Palmoplantar Keratoderma: A clinico-Epidemiological Study

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ABSTRACT:

BACKGROUND:

palmoplantar keratoderma (PPK) is an umbrella term for any form of persistent thickening of the epidermis at palmar and/or plantar surfaces, and includes hereditary and acquired conditions. PPK can manifest clinically as diffuse, focal and punctate forms.

OBJECTIVE:

To study the frequency, clinical features and etiological correlation of hereditary and acquired PPK.

PATIENTS AND METHODS:

The study is observational, descriptive and cross-sectional. It was conducted at the Dermatology Center, Medical City, Baghdad Teaching Hospital, during the period from February 2019 to April 2020 patients with hereditary and acquired PPK were included in this study. Detailed history, clinical examinations and investigations when appropriate were done to reach the diagnosis.

RESULTS:

Two hundred and eighty patients with PPK were enrolled in this study; 138 (49.3%) were males and 142 (50.7%) were females. Patients were divided into 2 groups; group A (hereditary PPK) included 22 patients (8%) with mean±SD age of 17.63±13.46 years. Group B (acquired PPK) included 258 patients (92%) with mean ±SD age of 31 ±20.43 years. Both palms and soles were more commonly affected than palms or soles alone. The most common morphological type was focal (51%) followed by diffuse in (47%). The most common diagnosis in group A was ichthyosis (7 patients, 31.81%), while the most common cause in group B was psoriasis (116 patients, 44.96%). Itching was the predominant symptom in both groups. PPK was seen among housewives, students and manual workers. Family history was positive in 12 (54.55%) patients in group A and 82 (32%) patients in group B.

CONCLUSION:

PPK is frequently encountered among Iraqi patients. Psoriasis was found to be the most common cause. Clinically the most common type was focal. Itching was the most common reported symptom.

KEYWORDS: palmoplantar keratoderma, psoriasis.

INTRODUCTION:

Palmoplantar Keratoderma (PPK) is an umbrella term for any form of persistent thickening of the epidermis at palmar and/or plantar surfaces, and include hereditary as well as acquired conditions. [(1)] PPK can manifest as diffuse, focal, striate and punctate forms.[(2)] In the last few years, the underlying gene defects for many types of hereditary PPKs have been defined. The involved genes encode; intracellular structural proteins, desmosomal proteins, gap junction components, and enzymes. Many of these gene products are involved in the formation of cornified cell envelope and in terminal differentiation of palmoplantar keratinocytes.[(3)]

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Hereditary PPKs can be divided in to:

1. Non-syndromic isolated PPKs, which further subdivided in to **diffuse** epidermolytic (Vorner /Unna Thost the most common form of autosomal dominant PPK),[(4)] and non epidermolytic, **Focal, striate and punctate** keratoderma**.**

2. Non-syndromic PPKs with additional distinctive cutaneous and/or adnexal manifestations (e.g. Loricrin keratoderma, Olmsted syndrome).

3. Syndromic PPKs, in which PPK is associated with a recognized set of extracutaneous manifestations; (a) with sensoneural deafness (e.g. Vohwinkel syndrome). (b) With prominent mucosal involvement (e.g. Papillon-Lefèvre syndrome). **(**c) With cardiomyopathy and woolly hair (Naxos and Carvajal syndrome). **(**d) With other systemic signs (e.g.Richner-Hanhart syndrome).

4. PPK in hereditary generalized skin disorders like ichthyosis, erythrokeratoderma and ectodermal dysplasia.[1]

In the majority of patients with hereditary PPK, life expectancy is not impaired. Nevertheless, severely affected individuals may be faced with a lifelong burden, patients may experience sudden cardiac death or esophageal carcinoma at a young age; thorough multidisciplinary management is required.[5] The diagnosis of hereditary primarily based on; Clinical findings including the distribution of keratoderma on palms and soles, involvement of the nails, hair, and teeth, as well as manifestations affecting other organs and systems. The family history, histopathology, immunostaining, molecular genetics allow for a precise diagnosis as well as counseling with regard to the risk of recurrence.[6]

Acquired PPK occur due to numerous underlying causes and can be categorized in to: reactive and inflammatory dermatoses (psoriasis, chronic hand dermatitis, and lichen planus), infections, as well as PPK associated malignancy, systemic disease, drugs, connective tissue disease, chemicals, malnutrition, idiopathic and keratoderma Climactericum. In acquired PPK the clinical appearance is usually nonspecific. The onset of acquired PPK is typically later in life, and it may affect patients who do not have a family history of disease, despite having a corresponding etiology.[7]

No specific and curative therapy exists currently for hereditary PPKs. Combined topical treatments such as keratolytic, moisturizer, mechanical trimming and systemic therapy may be helpful. In most cases oral retinoids appear the most efficient treatment. Gene therapy and new targeted treatments, according to the specific mechanisms oh hereditary PPK, appear promising for the future.[8]

PATIENTS AND METHODS

The study is an observational, descriptive, cross-sectional study that was carried out at the Dermatology center, Medical City, Baghdad Teaching Hospital, during the period from February 2019 to April 2020.

Total number of (280) patients with palmoplantar keratoderma were included in the study. Palmoplantar keratoderma is defined as persistent thickening of the epidermis at palmar and/or plantar surfaces, and include genetic as well as acquired conditions. Patients consulting the dermatology center, of both genders, all ages, whether inherited or acquired, limited to the palms and soles or involving other areas of the body were recruited. Formal consent was taken from each patient or their parents in case of children before starting the study, after full explanation about the nature of the study. The ethical approval was given by the Scientific Council of Dermatology and Venereology- Iraqi Board for Medical Specializations. They were no exclusion criteria except for the patients who refuse to participate in the study.

The diagnosis of keratoderma was established on clinical basis. Full history was taken from each patient regarding: age, occupation, residency, age of onset and duration of disease, sites involved, associated symptoms, triggering factors, seasonal variations, interference with quality of life, family history of similar conditions, any associated medical disease, current and previous treatments. Thorough clinical examination was carried out including the following points; site and morphology of the lesions.

Keratoderma was classified into the following types; 1-Diffuse, 2- Focal (areata, linear), 3- Punctate. The following points were noted; whether there is transgradient or not, scleroatrophy, pseudoainhum, tenderness, associated nail or hair findings.

General medical examination was performed. Investigations were done according to the cases, such as KOH mount for suspected fungal infections, complete blood count, blood film, thyroid function test, electrocardiogram, echocardiographic study, hearing assessment, consultation to pediatric, ear nose and throat, neurology, hematology and others when indicated. All patients were photographed with a mobile camera (Samsung Galaxy A9, 24 MP) in nearly the same illumination and distance.

The collected data was organized, tabulated, and statistically analyzed using statistical package for social sciences (SPSS). Values were expressed as mean ±SD.

RESULTS:

A total number of 280 patients with PPK were enrolled in this study; 138 were males and 142 were females. Patients were divided in to two groups: group A, hereditary cases (22 patients) and group B acquired cases, (158 patients). (Table 1) shows the demographic characteristics of patients with PPK in both groups in addition to the site of PPK, nail, and hair involvement.

Regarding the occupation of the patients in group A; the most frequent occupations were; students (7 patients). In group B the most frequent occupation was; housewife (91 patients).

(Table2) shows distribution of patients with PPK in both groups according to their occupation.
Diagnosis of disease associations in patients in group A and B is presented in tables (3, 4). Seasonal variations in group A reported in 9 patients; 5 in winter and 4 in summer, while in group B reported in 117 patients; 87 in winter and 30 in summer.

Morphology and distribution of the lesions:

Group A: both palms and soles were involved in 20 patients, only palms or soles were involved each in one patient. The keratoderma were: **a- Diffuse** in 17 patients (7 ichthyosis, 3 Vorner Unna Thost, 2 wooly hair and PPK, 2 loricrin, 1 Huriez, 1 Dyskeratosis congenital and 1 Hyper Ig E patient) **figure1**. **b- Focal** (areata) in 4 patients (3 unclassified PPK and 1 kindler), **focal** (Striate) in 2 patients (1 with keratoderma and wooly hair and 1 with ichthyosis hystrix) **figure 2**. **c- Punctate** in 1 patient with Darier disease.
Transgradient was seen in 7 patients; 3 had isolated PPK, 1 patient with each of the followings; Huriez syndrome, ichthyosis hystrix, epidermolytic ichthyosis, and loricrin keratoderma. Pseudoainhum was seen in 2 patients; PPK with wooly hair one patient and loricrin keratoderma one patient. Scleroatrophy was diagnosed in 2 patients; Huriez one patient and kindler syndrome one patient. The lesions were symmetrical in 20 patients, well defined in 14 patients and scaly in 18 patients. The color of the PPK was yellowish in 17, red in 4 and pink-red in 1 patient.
Regarding symptoms: 9 patients complained of itching, while 8 patients complained of pain. Fissuring was reported by 15 patients, malodor by 2 patients, maceration by 2 patients, and pseudoainhum in 2 patients. Nail involvement was observed in 9 patients, and hair involvement was seen in 7 patients.

Group B patients: Both palms and soles were involved in 98 patients; In 58 patients the diagnosis was psoriasis, dermatitis in 24 patients, lichen planus and scabies each in 4 patients. Only the palm was involved in 101 patients; in these patients dermatitis was diagnosed in 57 patients and psoriasis in 38 patients. Only the Soles were involved in 59 patients; psoriasis was diagnosed in 20 patients, contact dermatitis in 8 patients, juvenile plantar dermatosis in 8 patients and 7 patients had keratoderma climectricum.
The keratoderma were **a-diffuse** in 115 patients, **b-focal** in 137 patients and **c-punctuate** in 3 patients. The color was variable pink-red, red, red-brown, yellow, and orange. Well defined border seen in 146 patients, the lesion was symmetrical in 159 patients and scaly in 206 patients. Nail and hair involvement was seen in 119 patients for nails and 62 patients for hair. Regarding symptoms: 167 patients were complaining from itching, 123 patients complained from fissuring, pain was a symptom in 42 patients, malodor in 12 patients, and maceration in 11 patients.

Table 1: Characteristics of patients with PPK (demographics, site, nail, and hair involvement).

Characteristics		Group A (N=22)	Group B (N=258)
Gender (%)	Male	8 (36.36%)	130 (50.39%)
	Female	14 (63.64%)	128 (49.61%)
Age(years)	Mean ± SD	17.63 ± 13.46	31 ± 20.43
Duration of PPK(years)	Mean ± SD	15.73±12.74	5.25±6.82
Family history	Positive	12 (54.55%)	82 (32%)
	Negative	10 (45.45%)	176 (68%)
Site	palms& soles	20 (91%)	98 (38%)
	palms or sole	2 (9%)	160 (62%)
Nail findings	Positive	9 (41%)	119 (46%)
	Negative	13(59%)	139 (54%)
Hair findings	Positive	7 (32%)	62 (24%)
	Negative	15 (68%)	196 (76%)

Table 2: Distribution of patients with PPK according to occupation.

occupation	Group A	%	Group B	%
Housewife	6	27.27	91	35.3
Student	7	31.82	56	21.7
Manual worker	2	9.09	42	16.3
Preschool child	3	13.64	22	8.5
Military	0	0	13	5
Retired	0	0	11	4.3
Unemployed	4	18.18	10	3.9
Clerk	0	0	6	2.3
Driver	0	0	2	0.8
Carpenter	0	0	2	0.8
Nurse	0	0	1	0.4
Veterinary	0	0	1	0.4
Barber	0	0	1	0.4
Total	22	100	258	100

Table 3: Diagnosis of disease in patients in group A (hereditary PPK).

Diagnosis	Number	%
Ichthyosis	7	31.81%
Unna Thost	3	13.63%
Unclassified PPK	3	13.63%
Wooly Hair &PPK	2	9.09%
Loricrin Keratoderma	2	9.09%
Huriz Keratoderma	1	4.54%
Dyskeratosis Congenita	1	4.54%
Darier Disease	1	4.54%
Hyper Ig E Syndrome	1	4.54%
Kindler Syndrome	1	4.54%
Total	22	100%

Table 4: Diagnosis of disease associations in patients in group B(acquired PPK).

Diagnosis	Number	Percentage
Psoriasis	116	44.96%
Contact dermatitis	89	34.50%
Unclassified keratoderma	9	3.48%
Juvenile planter dermatitis	8	3.10%
Lichen planus	7	2.71%
Tinea	7	2.71%
Keratoderma climactericum	7	2.71%
Scabies	5	1.93%
Wart	2	0.77%
Mycosis fungoides	2	0.77%
Connective tissue disease	2	0.77%
Pityriasis rubra pilaris	2	0.77%
Chronic actinic dermatitis	1	0.38%
Atopic dermatitis	1	0.38%
Total	258	100%

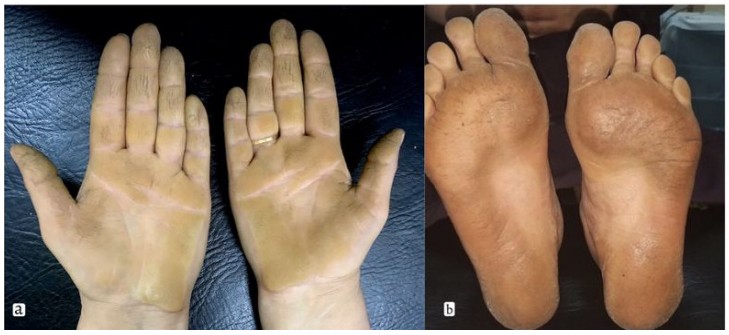

Figure 1:A 40-year-old female with Vorner Unna Thost PPK. There is a yellowish thick hyperkeratosis involving the entire surface of palms and soles (a, b).

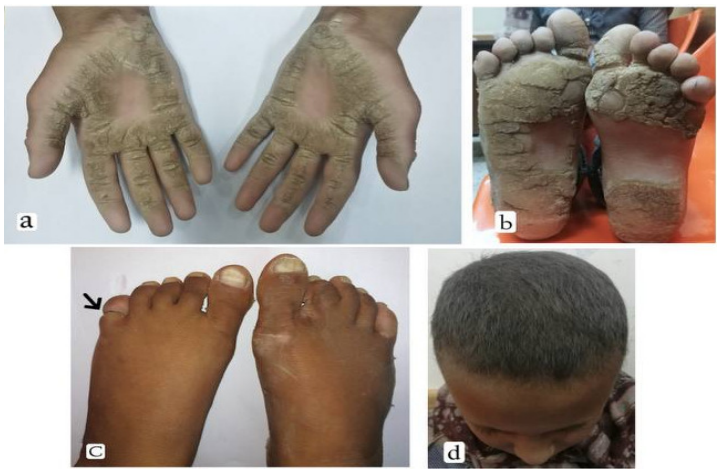

Figure2:An 11-year-old female with woolly hair with PPK. There are thick yellowish striate PPK on palms (a), diffuse keratoderma on soles (b), leukonychia with pseudoainhum (arrow) of the little toe (c), wooly hair (d).

DISCUSSION:

Although PPK is a relatively common condition with severe impact on quality of life, few reports have dealt with the subject.[9] Hence, the present study was conducted to study the causes and patterns of PPK in Iraqi patients.

PPK occurs most commonly as an acquired disorder.[8] In the present study the same trend was observed; acquired PPK constituted (92%) of cases. Psoriasis was the commonest (41.4%). Other workers have also found psoriasis to be the most common disorder.[9,10]

Al-Hamami et al (2010) found that hereditary PPK accounted for (7.2%) of genodermatosis.[11] In this study, the most common causes of hereditary PPK were secondary to ichthyosis (31.81%) followed by (13.63%) Vorner-Unna-Thost PPK and unclassified PPK (13.63%). while in Puri et al[10] stated that ichthyosis (25%)was the most common, followed by Vorners-Unna-Thost PPK (10%). Mahajan et al [12] had similar result.

Hyperimmunoglobulin E syndrome was associated with PPK in one patient in the present study. This was not mentioned in literature.

Psoriasis was the most common cause of acquired PPK followed by contact dermatitis in the present study. The same finding where reported by Kodali et al [13] , Mahajan et al [12] and Murthy et al [9]. While Agarwal et al [14], Dash et al [15] and Chopra et al [16] studies mentioned that eczema to be the most common cause.

In the current study 9 (3.48%) from the acquired group and 3 (13.63%) patients from hereditary group did not fit any diagnosis and were termed unclassified PPK.

Hereditary PPK usually present early than acquired keratoderma and other family member are also affected.[7]

Mahajan et al [12] mentioned that manual workers were the most commonly affected group with hereditary PPK (48.16%), while in the current study, students constituted the biggest group of hereditary PPK(31.8%), and the housewives were the most commonly affected with acquired PPK (35%) followed by students (21.7%), then manual workers (16.3%). Dash et al [15] and Kodali et al [13] studies found that acquired PPK was more common in farmers, followed by a laborers. These differences might be attributed to the different in the populations studied.

In the present study most PPK were exacerbated in winter and fewer in the summer. This is similar to Murthy et al [9], Agarwal et al [14], and Mahajan et al [12] Studies. Extremes of climatic conditions and temperature seem to exacerbate keratodermas.

In the present study PPK was most commonly focal in (51%) followed by diffuse in (47%) and punctate in (1.4%), this was also mentioned by Murthy et al[9] study while Mahajan et al [12] found that diffuse type (65.21%) is the most common.

PPK was bilateral and symmetrical in (62%) of our patients. This was also demonstrated by Kodali [13] and Dash et al [15] study.

Although the cosmetic appearance was complained of by the majority of our patients, itching was complained by (65%) and pain by (18%). Murthy et al [9] , Dash et al [15] , Kodali et al [13] stated that most common symptom was itching followed by pain.

Nail involvement was seen in (46%) of our patients. It was observed in (52%) of Mahajan et al [12] patients and in (46%) of Murthy et al [9] patients.

The present study highlighted the importance of this common problem in Iraqi patients, however a multicenter study covering the whole country is recommended. Also molecular and genetic studies are needed to reach the accurate diagnosis in hereditary PPK, and a diagnostic algorithm will help in outlining these conditions.

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