genital psoriasis in recent years, the optimal treatment approach for affected patients remains unclear. Overall, available evidence is limited, especially regarding the efficacy of systemic agents for genital psoriasis. This is most likely because systemic treatments are indicated for moderate-to-severe psoriasis, and efficacy evaluations typically do not specifically assess genital symptoms. Genital psoriasis is ill defined, varies in characterization throughout the literature, and is not distinguished from inverse psoriasis in several studies. The existing literature thus uses various different measures to evaluate treatment efficacy or assess symptom improvement qualitatively so studies can be difficult to compare. The introduction of novel assessment tools for genital psoriasis will facilitate a greater understanding of how various treatments compare.

Additionally, most studies included in our analysis did not assess or report safety data or side effects with treatment, which is especially important for the sensitive genital area. Most recommendations for treating genital psoriasis are based on case reports or expert opinion only, and randomized controlled trials for this disease are lacking [3, 11]. Larger sample sizes and controlled studies are needed to properly assess the safety and efficacy of treatments for
genital psoriasis to better understand the optimal management approach for these patients.

CONCLUSIONS

Recently, a growing number of studies have evaluated the efficacy of various treatments specifically for genital psoriasis, including one randomized clinical trial for a biologic agent [3]. A variety of topical therapies have shown varying success for treatment of genital psoriasis, while far fewer systemic and biologic therapies have been evaluated for genital psoriasis. Further inquiry into the optimal treatment regimen for genital psoriasis is necessary.

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