

How frequently does palmoplantar psoriasis affect the palms and/or soles? A systematic review and meta-analysis

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Abstract

Introduction: Palmoplantar psoriasis (PPP) is a variant of psoriasis that affects the palms and/or soles. Although PPP is a disabling and therapeutically challenging condition, its epidemiology is poorly defined.

Aim: To assess the prevalence of PPP locations (palms, soles or both), and to analyse epidemiological and clinical characteristics of the disease.

Material and methods: Two bibliographic databases (MEDLINE and SCOPUS) were used as data sources searched from inception to October 2017. The selection of articles was limited to human subjects and English or French languages.

Results: A search resulted in a total of 293 articles, out of which 24 were utilized for the current systematic review and 21 for meta-analysis. All listed studies comprised a total of 2083 patients with PPP, with more males than females. According to the results of meta-analysis, majority of patients had the highest prevalence of both palms and soles involvement (95% CI: 47–67), with an almost equal prevalence showing palmar (21%; 95% CI: 13–30) or plantar (20%; 95% CI: 12–29) involvement. The most prevalent type of PPP was plaque/hyperkeratotic, followed by the pustular type.

Conclusions: Almost three-fifths (59%) of all PPP patients had involvement of both palms and soles, while exclusive palmar or plantar involvement was seen in 21% and 20% of patients, respectively. Future research should be performed to elucidate basic epidemiological and clinical characteristics of PPP, which would be helpful for proper consideration of this condition.

Key words: palmoplantar psoriasis, prevalence, epidemiology, systematic review, meta-analysis.

Introduction

Palmoplantar psoriasis (PPP) is a variant of psoriasis located on the palms and/or soles which often occurs along with psoriasis elsewhere on the body and less commonly may be the only skin manifestation [1, 2]. The prevalence of PPP in psoriasis patients varies between studies from 2.8% to 40.9% [3]. The lesions of PPP are

typically bilaterally symmetrical, although unilateral involvement may be seen [3]. PPP can express many different morphologic patterns ranging from thick hyperkeratotic plaques to pustular lesions with a spectrum of overlapping of both [1, 4, 5]. Unlike chronic plaque psoriasis, PPP has a significant discordance between body surface area (BSA) involvement and impact on health-related quality of life (QoL) [1]. Even though PPP

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involves a small percentage of the BSA, patients with this condition are more likely to suffer from greater QoL impairment than those with moderate-to-severe plaque psoriasis [6], and have significantly higher impairment at work/hobbies [7]. According to Pettey *et al.* [8], the unique impact of PPP involvement beyond common plaque psoriasis is primarily physical with a greater physical dysfunction and physical discomfort. Only a few studies compared QoL between patients with PPP on the palms and the soles. In the study of American psoriasis patients, QoL was overall more impaired due to psoriasis on the palms than on the soles [9], while the opposite was true in the study of Serbian psoriasis patients [10].

Although PPP is a disabling variant of psoriasis and therapeutically challenging condition which is often recalcitrant to various topical and systematic therapy [11–13], its epidemiology is poorly defined.

Aim

The aim of this systematic review and meta-analysis was to estimate the prevalence of PPP for each single location (palms or soles or both) and to find out which one is the most prevalent. In addition, we were interested to know the gender more affected by the PPP and the most common morphological type of this condition.

Material and methods

The present systematic review and meta-analysis were conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [14].

Identification of studies

The MEDLINE (via PubMed), and Elsevier's abstract and citation database SCOPUS were searched from inception to October 2017 by two independent investigators (Sojević Timotijević Z, Trajković G). The following search terms were used: psoriasis[ti] palmoplantar*[ti]. Searching was restricted to English and French language articles. There was no restriction on the type of psoriasis and patients age. We manually searched the references of all selected articles to identify other relevant studies.

Inclusion and exclusion criteria

Inclusion criteria of the selected studies were: (1) at least one sample of psoriatic patients designated as palmoplantar psoriasis; (2) published data on absolute frequency or proportion of number of patients with psoriasis involvement of (a) palms, (b) soles, and (c) both, or possibility to reconstruct such numbers based on the available data. The criterion for exclusion was the inability to find numbers or proportions of patients with PPP by single locations (palms, soles, or both).

Data extraction and analysis

While the titles and abstracts met the inclusion criteria, full-text articles were searched and screened independently by two investigators (Sojević Timotijević Z, Trajković G) to confirm eligibility and any disagreement was resolved by consensus or a third opinion (Janković S).

The following information was extracted: first author, year of publication, origin of the study, study design, study date, study population (sample size, percentage of men and women, mean age and/or age range of subjects), clinical type of psoriasis, PPP involvement of palms, soles, and both, involvement of the rest of the body, and baseline disease measures.

We used qualitative analysis to aggregate findings from selected studies and the random effects weighted analysis to obtain the pooled proportions with 95% confidence intervals (CI) of affected sites (palms, soles, and both), illustrated in a forest plot. The method of Barendregt and Doi [15] for meta-analysis of multiple categories was applied.

Results

In total 293 relevant articles that fit our search strategy were identified. The procedure for identifying and selecting eligible studies is shown in Figure 1. After removal of duplicates (126 records), 167 articles remained for screening. A further 11 articles were excluded through abstract screening. Of 156 articles available for full-text reading, 132 articles were excluded according to exclusion criteria. Finally, a total of 24 articles that fulfilled criteria were included in our systematic review [1, 3, 12, 16–36]. Out of 24 studies, 21 were included in the meta-analysis, while three studies did not fulfil the inclusion criteria [1, 16, 25] since data on involvement of palms and/or soles could not be precisely extracted for all PPP cases.

The basic characteristics of all 24 studies included in the review are presented in Table 1. Seven studies were intervention studies; the remaining 17 were observational in design. The included studies were conducted in 13 different countries (8 studies were from India, 2 from the USA, 2 from Israel, 2 from Austria, 2 from Germany and one study from each of the following countries: Japan, Canada, Kuwait, France, England, Italy, and Turkey). One study was a joint study from Italy and Austria.

All listed studies comprised a total of 2083 patients with PPP. According to available data from 22 studies, more males (1072) than females (841) were affected by PPP. For 170 patients from two studies, gender data were not available. The statistically significant predominance of men was noted in nine studies, while the predominance of women was seen in two studies. Ages of patients ranged from 8 [26] up to 87 years [30], whereas the mean age ranged from 37.4 years [17] to 58.5 years [20]. With the exception of two studies [25, 31], all the remain-

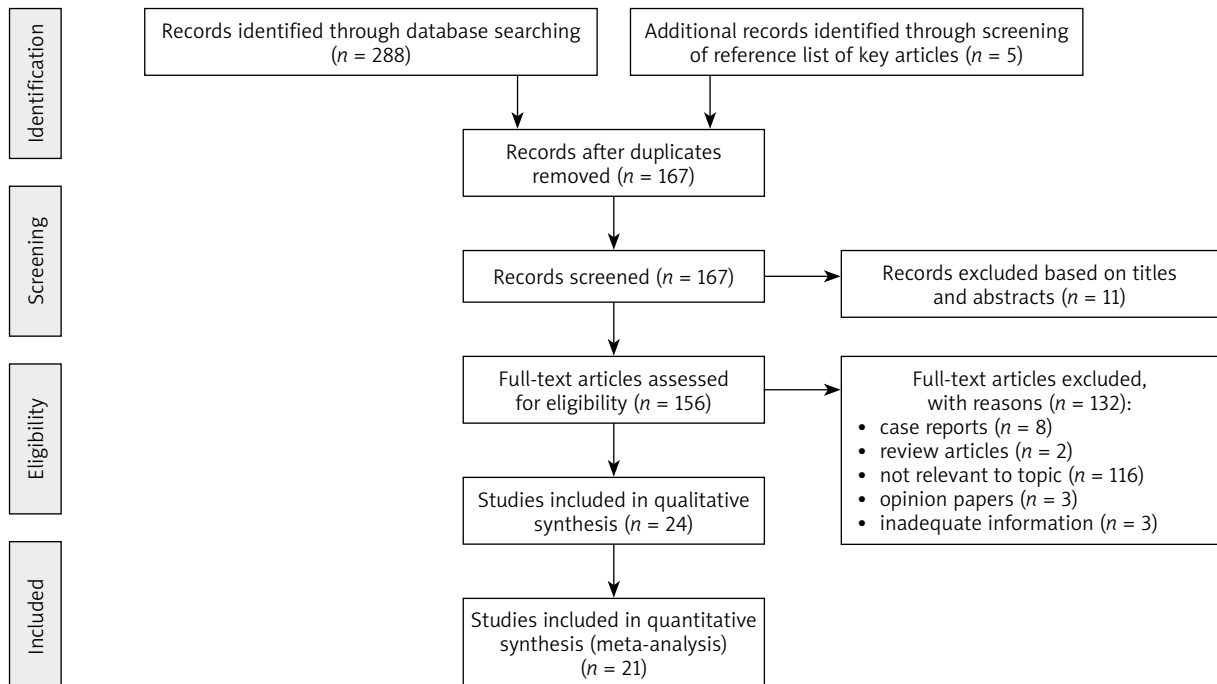


Figure 1. Flow diagram of study identification, inclusion and exclusion criteria

ing studies reported a clinical type/s of PPP as plaque/hyperkeratotic, pustular or mixed. The most common was the plaque/hyperkeratotic type.

In most studies (20) all three locations: palms, soles and both were affected by psoriasis, whereas in 4 remaining studies only two locations in each study were affected: palms and both palms and soles [18, 24], and soles and both palms and soles [28, 34]. Most studies (17) confirmed the involvement of the rest of the body, while data were not available in 7 studies.

To assess severity of PPP, different measures were used, such as involved palmoplantar surface area (PPSA), involved BSA outside the palmoplantar region, physician's global assessment (PGA) score for extra-palmoplantar lesions, psoriasis area and severity index (PASI), modified palmoplantar (pustular) psoriasis area and severity index (m-PPASI), severity index (SI), erythema, scaling and induration (ESI) score; and erythema, scaling, induration and fissuring (ESIF) score. In addition, two QoL instruments were used: dermatology life quality index (DLQI), and palmar-plantar QoL index (PPQoLI). For the body involvement with psoriasis, different cutoff levels were reported: four cutoff levels for the involvement of PPSA: $\geq 10\%$ [19], $\geq 30\%$ [26, 27], $> 30\%$ [23, 32], and $\geq 50\%$ [1, 12]; and two cutoff levels for the involvement of BSA outside the palms and soles: $\leq 5\%$ [21, 23, 26, 32], and $\leq 30\%$ [3, 31]. PGA score for extra-palmoplantar lesions was used in three studies [19–21], and m-PPASI was used in two studies [12, 19]. Most studies used more than one measure. Only six studies [3, 23–25, 35, 36] re-

ported data on unilateral/bilateral distribution of lesions on palms and soles, with more frequent bilateral lesions.

Prevalence of PPP in all psoriasis patients

The prevalence of PPP as a part of a larger study on psoriasis was noted in six studies included in this analysis [1, 3, 12, 16, 17, 35]. It ranged from 10.1% [17] to 59% [35], and even to 76% [12] of all psoriasis patients.

Prevalence of PPP locations

Most studies (18) reported that the prevalence of PPP of both palms and soles was higher (ranging from 15% to 96%), than the prevalence of palmar or plantar single location (ranging from 0 to 50% and from 0 to 44%, respectively) (Table 1).

When considering the 21 studies included in the meta-analysis, the highest PPP prevalence was seen for both palms and soles involvement (59%; 95% CI: 47–67). The prevalence of each single location, i.e. of palms (21%; 95% CI: 13–30), and of soles (20%; 95% CI: 12–29) involvement was almost equal. Random effects pooling was used due to significant heterogeneity ($Q = 298.38$; $p < 0.001$, $I^2 = 93\%$). The proportions of PPP in individual studies and their weighted average by specific locations are shown in Figure 2.

Discussion

The prevalence of PPP locations showed high variability between studies varying from 15% to 96% when

Table 1. Description of studies included in the systematic review and meta-analysis of palmoplantar psoriasis

First author, year	Country	Type of study	Study dates	Study population	Clinical type	Palms/soles involved, n (%)	Rest body involved	Disease measures
Adißen, 2009*	Turkey	Retrospective cohort study	2003–2007	114 patients Age range: 10–72 y 50 males and 64 females	Plaque or hyperkeratotic Pustular	P or S: 22 (19.2) PS: 92 (80.7)	NA	NA
Al-Mutairi, 2014	Kuwait	Case-series	January 2011 to January 2013	103 patients Mean age: 37.4 y; range: 15–71 y 62 males and 41 females	Plaque Pustular	P: 14 (13.6) S: 22 (21.4) PS: 67 (65)	Yes	NA
Angelovska, 2014	Germany	Case-series	2007–2012	6 patients Age range: 41–57 y 5 males and 1 female	Hyperkeratotic Pustular	P: 5 (83.3) S: 0 (0) PS: 1 (16.7)	Yes	NA
Bissonnette, 2011	Canada	Randomized double blind trial	February 2007 to July 2008	24 patients 9 males and 15 females	Plaque	P: 2 (8.3) S: 2 (8.3) PS: 20 (83.4)	Yes	PPSA ≥ 10%; m-PPASI ≥ 8; PGA; DLQI
Brunasso, 2010	Austria	Case-series	January 2005 to December 2009	19 patients Mean age: 58.5 y; range: 41–79 y 8 males and 11 females	Pustular	P: 6 (31.6) S: 4 (21.0) PS: 9 (47.4)	Yes	PGA score ≤ 2 outside the PPSA
Brunasso, 2013	Italy and Austria	Retrospective case-series	January 2005 to January 2010	90 patients, mean age: 57.7 y; range: 11–82 y 45 males and 45 females	Plaque Pustular	P: 21 (23.3) S: 19 (21.1) PS: 50 (55.6)	Yes	BSA outside the PPSA ≤ 5%; PGA score ≤ 2 outside the PPSA
Coleman, 1989	United States	Retrospective cohort study	April 1986 to November 1987	11 patients Age range: 32–69 y 5 males and 6 females	Plaque Pustular	P: 3 (27.2) S: 4 (36.4) PS: 4 (36.4)	NA	Four point scale score
Farley, 2009*	United States	Retrospective cohort study	August 2006 to March 2008	150 patients	Hyperkeratotic Pustular Hyperkeratotic/pustular Indeterminate	P: 21 (14.0) S: 10 (7.0) P or S: 27 (18.0) PS: 92 (61.0)	Yes	PPSA ≥ 50%; BSA outside the PPSA; PPQoLI
Haseena, 2017	India	Open trial	October 2009 to September 2010	28 patients, mean age: 42.2 y; range: 14–68 y 17 males and 11 females	Plaque or hyperkeratotic	P: 8 (28.6) S: 13 (46.4) PS: 7 (25)	Yes	PPSA > 30%; BSA outside the PPSA ≤ 5%; ESIF score
Hofer, 2006	Austria	Randomized trial	NA	8 patients Mean age: 50 y, range: 26–65 y 3 males and 5 females	Pustular Hyperkeratotic	P: 2 (25.0) S: 0 (0) PS: 6 (75.0)	NA	SI (erythema, infiltration, scaling and vesicles)
Janagond, 2013	India	Randomized trial	January 2011 to February 2012	100 patients Age range: 17–53 y 59 males and 41 females	Plaque	P: 3 (3.0) S: 1 (1.0) PS: 96 (96.0)	Yes	PPSA ≥ 50%; m-PPASI

Table 1. Cont.

First author, year	Country	Type of study	Study dates	Study population	Clinical type	Palms/soles involved, n (%)	Rest body involved	Disease measures
Khandpur, 2011*	India	Case-series	2006–2008	154 patients, age range: 21–50 y (for 67% of patients) 111 males and 43 females	NA	P: 24 (15.6) S: 22 (14.3) P or S: 33 (21.4) PS: 75 (48.7)	Yes	NA
Kumar, 1997	India	Randomized trial	NA	28 patients Age range: 8–60 y 12 males and 16 females	Plaque	P: 4 (14.3) S: 9 (32.1) PS: 15 (53.6)	Yes	PPSA ≥ 30%; BSA outside the PPSA ≤ 5%; ESI score
Kumar, 2002	India	Retrospective cohort study	1993–2000	532 patients Age range 6–73 y 282 males and 250 females	Plaque/hyperkeratotic Pustular	P: 43 (8.1) S: 236 (44.4) PS: 253 (47.5)	Yes	BSA outside the PPSA ≤ 30%
Kumar, 2004	India	Open trial	NA	14 patients Mean age: 41.5 y; range: 18–52 y 11 males and 3 females	Plaque	P: 2 (14.3) S: 2 (14.3) PS: 10 (71.4)	NA	PPSA ≥ 30%; ESIF score
Lawrence, 1984	England	Randomized double blind trial	NA	20 patients	Hyperkeratotic Pustular	P: 0 (0) S: 5 (25.0) PS: 15 (75.0)	Yes	NA
Lior, 2010	Israel	Open trial	NA	7 patients Mean age: 47 y; range: 27–68 y 4 males and 3 females	Plaque	P: 3 (42.9) S: 1 (14.2) PS: 3 (42.9)	Yes	NA
Lozinski, 2016	Israel	Retrospective cohort study	2010–2012	248 patients Age range: 10–87 y 143 males and 105 females	Plaque	P: 23 (9.3) S: 16 (6.4) PS: 209 (84.3)	Yes	NA
Nisticò, 2006	Italy	Open trial	NA	54 patients Mean age: 48 y 29 males and 25 females	NA	P: 27 (50.0) S: 19 (35.2) PS: 8 (14.8)	Yes	BSA outside the PPSA ≤ 30%; PASI
Ravi Kumar, 1999	India	Case-series follow-up	NA	15 patients Age range: 22–65 y 9 males and 6 females	Plaque	P: 1 (6.7) S: 5 (33.3) PS: 9 (60.0)	Yes	PPSA > 30%; BSA outside the PPSA ≤ 5%; ESIF score
Redon, 2010	France	Case-series	November 2001 to April 2008	92 patients Mean age: 47 y 54 males and 38 females	Plaque/pustular	P: 43 (46.7) S: 7 (7.6) PS: 42 (45.7)	NA	NA
Tanaka, 2000	Japan	Case-series	NA	9 patients Age range: 25–80 y 4 males and 5 females	Pustular	P: 0 (0) S: 2 (22.2) PS: 7 (77.8)	NA	PASI

Table 1. Cont.

First author, year	Country	Type of study	Study dates	Study population	Clinical type	Palms/soles involved, n (%)	Rest body involved	Disease measures
Venkatesan, 2015	India	Cross-sectional hospital based study	January to June 2014	236 patients Age range: 20–60 y [†] 142 males and 94 females	Plaque	P: 66 (28.0) S: 47 (19.9) PS: 123 (52.1)	Yes	NA
Wilkinson, 1979	Germany	Case-series	NA	21 patients Age range: 31–75 y 8 males and 13 females	Plaque or hyperkeratotic Pustular	P: 7 (33.3) S: 4 (19.0) PS: 10 (47.7)	NA	NA

[†]Not included in meta-analysis, for all psoriasis patients, PP – palmoplantar psoriasis, P – palms, S – soles, PS – both palms and soles, NA – not available, y – year, BSA – body surface area, PPSA – palmoplantar surface area, PGA – physician's global assessment, m-PPPSI – modified palmoplantar (pustular) psoriasis area and severity index, DLQI – dermatology life quality index, PPQoL – palmar-plantar quality of life index, PASI – psoriasis area and severity index, SI – severity index, ESI – erythema, scaling, induration, fissuring.

considering both palms and soles, while the palms and soles involvement was seen from 0% to 50%, and from 0% to 44%, respectively.

The meta-analysis revealed that the prevalence of PPP of both palms and soles (59%) was almost three times higher than the prevalence of any single location of PPP, i.e. either palms (21%) or soles (20%) involvement. However, there was no statistically significant difference between palmar and plantar involvement (80% vs. 79%), which is in accordance with several studies from the West [37, 38]. In contrast, Indian authors reported that plantar involvement in their patients was twice more common than palmar involvement, and attributed this to the Indian custom of walking barefoot or wearing open slippers most of the time [3, 39].

There is a paucity of information about gender differences in psoriasis [40], especially in localized psoriasis variants such as PPP [41]. Our results suggest that more males than females were affected by PPP. This topic should deserve more attention in the future, with special focus on the practical implications that gender-specific characteristics may have on the prognosis and therapy of PPP [40].

According to the results of this review, ages of patients ranged from 8 to 87 years, which is in accordance with the previous finding that PPP affects individuals of all ages [41]. In the study by Chung *et al.* [6], patients with PPP were older than patients with plaque psoriasis with mean ages of 53.8 years vs. 48.7 years, respectively.

PPP can be seen in many different clinical forms [5]. It features hyperkeratotic, pustular, or mixed morphologies [41]. In this review, patients displayed predominantly plaque/hyperkeratotic palmoplantar lesions, followed by pustular lesions and their combination (plaque/pustular). Only in two studies [20, 34], pure palmoplantar pustulosis is recognised as a subtype of psoriasis, which is in agreement with other studies [42, 43]. The results of a study conducted by Brunasso *et al.* [21] suggest a close relationship between PPP and palmoplantar pustulosis and that the existing data concerning epidemiology, clinical presentation, genetics, histopathology and pathogenesis do not permit a clear distinction between these two entities. However, most genetic studies in last two decades have provided evidence that palmoplantar pustulosis is a disease distinct from psoriasis [44–49]. According to a recently published systematic review of palmoplantar pustulosis, there are no sufficient data to exclude this condition from the psoriasis group [50]. Future studies are needed to elucidate this still controversial issue.

PPP may exist separately or may be associated with psoriasis elsewhere on the body [5]. Almost 40% of the patients from 15 studies included in this review had an isolated form of PPP without lesions elsewhere. Kumar *et al.* [3] reported the highest percentage of the patients (almost 70%) with isolated PPP as a consequence of longer persistence/refractory nature of lesions at palms and/or soles.

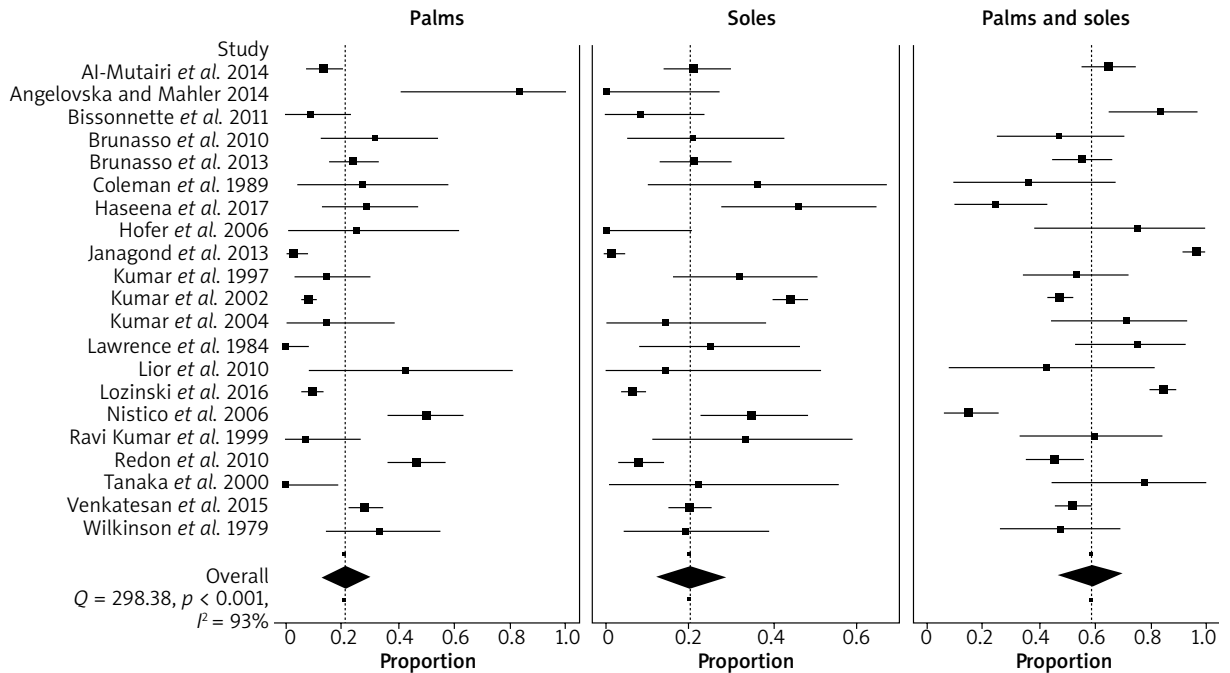


Figure 2. Forest plot depicting proportions with their confidence intervals from the studies comparing involvement of affected sites in patients with palmoplantar psoriasis

There is no universally accepted definition of mild, moderate and severe PPP. It is well known that PPP severity appeared independent from the degree of BSA involvement [1] and that even mild psoriasis located on the palms and/or soles frequently needs more intensive therapy than does psoriasis elsewhere [4]. For the assessment of PPP severity, different traditional measures with different cut-off levels were used in the studies included in this review. However, the researchers agreed that the level of functional impairment should be taken into account, rather than relying on traditional measures [1, 4, 6]. Two assessment tools specifically tailored to patients with PPP were developed to help clinicians to measure the severity of PPP and response to treatment: m-PPPASI [19, 51] and PPQoLI [1].

The lesions of PPP are almost always bilaterally symmetrical, which was well illustrated in all studies with available data, with a high percentage of patients showing this pattern (100% in the studies by Wilkinson *et al.* [36], Hofer *et al.* [24], and Haseena *et al.* [23]; and between 79% and 96% in the studies by Khandpur and Sharma [25], Venkatesan *et al.* [35], and Kumar *et al.* [3].

This is the first systematic review and meta-analysis of the PPP prevalence according to the affected locations and basic epidemiological and morphological characteristics. However, the results of this review should be considered in light of some limitations. Our sample was not comprehensive. We focused in our literature search on the terms “palmoplantar” and “psoriasis”, and only papers written in English and French language were considered.

Conclusions

According to our results, even three fifths of all PPP patients had involvement of both palms and soles (59%), while two fifths of them had either the palm (21%) or sole (20%) involvement. Males were more affected by PPP than females. The data concerning the percentage of involved PPSA and BSA outside the PPSA, as well as data concerning unilateral/bilateral involvement of the palms and/or soles, were lacking in most studies. Also there is no consistency between studies in determining disease measures used as inclusion criteria, and their cutoff values. Future research should be performed to elucidate basic epidemiological characteristics of PPP and to assess which location of PPP (palms or soles) causes greater physical discomfort and functional disability which probably would be helpful for proper consideration of this debilitating and therapeutically challenging condition.

Acknowledgments

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Conflict of interest

The authors declare no conflict of interest.

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