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Literature Review of Stucco Keratosis - Epidemiology, Diagnosis, and Management Strategies

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ABSTRACT

Stucco keratosis is a benign, asymptomatic skin condition characterized by small, white-to-gray papules, typically observed on the lower extremities of older adults. It is a relatively common dermatological finding in elderly populations, especially in males. Nonetheless, it remains under-declared in the literature, with limited consensus regarding its etiology, pathogenesis, and optimal management. The clinical importance of stucco keratosis is questionable, including its potential misdiagnosis as other keratotic lesions, such as seborrheic keratoses or actinic keratoses. Furthermore, data on effective outcomes and rates of recurrence are limited. This review aims to summarise current evidence in order to clarify diagnostic criteria and examine the range of interventions. It also synthesizes and critically appraises the existing literature on stucco keratosis in terms of epidemiology, clinical features, differential diagnosis, and treatment approaches. There are no existing systematic reviews addressing this topic, which underscores the need for a comprehensive summary. This systematic review includes case reports, observational studies, clinical trials, clinico-pathological studies, molecular studies, and reviews related to stucco keratosis. Data from PubMed, Embase, Web of Science, and Cochrane Library databases on incidence, diagnostic accuracy, intervention efficacy, and recurrence have been extracted and narratively synthesized. A better understanding of stucco keratosis may help dermatologists differentiate it from clinically similar lesions and select appropriate management strategies, particularly in elderly patients. Findings from this review can support future research and clinical guidelines.

Keywords: stucco keratosis, keratosis alba, seborrheic keratosis, elderly dermatology

1. INTRODUCTION

Description and Clinical Features

Stucco keratosis is a benign epidermal lesion that was first observed by Kocsard and Ofner in 1958. They described lesions seen in 24 male patients during a survey on 250 geriatric patients (Kocsard et al., 1958). The lesions are usually asymptomatic, although they may occasionally itch or become irritated by friction (Braun-Falco and Weissmann, 1978; Shall et al., 1991). The lesions commonly appear on the lower legs, particularly in the distal tibial and ankle regions, but they may also be found on the feet, forearms, and trunk (Shall et al., 1991). In histology, stucco keratosis is characterized by hyperkeratosis, mild acanthosis, and papillomatosis.

Differential Diagnosis

Due to their keratotic and superficial nature, stucco keratoses can be mistaken for other cutaneous lesions, necessitating careful clinical differentiation. Common differential diagnoses include viral warts, seborrhoeic keratosis, squamous cell carcinoma, actinic keratosis, acrokeratosis verruciformis of Hopf, lichen planus, lichen nitidus, arsenical keratosis, hyperkeratosis lenticularis perstans (Flegel disease), and epidermodysplasia verruciformis. Differentiating stucco keratosis from actinic keratosis is very important because of the carcinomatous potential of the latter.

Epidemiological Profile

The condition occurs in older individuals and is relatively common in men older than 40. Exact prevalence is not known as many patients are not reported due to asymptomaticity, but based on clinical experience and case series, it is shown to be a fairly common condition in elderly men (Kocsard and Carter, 1958). It has been described all over the world, but it is reported more commonly in populations with lighter skin phototypes. There are no strong associations with sun exposure, systemic disease, or environmental factors, although some hypotheses suggest that aging skin or reduced hydration may play a role in lesion development.

Current State of Knowledge

Despite being a frequently encountered dermatologic finding in outpatient settings, the literature on stucco keratosis remains sparse. Most available data come from isolated case reports, small case series, or dermatology textbook descriptions, with very few studies exploring pathophysiology, etiology, or treatment outcomes in depth. There are currently no standardized diagnostic criteria, so a diagnosis is typically based on clinical appearance. Histopathological confirmation is not routinely performed unless atypical features are present. Similarly, treatment protocols are not well-defined. Most clinicians do not treat the lesions unless they are cosmetically concerning or symptomatic. Suggested treatments include cryotherapy, curettage, or topical keratolytics, but no comparative studies exist to evaluate their efficacy or recurrence rates. A preliminary literature search reveals no existing systematic reviews that comprehensively address the epidemiology, diagnosis or treatment of stucco keratosis, highlighting a clear gap in the dermatological evidence base.

2. REVIEW METHODS

PubMed, Embase, Web of Science, and Cochrane Library were searched using keywords such as ‘stucco keratosis’, ‘benign keratosis’, ‘keratosis alba’, and ‘elderly dermatology’. A total of twenty manuscripts were considered in this systematic review, including eight case reports, three observational studies, two clinical trials, two molecular studies, one clinical report, one clinico-pathological report, and three reviews. No systematic reviews or meta-analyses specifically focusing on the topic were found. After a thorough analysis, four case reports, one clinical trial, and one review were excluded from further study, as they were found to be outdated or irrelevant to the topic. The selection process is shown in Figure 1.

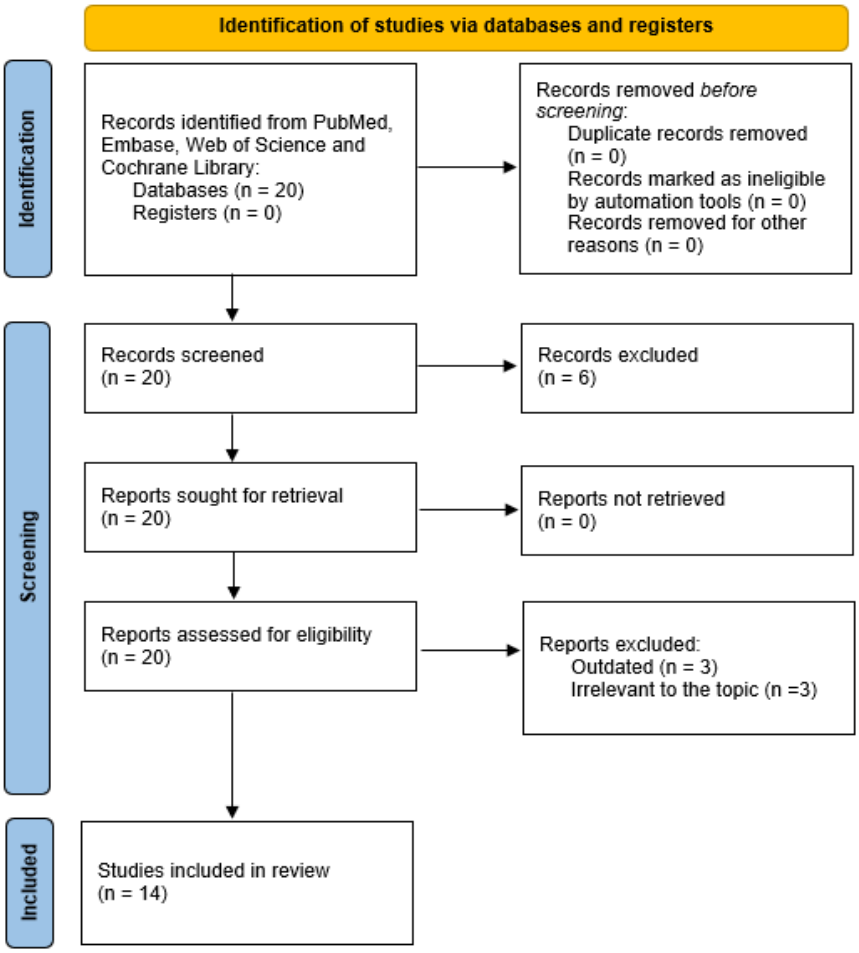

Figure 1. PRISMA diagram showing the article selection process.

3. RESULTS & DISCUSSION

The most important features and results of selected studies on stucco keratosis are summarised in Table 1.

Table 1. Summary of selected studies included in the review.

Author (Year)	Country	Study Type	Sample Size	Main Findings
Zhou et al., 2024	China	Case report	1	Stucco keratosis associated with *Malassezia* infection treated successfully with itraconazole
Gorai et al., 2022	India	Review article	Not applicable	Current treatment methods remain safe and generally effective
Kato and Yamamoto, 2015	Japan	Case report	1	Stucco keratosis is not related to esophageal cancer
Abdel-Azim et al., 2015	Egypt	Observational study	50	Dermatoscopy is crucial in differentiating various keratoses from skin cancers
Alapatt et al., 2016	India	Observational study	50	Network-like structures are the most common dermoscopic finding in stucco keratosis and hyperpigmentation is the most common histopathological finding.
Hafner et al., 2010	Germany	Molecular study	7	FGFR3 and PIK3CA mutations are

				involved in the pathogenesis of stucco keratosis.
Hafner et al., 2010	Germany	Molecular study	175	Potentially oncogenic mutations in FGFR3, PIK3CA, and HRAS in stucco keratosis were different from mutations in those genes found in malignant tumors
Wood et al., 2013	USA	Clinical report	25	Patients generally prefer cryosurgery to curretage because of reduced wound care, despite experiencing more pain during the procedure.
Stockfleth et al., 2000	Germany	Case report	1	Stucco keratosis associated with *HPV* infection treated successfully with imiquimod.
Shall and Marks, 1991	Great Britain	Clinico-pathological study	8	Etretinate effective in treatment of stuccokeratosis.
Braun-Falco and Weissmann, 1978	Germany	Review	Not applicable	Stucco keratosis is a typical find on the skin of elderly patients, especially males.
Kocsard and Carter, 1971	Australia	Observational study	250	Stucco keratosis is reversible
Smith et al., 1971	USA	Case report	1	Keratosis alba as a variant of stucco keratosis
Kocsard et al., 1958	Australia	Case report	1	A first report of stucco keratosis

Clinical Presentation

The findings supported that stucco keratosis predominantly affects older adults, with a mean age of diagnosis ranging from 40 to 60 years. In the first studies on the topic, lesions were found in 10 to 20% geriatric patients (Kocsard et al., 1958). 7% of them were male and 3% were female. The lesions were commonly found on sun-exposed areas, such as the lower legs and feet (however, not on the head, face, and neck), and were described as small, rough, 'stuck-on' papules. In one isolated case, stucco keratosis was diagnosed in a 20-year-old woman and was present on her mons veneris (Zhou et al., 2024).

While it is most commonly used as a synonym for stucco keratosis, keratosis alba may be a separate or closely related dermatologic condition more commonly seen in those with darker skin types. One manuscript characterizes keratosis alba in darker skin as slightly elevated, hypopigmented lesions exhibiting a cauliflower-like surface and minimal adherent scaling that can not be removed easily (Smith et al., 1971).

Several case reports provided unique clinical insights. Notably, a single manuscript reported stucco keratosis in a patient with esophageal cancer. Although both conditions occurred at the same time, there was no significant improvement of the stucco keratosis following successful chemotherapy. This fact suggested that the two conditions were more likely coincidental rather than causally related (Kato and Yamamoto, 2015). In two cases, stucco keratosis appeared to be associated with local infection. Microbiological analysis showed human papillomavirus (HPV) in one patient's skin lesions (Stockfleth et al., 2015) and spores of Malassezia fungus were found in the other case. (Zhou et al., 2024).

Histopathological Findings

Stucco keratosis histologically resembles a hyperkeratotic seborrheic keratosis, showing orthohyperkeratosis and a church-spire-like epidermal papillomatosis ('saw-tooth pattern'). Horn cysts can be present in about half of the cases. The histopathological characteristics of stucco keratosis were consistent across the studies, with common findings including thickening of the epidermis, compact orthokeratosis, and mild acanthosis. No evidence of atypical cellular features was found, confirming the benign nature of the condition (Kocsard et al., 1958; Shall and Marks, 1991; Alapatt et al., 2016).

Features in dermoscopy

Stucco keratosis has a spectrum of features on dermoscopy. Morphological index, like well-defined borders, sometimes bibliomedica.COM Portions of a tumor that differed in their several days with reticular pattern, and not associated with a network-like structure, comedo-like openings, milia-like cysts. Some of the lacerations may have moth-eaten edges and fascicles and ridges forming a cerebriform pattern on the surface. Hairpin vessels can occasionally be seen, usually with a surrounding whitish halo. These features support the benign nature of the lesion and help distinguish it from malignant skin conditions (Alapatt et al., 2016; Abdel-Azim et al., 2015).

Molecular Findings and Related Evidence

One study detected PIK3CA mutations in stucco keratoses – mutations also commonly found in seborrheic keratoses, particularly hyperkeratotic subtypes. This genetic overlap supports the hypothesis that stucco keratosis may represent a variant within the spectrum of seborrheic keratoses. Further, other reviewed studies have shown that multiple oncogenic mutations – including FGFR3, PIK3CA, and RAS – are frequently present in seborrheic keratoses, despite their benign behavior and lack of malignant potential (Hafner et al., 2010). These findings reinforce a growing consensus that the presence of oncogenic mutations alone does not necessarily confer malignancy in keratinocytic tumors. Instead, additional genetic or epigenetic events are likely required for malignant transformation, which appears absent in stucco keratosis.

Management and Treatment

As stucco keratosis is typically asymptomatic and has minimal clinical impact, most patients were managed conservatively (Kocsard et al. 1958; Shall and Marks, 1991; Scott et al., 1971). However, several treatment options were noted in the studies. Two patients with numerous lesions who were treated with etretinate (initially in a 1 mg/kg/day dose for a month and then 0,5 mg/kg/day for another month). They showed a dramatic clinical improvement, which, however, lasted for 6 months only. One of the patients requested further treatment and remained lesion-free after one month of a 1 mg/kg/day etretinate dose and then a maintenance dose of 25 mg (Shall and Marks, 1991). One patient was successfully treated with topical maxacalcitol, demonstrating that topical vitamin D analogs could be a viable treatment in some instances. A unique case involving the human papillomavirus (HPV) has been identified in a case of stucco keratosis. The patient reacted positively to topical 5% imiquimod, and imiquimod could be useful, especially in those with HPV-driven skin lesions (Stockfleth et al., 2015). Another pathogen-related case documented an unusual association between stucco keratosis and Malassezia infection, with oral antifungal therapy. Traditional treatments like cryotherapy and curettage were also widely applied, with a high cure rate and minimal recurrence, though recurrence was more frequent in cases treated with cryotherapy. The bottleneck for the widespread application of these procedures was the numerous skin lesions seen in some of the patients, which made excision challenging (Shall and Marks, 1991; Wood et al., 2013; Gorai et al., 2022).

Complications and Recurrence

Recurrence rates varied across studies; however, the majority showed no significant recurrences. Furthermore, no reports of malignant conversion were reported, confirming the benign nature of stucco keratosis.

Synthesis of Findings

All studies uniformly emphasize the benign nature of stucco keratosis with clinical and histopathological findings. While most cases require no treatment, treatment modalities such as cryotherapy, curettage, and various topical oxidation inducers like maxacalcitol have been effective in symptomatic patients. The review also highlights rare associations with Malassezia infection and HPV (both of which responded well to appropriate treatments), which may open a new perspective for exploring the pathogenesis of keratoses.

This review offers a complete summary of the prevalent knowledge on stucco keratosis – a benign, keratotic skin lesion most frequently affecting older adults with a history of chronic sun exposure (Kocsard et al., 1958; Braun-Falco et al., 1978; Shall and Marks, 1991). Clinically and histopathologically well-defined, the condition is mainly asymptomatic and managed conservatively (Alapatt et al., 2016, Abdel-Azim et al., 2015). However, recent reports and molecular findings enrich our knowledge of stucco keratosis beyond the clinical presentation, pointing to novel directions for etiological investigations and treatment (Hafner et al., 2010).

Interpretation of Results

Stucco keratosis appears as small gray-white papules with a rough surface and a 'stuck-on' appearance, typically of the lower limbs. Histopathological features consistently include compact orthokeratosis, mild acanthosis, and absence of cytologic atypia. These findings reaffirm its benign character and its differentiation from pre-malignant or malignant lesions.

While the majority of lesions are self-limiting and asymptomatic, some cases warrant intervention due to cosmetic or symptomatic concerns. Classical treatments such as cryotherapy and curettage are still considered the initial choice as they are relatively safe and provide low recurrence rate. Patients generally prefer cryosurgery to curettage because of reduced wound care, despite experiencing more pain during the procedure (Wood et al., 2013). Creams that contain salicylic acid or urea — both of which can help to soften thickened skin — are effective treatments for conditions similar to stucco keratosis, though not enough research exists to confirm their efficacy for stucco keratosis specifically. Etretinate, a drug used successfully in other skin disorders, offers some temporary relief in some cases of stucco keratosis. But because its effects are transient and it might have serious side effects, it is not as reliable as other established treatments are believed to be. Additionally, this review identified emerging therapeutic options: topical maxacalcitol, a vitamin D analog, was effective in one case; topical imiquimod (5%) produced a good response in a patient with HPV-associated stucco keratosis; and a case of stucco keratosis associated with Malassezia infection responded well to antifungal therapy. These cases highlight the potential role of infectious or immunological factors in the pathogenesis of some stucco keratoses.

Importantly, this review also identified molecular evidence linking stucco keratosis to other benign keratinocytic neoplasms. Together, these molecular findings challenge the historical perception of benign keratoses as purely degenerative or age-related and instead suggest that they may arise through defined, mutation-driven pathways – albeit with self-limiting growth behavior.

Context of Other Evidence

The clinical and histopathological findings in this review are consistent with the broader literature on benign keratotic lesions. Previous studies have shown that sun exposure and advanced age are the main risk factors, with lesions typically appearing in sun-exposed areas. However, this does not explain why the face, head, and neck are usually not affected.

The recent molecular evidence linking stucco keratosis to seborrheic keratosis makes a substantial contribution to our knowledge base. While these entities are often distinguished according to the location and surface properties, they could have a common molecular pathogenesis. These insights may eventually guide molecular-risk categories or impact treatment decisions.

Moreover, the finding of HPV and Malassezia in single cases brings up interesting issues regarding possible secondary effects in lesion development, recurrence, or resistance to treatment.

Limitations of the Review

Several limitations should be acknowledged:

1. Study Design: The majority of studies in this review are case reports or small series, which limits generalizability.
2. Sample Size: Small cohorts limit statistical power and the ability to draw firm conclusions on treatment efficacy or recurrence risk.
3. Heterogeneity: Variability in patient characteristics, diagnostic criteria, and treatment approaches limited the ability to perform pooled analysis or meta-synthesis.
4. Molecular Data: While the presence of oncogenic mutations is compelling, molecular analyses were only performed in a subset of studies, often without direct comparison groups or controls.

Implications for Practice and Policy

The findings affirm that stucco keratosis is a benign, often incidental finding that typically does not need treatment. However, cosmetic concerns, uncertain diagnosis, or patient preference may cause the need for intervention. Traditional treatments including cryotherapy and curettage are successful, but emerging treatments with topical maxacalcitol may provide an alternative in certain cases. The effectiveness of topical keratolytic agents such as salicylic acid and urea, as well as etretinate, has not yet been proven due to the lack of targeted studies.

Clinicians should also be aware of the rare but possible associations with HPV, fungal infection, and underlying malignancies, even if the latter appear coincidental. From a diagnostic standpoint, differentiating stucco keratosis from actinic keratosis, seborrheic keratosis, and early squamous cell carcinoma is critical to avoid mismanagement. A diagnosis of stucco keratosis can be made solely on

the basis of the clinical picture or in correlation with shave biopsy to exclude other diagnoses (such as skin cancer). In case of any doubt, dermoscopy is a quick and non-invasive method that allows to confirm the diagnosis with great accuracy.

From a policy perspective, the growing molecular understanding of benign keratoses may eventually inform classification systems, highlight targets for topical therapy, or enable the development of precision dermatology approaches – even for benign lesions.

Future Research Directions

This review identifies several promising areas for future investigation:

1. Molecular Profiling: Larger studies using genomic and transcriptomic tools are needed to confirm the presence and functional significance of mutations (e.g., PIK3CA, FGFR3, RAS) in stucco keratosis.
2. Comparative Studies: Direct comparisons between stucco keratosis and seborrheic keratosis at the molecular and immunologic levels could help refine nosological units.
3. Role of Infectious Agents: Future studies should address the frequency and clinical significance of HPV and Malassezia among these lesions.
4. Treatment Trials: Randomized controlled trials comparing conventional versus new therapies, such as topical agents (maxacalcitol and imiquimod), would contribute to establish evidence-based recommendations for management of stucco keratosis.
5. Long-Term Results: Studies with longer follow-up could be helpful to elucidate rates of recurrence and verify the absence of malignant transformation.

4. CONCLUSION

Stucco keratosis is a benign, age-related skin condition, which has not been associated with a known malignant potential. Molecular findings, including PIK3CA mutations, support a common pathogenesis with seborrheic keratosis. Although there are some emerging reports of associations with infections such as Malassezia and HPV, these are yet to be validated. Conservative therapy methods are still successful, and newer topical treatments show alternatives for advanced cases. Further research is needed to elucidate the mechanisms of pathogenesis, to assess new therapeutic options, and to investigate possible infectious associations.

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Author contributions

All authors contributed significantly to the preparation of this manuscript. Danuta Borowska conceived and designed the review topic and supervised the project. Julia Urbańska, Julia Sztubińska and Marta Tortyna conducted the literature search and data extraction. Kamil Nieczaj, Olga Samsel, Natalia Sioch performed critical analysis and interpretation of the collected data. Paula Szarek and Maciej Trzciński contributed to the writing of the manuscript draft. Marta Marciniak coordinated the final editing and formatting of the manuscript. Wojciech Modzelewski was responsible for statistical analysis and visual representation of the data. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Informed consent

Not applicable.

Ethical approval

Not applicable.

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Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data associated with this work are present in the paper.

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