



Management of Paediatric Psoriasis by Paediatricians: A Questionnaire-Based Survey

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ABSTRACT

Introduction: Paediatric plaque psoriasis (Ped-Pso) in children and adolescents is often diagnosed and treated for the first time by paediatricians. An early onset of psoriasis is associated with a genetic family burden, higher severity of disease and increased risk of comorbidities, sometimes starting in childhood. However, little information is available on prevalence data and the clinical management of PedPso by paediatricians.

Methods: A total of 191 questionnaires were sent out to paediatricians regarding their management of PedPso, with a focus on prevalence, diagnosis, initiation of therapies, screening for comorbidities and collaboration with dermatologists. Of these, 95 (49.7%) were returned and evaluated anonymously.

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Results: Only about one-half of the responding paediatricians reported being certain in their diagnosis of PedPso, even though they regularly see moderate-to-severely affected patients. The questionnaire revealed that there are clear differences in the general management of PedPso if the paediatrician is not certain of the diagnosis of psoriasis. Compared to paediatricians certain of their diagnosis, those who are uncertain less frequently perform whole-body inspection, screen for relevant comorbidities, such as psoriasis arthritis, metabolic syndrome or mental disorders, and prescribe the use of topical or systemic therapies. No responding paediatrician reported the use of modern systemic therapies, such as biologicals, even in severely affected children. The majority of respondents rated their cooperation with dermatologists as good.

Conclusion: The certainty of the diagnosis, the use of system therapies and the screening for comorbidity could improve the care of PedPso through targeted training of paediatricians and intensified interdisciplinary cooperation with dermatologist.

Keywords: Adolescent; Childhood; Juvenile; Management; Paediatric; Paediatrician; Psoriasis; Therapy; Treatment

Key Summary Points

Little is known about how paediatricians routinely diagnose and treat juvenile patients with psoriasis in the clinical setting, even though many children with skin diseases are managed by paediatricians.

An anonymous survey was sent out to paediatricians to investigate the degree of certainty with the diagnosis of psoriasis in children by paediatricians, with a focus on assessment of comorbidity screening, drug treatment and cooperation with dermatologists.

Most paediatricians reported feeling a degree of uncertainty when making a diagnosis of paediatric psoriasis, which had a negative impact on relevant comorbidity screening and drug treatment.

A key point to improving the general care of children with psoriasis should be increasing the level of knowledge of paediatricians about this disease and improving the certainty of diagnosis.

adolescents [4–6]. In addition to skin involvement, PedPso patients can also be affected by different comorbidities, such as psoriasis arthritis (PsA), obesity and mental disorders [7]. The question of whether the onset of psoriasis in childhood is also associated with an increased risk of comorbidities in adults is as yet unanswered and subject to rigorous debate. However, it is known that the early onset of psoriasis is associated with family stress and a more severe course of disease that also seems to respond more poorly to systemic therapies [8–10].

In many countries where specialized paediatric dermatologists are scarce, children, including those with chronic skin diseases, are cared for exclusively by paediatricians. However, little is known about how specific paediatricians diagnose PedPso, which management strategies are used and how interdisciplinary cooperation with dermatologists works in a real-life setting. Our hypothesis is that the poorer the knowledge of Pso by the paediatrician, the higher the degree of diagnostic uncertainty and, ultimately, the more insufficient the care received by PedPso patients. To better assess the situation, we conducted a survey on the certainty of paediatricians with diagnosing psoriasis and on whether there are differences in the management and therapy of PedPso patients if the correct diagnosis is made or if there is uncertainty.

INTRODUCTION

Plaque psoriasis (Pso) is a chronic immune-mediated inflammatory disease with characteristically itchy and sometimes painful skin plaques. In up to 35% of adult Pso patients, onset of the disease began in childhood. Due to the visible squamous, reddish skin lesions, patients often suffer from intense stigmatisation. Consequently, Pso has a significant detrimental impact on the health-related quality of life of both affected adults and children [1–3]. Paediatric plaque psoriasis (PedPso) is observed in infants as early as 2.1 months, with a prevalence of 0.1%; the prevalence increases to up to 0.4% in children under 12 years and up to 1% in

METHODS

Study Design and Study Population

In the period 2018–2019, 191 questionnaires were sent throughout the Rhein-Main region to all existing paediatric private practices or hospital outpatient clinics within a radius of 50 km; of these, 95 (49.7%) were returned anonymously and could be partially or fully analysed. A returned questionnaire was deemed evaluable when no fewer than five questions were answered. If several paediatricians worked in a single centre, only one questionnaire was sent and data for the entire centre were collected. In addition to the paper-based format, it was

possible to complete the questionnaire electronically using a QR code; however, the electronic version was not used by any of the respondents.

The local ethics committee of the University Hospital Frankfurt am Main waived ethics committee approval as this was an anonymous survey.

Questionnaire

The questionnaire was divided into three main topics, focusing on (1) prevalence, severity and comorbidity screening of PedPso patients; (2) frequency of use and choice of medication (i.e. topical and systemic therapy options); and (3) cooperation between paediatricians and dermatologists to combine the level of knowledge about psoriasis management. A general distinction was made in the evaluation of further management of PedPso patients regardless of whether the paediatricians tended to feel certain or uncertain with the diagnosis of psoriasis.

Institutional review board approval and formal consent of participants were not required.

Statistical Analysis

This was an exploratory data analysis. The level of significance was set at $p \leq 0.05$. Missing or illogical data were not taken into account in individual parts of the answers. The two-tailed Fisher's exact test was used to determine statistical significance with a 95% confidence interval. MedCalc (R) version 19.2 statistical software (MedCalc Software BV, Ostend, Belgium; <https://www.medcalc.org>) was used for the statistical evaluations.

RESULTS

Frequency, Severity and Comorbidity Screening of Pso in Paediatric Patients by Paediatricians

Of a total of 191 questionnaires sent to paediatricians or children's hospitals with an outpatient clinic, 95 (49.7%) questionnaires were returned. The average number of children and

adolescent patients with psoriasis managed in a 3-month period was reported to be 2.2 (minimum 0.5, maximum 15). Regarding the question of certainty to diagnose PedPso (self-rating), 31% ($n = 30$) of surveyed paediatricians who responded answered as being very certain or certain and 53.7% ($n = 51$) as being uncertain or very uncertain; 14.7% ($n = 14$) of all respondents did not answer this question (Fig. 1) (Supplement figure 1). As an assessment of disease severity, one question referred to body surface area (BSA) involvement; based on the answers, 70.1% of children and adolescents displayed a mild form (BSA 0–2%), 21.9% displayed a moderate form (BSA > 2 to < 10%) and 8.0% displayed a severe form of psoriasis (BSA > 10%).

The diagnosis of psoriasis is primarily made clinically and usually requires a whole-body inspection to correctly assess severity and to avoid overlooking any special manifestations. Nevertheless, only about one-half of the paediatricians who responded regularly examine the whole-body surface of the affected patients. The number of physicians regularly performing a full-body inspection was significantly higher among the group of paediatricians who reported being certain in making the diagnosis of psoriasis compared to those who were uncertain [73.4% ($n = 22/30$) vs. 49.0% ($n = 25/51$), respectively; $p = 0.038$] (Fig. 2a,b) (Supplement figure 2). However, the majority of paediatricians in both groups examine the patient's whole-body surface at least occasionally or frequently (Fig. 2c). Only about 2% of the physicians reported never conducting a clinical evaluation of the skin of their PedPso patients; all of these physicians had reported being uncertain of making the correct diagnosis of PedPso (Fig. 2a).

In terms of potential concomitant diseases and comorbidities of Pso, 54.3% of surveyed paediatricians who responded stated that they regularly screen their patients. The subset of physicians monitoring comorbidities was considerably higher in the group of those who were certain in correctly diagnosing PedPso than in the group who were uncertain [75.9% ($n = 22/29$) vs. 49.0% ($n = 24/49$), respectively; $p = 0.047$]. The comorbidity with the highest screening priority for paediatricians is PsA (35.1%), followed by obesity (16.8%),

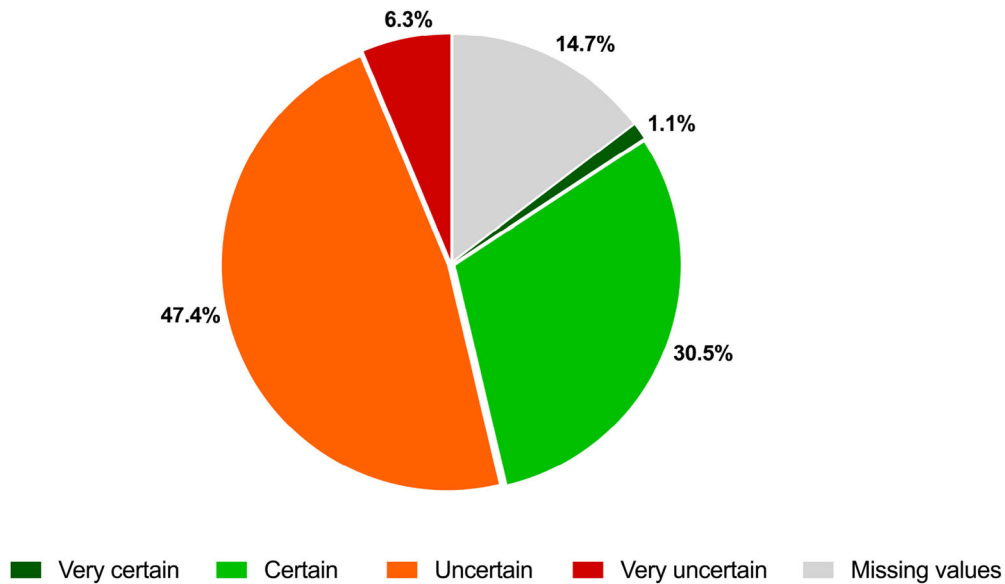


Fig. 1 Paediatricians' self-assessment of the degree of certainty that the clinical diagnosis of psoriasis in children can be made in the routine clinical setting

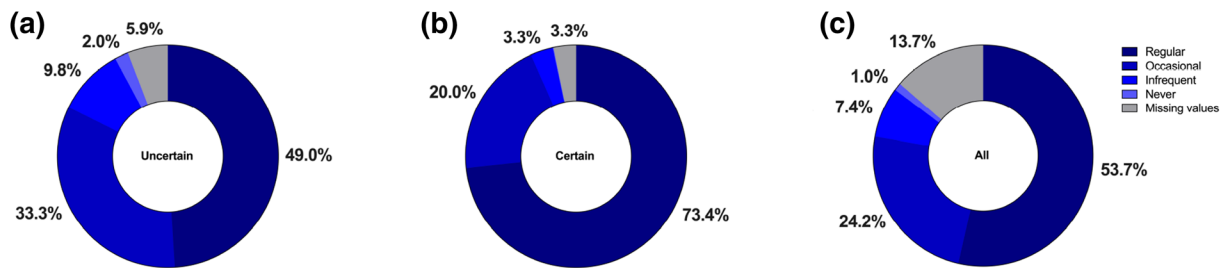


Fig. 2 Examination of the whole-body surface by paediatricians who are uncertain of making the correct diagnosis of paediatric plaque psoriasis (PedPso) ($n = 30$) (a),

certain of making the correct diagnosis of PedPso ($n = 51$) (b) and the entire group of surveyed paediatricians who responded ($n = 81$) (c)

hypertension (16.0%), type II diabetes (12.2%) and hyperlipidaemia (11.5%). It is noteworthy that assessments of psychiatric disorders, such as depression or anxiety disorders, are at least performed, although only 8.4% of the paediatricians reported including such assessments for psychiatric comorbidity in their general clinical routine (Fig. 3).

Therapy Strategies of Paediatricians for treating PedPso

Therapy for PedPso can be a challenge due to the limited approval of regulatory agencies for

topical and systemic medications. The question of whether paediatricians treat psoriasis independently was positively answered by 54.7% ($n = 52/95$) of respondents. Accordingly, about half of the paediatricians did not start therapy independently. In total, 31.6% ($n = 30/95$) of respondents recommended a topical therapy for PedPso, while merely 5.3% ($n = 5/95$) of the paediatricians also use systemic medication to treat plaque psoriasis.

Within the group of 51 physicians who expressed uncertainty with the diagnosis of PedPso, 72.5% ($n = 37$) did not initiate any therapy, 23.5% ($n = 12$) prescribed topical

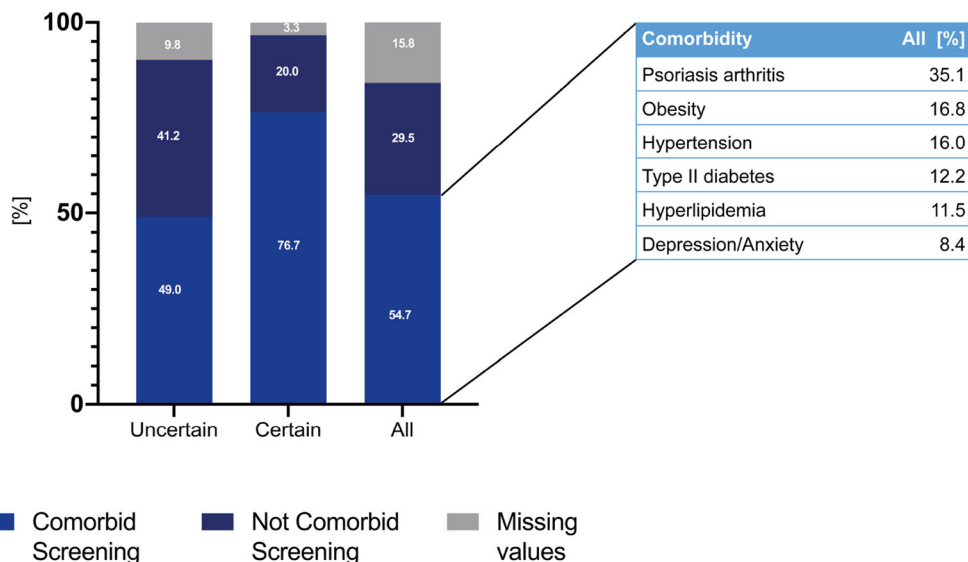


Fig. 3 Comparison of frequency for screening for comorbidity in patients with PedPso by group of “uncertain” physicians, “certain” physicians and all responding paediatricians. Frequencies of screened comorbidities examined

by all paediatricians are based on data reported by physicians who control for concomitant diseases as part of their general clinical routine

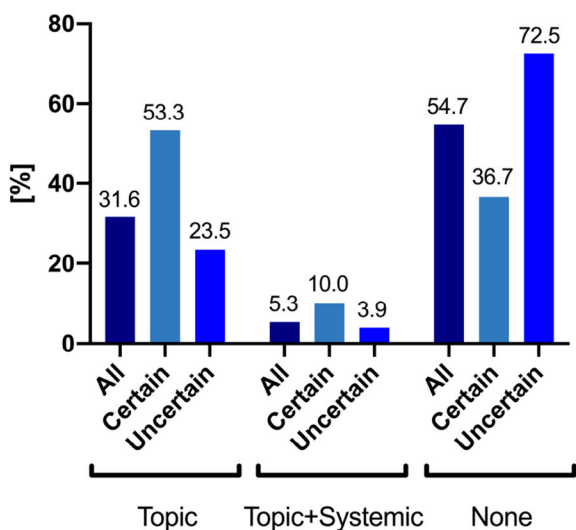
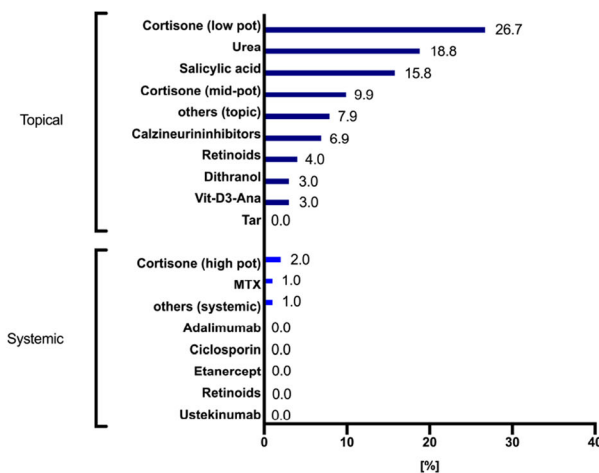


Fig. 4 a Proportion of “certain” and “uncertain” paediatricians prescribing topical therapies, topical therapies + systemic medications or no treatments at all in PedPso (%). **b** Treatment options separated into topical and



systemic agents, as prescribed by all responding paediatricians (b). Ana analoga, mid/high pot medium/high potency, MTX Methotrexate

therapies and 3.9% (n = 2) prescribed systemic therapy. In comparison, only 36.7% (n = 11) of experienced physicians (diagnostic certainty) did not initiate a therapy, 53.3% (n = 16)

prescribed topical therapies and 10.0% (n = 3) recommended systemic therapy (Fig. 4a). The probability of prescribing any therapy was significantly higher among paediatricians who

were certain of their diagnosis than among those expressing uncertainty ($p = 0.0022$).

The most frequently chosen drugs were topical low-potency glucocorticosteroids (26.7%), followed by urea (18.8%) and salicylic acid (15.8%). Medium- or high-potency topical glucocorticoids were administered by 9.9% of paediatricians. In contrast, vitamin-D derivatives (e.g. calcipotriole, tacalcitole, calcitriole) and dithranol were only used by 3% of paediatricians, whereas tar preparations are no longer recommended.

Systemic therapies were in general prescribed very rarely. Biologics, cyclosporin and retinoids were not used by any paediatrician. Moreover, the selection was limited to conventional drugs, such as systemic glucocorticoids (2%) and methotrexate (1%) (Fig. 4b).

In terms of the factors influencing the choice of treatment, more than half of the physicians stated that the level of severity in combination with the psychological strain was pivotal in determining treatment. Only a few paediatricians reported disregarding the quality of life of the children and adolescents and using severity as the sole criterion driving the choice of treatment, .

Of the 92 evaluable questionnaires, only 25 (27.2%) paediatricians stated having a confident feeling with both diagnosing and managing PedPso compared to the majority ($n = 67$; 72.8%) of paediatricians who rated their knowledge as poor or very poor. Again, in the group of those physicians who reported uncertainty with diagnosing PedPso, the number of physicians evaluating their knowledge of therapeutic strategies as poor or very poor is significantly lower than that in the group with better clinical expertise [64.3 ($n = 18/28$) certain vs. 5.9% ($n = 3/51$) uncertain; $p < 0.00001$].

Hence, over 90% of the surveyed paediatricians were interested in receiving training in the management and therapeutic strategies of PedPso patients.

Collaboration with Dermatologists

In the vast majority of cases, cooperation between paediatricians and dermatologists is

already present. Overall, 70 of the 92 responding paediatricians stated an ongoing cooperation with a dermatologist. However, psoriasis was not the only reason for this cooperation. An additional eight paediatricians explicitly emphasized the need of working alongside dermatologists in order to treat psoriasis. Fourteen paediatricians reported being unsuccessful in locating a dermatologist with whom they could cooperate, yet none of these 14 indicated a refusal of interdisciplinary cooperation. Approximately 80% of all paediatricians would refer a patient with PedPso to a dermatologist. Other specialties, such as rheumatology, ophthalmology endocrinology or psychiatry, played a minor role in the treatment of juvenile psoriasis. The four most important reasons for forwarding patients to dermatologists were to confirm the diagnosis (88.4%), initiate therapy in line with guidelines (80.0%), continue the treatment of psoriasis with the specialist (56.8%) and screen for comorbidities (21.0%).

Negative aspects of cooperating with dermatologists, such as not receiving an appointment promptly (13.4%) or having negative experiences in working with dermatologists (7.2%), were also indicated. Paediatricians also reported that some children with PedPso or their parents did not see a need to see the dermatologist or even refused to do so (7% each).

DISCUSSION

Reliability in diagnosing psoriasis is an essential criterion for correctly recognising the disease and subsequently initiating the appropriate therapies. Approximately one-third of the surveyed paediatricians considered themselves to be competent, while more than half were rather uncertain regarding diagnostic competency. With a more reliable knowledge of psoriasis, diagnosis would be more certain and management of the disease would be better. This is illustrated by the performance of a whole-body inspection, which was carried out by around three-quarters of the paediatricians who reported being certain of being able to make a reliable diagnosis, against one-half of those physicians who stated their uncertainty in this respect. In

particular, special manifestations that are less common in children, such as genital involvement, can be overlooked [11].

The factors which make it difficult to arrive at the correct clinical diagnosis in young infants in diapers include the possibility of the condition being an eczematous form with simultaneous atopy or psoriatic affection of the diaper region, with the latter also possibly classified as eczema [12]. Eczema, in particular, is a significantly more common dermatosis in childhood and is simultaneously present in up to 10% of psoriatic patients [13]. A guttate form of psoriasis, often seen after streptococcal infections, is the second most common manifestation in 10–30% of children, manifesting as classic plaque rashes and, therefore, is easier to diagnose [14]. Up to 50% of adults with psoriasis present early symptoms of psoriasis in the first two decades of life [15].

Screening for comorbidities is an essential part of psoriasis management. Based on the responses to the questionnaire, more intensive screening activities were carried out by paediatricians with clinical expertise in diagnosing PedPso than by those who were less experienced and more uncertain regarding their diagnosis. PedPso patients have a twofold higher risk of being obese and also have a significantly increased risk of elevated serum lipid levels and of having type II diabetes, hypertension and non-alcoholic fatty liver disease (NAFLD) with elevated liver enzyme levels [7, 16]. Overweight children tend to have a more severe clinical manifestation of psoriasis [17]. In addition, the risk of early joint involvement in children with PedPso is significantly increased [18]. Clear recommendations consist of a regular monitoring for the development of comorbidities in PedPso patients. However, no current data are available on whether paediatricians are focused on such monitoring. Patients should be checked annually for obesity, whereas fasting glucose to rule out type II diabetes should be tested every 3 years. Other comorbidities, such as dyslipidaemia or NAFLD, should also be assessed regularly, depending on the additional risk profile. A presence of PsA or enthesitis can easily be detected by gathering a targeted medical history combined with an assessment of clinical

performance once a year; this is also true for an assessment for depression and anxiety disorder [19]. Our data indicate that screening of the paediatric population for comorbidities focuses on PsA, although the absolute risk of developing a partial metabolic syndrome is even higher in this patient population. Possible explanations for this focus could be that the general awareness of PsA, especially among adult patients, is greater than that for metabolic comorbidities and thus PsA is more frequently considered in the diagnostic testing. In addition, a metabolic syndrome is more commonly expected in adults than in children, resulting in general in a lower awareness.

However, there is also a strong need to screen for psychiatric disorders. Only 8.4% of paediatricians reported performing specific examinations (interviews, questionnaires such as the Patient Health Questionnaire-4 tool), although psychiatric disorders are among the most common comorbidities in PedPso patients, with a co-prevalence of > 5% [20]. Screening for psychiatric disorders is highly recommended in most of the paediatric psoriasis guidelines and should clearly be implemented by paediatricians [19, 25].

The low level of awareness for the necessity to monitor PedPso patients for potential comorbidities was confirmed in an earlier study and found to affect not only paediatricians but also dermatologists [21]. In that study, psychiatric comorbidities were the least examined concomitant disease.

Treatment of PedPso by Paediatricians

Whether a certain therapy is prescribed by a paediatrician primarily depends on the knowledge and level of experience of the paediatrician with the diagnosis. Almost three-quarters (72.5%) of the responding paediatricians who reported being uncertain with the diagnosis did not initiate any therapy, whereas only 36% of those paediatricians who were certain with the diagnosis withheld treatment. Thus, the certainty of the paediatrician with the diagnosis seems to be an essential distinguishing feature of whether a therapy is initiated.

When a diagnosis is made, the most common treatments consist of topical preparations, ranging from low- to middle-potency potency steroids to descaling products and basic care compounds. Since the majority of PedPso patients seen by paediatricians are only mildly affected, this therapeutic strategy is reasonable. Of note, low- to middle-potency steroids are prescribed much more frequently than middle- to high-potency compounds.

Augustin et al. performed an analysis of the drug treatments used in PedPso patients and showed that topical glucocorticoids are used much more frequently than vitamin-D derivatives by ratio of 10:1 [22], which is in accordance with our analysis. However, a more frequent use of steroid-free preparations or a combination of glucocorticoids + calcipotriol would be desirable since such combination therapy has the advantage of allowing a more extended duration of therapy. In addition, the irreversible side effects of steroid treatments, such as skin atrophy/striae or telangiectasias, are less common with combination therapies, coupled with a good effect on mild-to-moderate forms of psoriasis [23]. It should also be noted that calcineurin inhibitors, which are used off-label in psoriasis, are recommended more than twofold more often than vitamin-D analogues. This trend was also shown in an American survey of paediatricians in 2012 [24]. One reason for this observation could be difficulty in making a clear diagnosis, especially when distinguishing the symptoms from eczema, in which case calcineurin inhibitors have an on-label approval, although they are also known to have an anti-inflammatory effect on psoriasis lesions.

Systemic therapies in psoriasis are generally used very cautiously by paediatricians, but when they are used, systemic glucocorticoids are still the first choice. This is in line with previous studies on PedPso treatment, although it is an obsolete strategy in adult patients and, therefore, no longer recommended in guidelines or consensus papers [25, 26]. A survey of French paediatricians likewise showed that the use of systemic therapy options is low, with a rate of 4%, and mainly consist of compounds such as steroids or methotrexate [27], confirming the low rate of 3% reported in our study.

The administration of biologicals, which are also approved for paediatric psoriasis (adalimumab at age ≥ 4 years, etanercept at age ≥ 6 years, ustekinumab at age ≥ 12 years), is not realised by paediatricians at all, even though their safety and effectiveness have been confirmed in a number of studies [28]. One obvious explanation for this is the fact that these mostly severely affected patients are primarily referred to dermatologists since the experience of paediatricians with biologicals in PedPso patients is very limited. Paediatricians may also fear the appearance of adverse events with novel systemic agents.

Further educational work on this topic is undoubtedly necessary so that paediatricians will become more likely to use antibody therapies in PedPso. This need is highlighted by the considerable number of paediatricians surveyed in this study.

Cooperation Between Paediatricians and Dermatologists

Cooperation between the various disciplines seems for the large part to be constructive and beneficial to the patients. In general, paediatricians estimate their knowledge on psoriasis to be poor and therefore wish to expand their understanding of the disease. Specific training sessions could serve to optimise this unmet need, and comorbidity screenings could be held for the purpose of increasing knowledge of adequate therapies for different classes of severity, including systematic treatment options.

Limitations

There are some potential limitations to this study. First, the data were collected retrospectively and have probably been estimated in the majority of cases. Options for controlling the reliability of the data are lacking. Beyond that, only one-half of the questionnaires sent out to the paediatricians were returned and evaluated. Nevertheless, there were an acceptable number of returned questionnaires, and a real-world cross-section of PedPso management in

paediatricians in an exemplary European area was achieved.

CONCLUSION

This work clearly shows that an accurate diagnosis of PedPso wields a definite influence on the quality of disease management. Essential steps, such as whole-body inspection, which is necessary to determine the correct disease severity, screening for relevant comorbidities and use of appropriate therapy options ultimately depend on an accurate diagnosis. Our data confirm that all of these aspects need optimisation. The interdisciplinary cooperation between paediatricians and dermatologists is an excellent approach, but urgent work is necessary to increase clinical awareness and provide further training opportunities for paediatricians on the subject of infantile psoriasis in order to adequately improve the management of PedPso patients.

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Compliance with Ethics Guidelines. The local ethics committee of the University

Hospital Frankfurt am Main waived ethics committee approval as this was an anonymous survey.

Data Availability. The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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