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# A multi-centre diagnostic accuracy study to develop diagnostic criteria for psoriasis in children and young people

DIPSOC
Developing Diagnostic criteria for Psoriasis in Children

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## Introduction

In children, psoriasis can be challenging to diagnose. Difficulties arise from differences in the clinical presentation compared to adults, because other childhood rashes are common and because psoriasis may be an unexpected diagnosis. Case identification underpins clinical trials and epidemiological research, both of which are needed to advance treatment and inform advice given to children and families.

## Methods

| | |
|---|---|
| Study design | Multi-centre case-control diagnostic accuracy study. |
| Study setting | UK paediatric dermatology clinics. |
| Primary objective | To test the diagnostic accuracy of consensus agreed diagnostic criteria for plaque psoriasis in children/young people and develop the best predictive diagnostic criteria using multivariate analysis. |
| Secondary objectives | i. To compare the diagnostic performance of the consensus agreed and the best predictive diagnostic criteria.<br>ii. To assess the inter-observer variability in the diagnostic criteria assessment. (Data not presented)<br>iii. To assess the variability in the reference standard for psoriasis. (Data not presented) |
| Sample size | 320 participants (160 cases and 160 controls) to provide 10 events per variable. |
| Inclusion criteria cases and controls | • Children/young people (0 to <18 years of age).<br>• Confirmed diagnosis of plaque psoriasis (cases) or a scaly inflammatory rash (controls) made by a dermatologist.<br>• Active disease at the time of assessment. |
| Index test and reference standard | Index test: i) consensus agreed criteria - 16 diagnostic features identified as important for the diagnosis of psoriasis by international experts; ii) best predictive criteria identified by the multivariate analysis.<br>Reference standard: Dermatologist's diagnosis (clinical, may include a skin biopsy if clinically indicated). |
| Description of study flow | • Consecutive cases and controls approached in clinic or from clinic lists<br>• One study visit of approximately 30 minutes: demographic data, diagnostic criteria assessment by a trained investigator who was unaware of the child's/young person's diagnosis (blinded to the reference standard), quality of life questionnaires.<br>• Data extracted from the medical record by an investigator who did not conduct the diagnostic criteria assessment (blinded to the index test): reference standard, disease severity, duration of disease, current skin medications. |
| Analysis | • Diagnostic accuracy: sensitivity, specificity and area under the receiver operator curve (AUC) .<br>• Multivariate analysis: backward logistic regression.<br>• Internal validation: bootstrapping.<br>• Level of agreement: Kappa statistic. |

## Results

330 children and young people were recruited: 160 cases and 170 controls. Cases were more often female (60% vs 41.9%), older at the time of the research visit (11.1 years vs 7.4 years) and onset of the rash (7.0 years vs 1.2 years), and of white ethnicity (80% vs 59.4%). Nearly all controls had a diagnosis of eczema (94.4%).

### Best predictive criteria

| Diagnostic criteria | Odds ratio* | 95%CI | Wald p value | Coefficient |
|---|---|---|---|---|
| Scale and erythema in the scalp involving the hairline | 2.17 | 1.06, 4.44 | 0.034 | 0.595 |
| Scaly erythema inside the external auditory meatus | 2.06 | 0.95, 4.44 | 0.067 | 0.644 |
| Persistent well-demarcated erythematous scaly rash anywhere on the body | 2.79 | 1.46, 5.32 | 0.002 | 1.013 |
| Persistent erythema in the umbilicus | 3.06 | 0.92, 10.17 | 0.068 | 1.173 |
| Scaly erythematous plaques on the extensor surfaces of the elbows and/or knees | 2.01 | 1.06, 3.82 | 0.032 | 0.701 |
| Well-demarcated erythematous rash in the napkin area involving the crural fold | 2.66 | 0.85, 8.30 | 0.091 | 1.050 |
| Family history | 3.66 | 2.05, 6.54 | 0.000 | 1.276 |

Table 1: Adjusted odds ratios (OR) and coefficients values of the seven best predictive diagnostic criteria in the prediction model. *multivariate analysis

### Diagnostic accuracy

Consensus agreed criteria - 84.6% sensitivity, 65.1% specificity, AUC 0.748 (0.700, 0.796). Best predictive criteria - sensitivity 76.8%, specificity 72.7% and AUC 0.84 (0.79, 0.88)

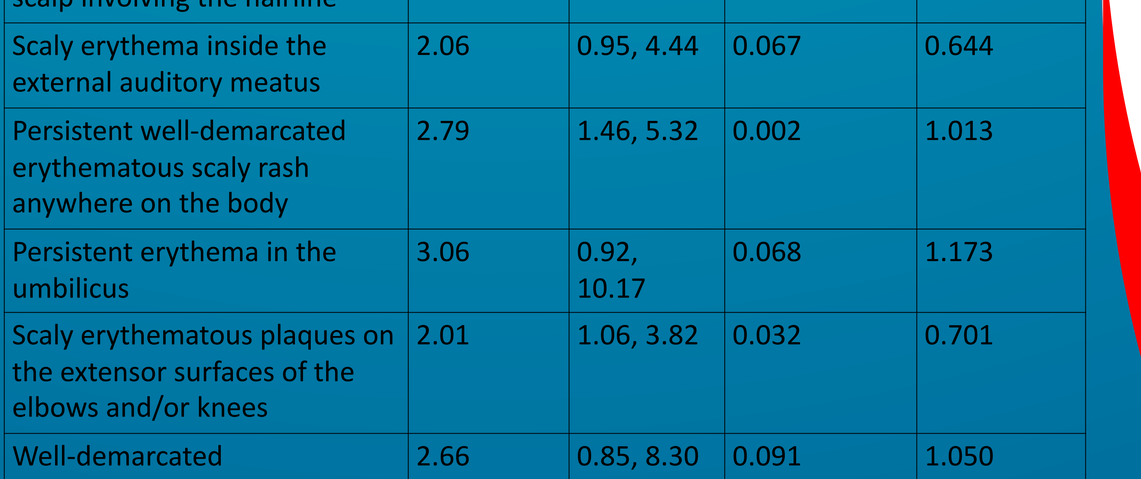


Figure 1: a) Receiver Operator Characteristic (ROC) curve of the consensus agreed criteria; b) ROC curve of the best predictive criteria. Complete case analysis (n=308).

## Potential Impact

1. Improved recognition of psoriasis in primary care and paediatrics.
2. Improved differentiation of juvenile idiopathic arthritis into juvenile psoriatic arthritis.
3. To assist epidemiological studies by providing a clear case definition.
4. To help standardise research globally in childhood psoriasis, permitting meta-analyses
5. To reduce the burden of disease in adulthood from early diagnosis of psoriasis and psoriatic arthritis.

## Conclusion:

Seven diagnostic criteria with good discriminatory ability in secondary care patients are proposed. Three of the best predictive criteria involve skin in hidden sites, such as umbilicus, groin flexures and external auditory meatus. These criteria will therefore be a helpful to prompt the examination of sites covered by hair or clothes. The DIPSOC study was designed as a development study and is a promising first step. Further validation studies are planned to validate in additional dataset and explore diagnostic performance in different settings.

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