Original Contribution

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Nail changes and disorders in elderly Egyptians

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Summary

Background The nail unit is an important part of cosmetic appearance of an individual. Older people are at an increased risk of nail alterations, including normal age-related changes and disorders that more commonly affect this specific population.
Objectives To identify and evaluate the age-related nail changes and disorders in Egyptian elderly people both clinically and histopathologically.
Patients/Methods A total of 400 adult subjects, not complaining from any dermatological disease, were included in the present study; half of them were elderly of 60 years and above (elderly group). Meanwhile, the other half served as a control group with younger ages. Full history taking, general and local examinations as well as nail biopsies were performed from selected cases with age-related nail changes and disorders.
Results Nail changes were significantly ($P < 0.05$) more common in old age group (88%) compared to control subjects (39%). The commonest age-related nail changes noticed were pale, dull, opaque, and lusterless nails (73%); brittle nails (67.5%); decreased lunula visibility (49%); and onychorrhexis (45.5%). They showed highly significant increase ($P < 0.001$) when compared with control group.
Conclusions The prevalence of nail changes and disorders has increased among elderly patients although they are frequently overlooked by health care providers. Dermatologist should be aware about various nail changes related to aging and those associated with other dermatoses or systemic diseases. Histopathologic picture can enhance the accuracy of clinical diagnosis of various nail changes and disorders.

Keywords: aging nails, elderly, nail changes, nail disorders

Introduction

A long life is a cherished desire of every man, but all are not destined to enjoy it. The elderly are defined as those who are 60 years of age and above.[1] Nail disorders comprise approximately 10% of all dermatological conditions and affect a high percentage of the elderly.[2]

Nail changes associated with aging include characteristic modifications of color, contour, growth, surface, thickness, and histology.[3] Age associated disorders include brittle nails, trachyonychia, onychauxis, pachyonychia, onychogryphosis, onychophosis, onychoclavus, onychocryptosis, onycholysis, infections, infestations, splinter hemorrhages, subungual hematoma, subungual exostosis, and malignancies.[4]

The senile changes in the nails are thought to result from impaired peripheral circulation, commonly due to arteriosclerosis.[5] Though nail plate is an efficient sunscreen,[6,7] ultraviolet radiation may play a role in such changes. Trauma, faulty biomechanics, infections, concurrent dermatological, or systemic diseases and their treatments are also contributory factors.[8,9] The calcium content of the aging nail is increased and the

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iron content is decreased.[5] Nail growth decreases by approximately 0.5% per year between the ages of 20 and 100 years.[4]

A skillfully performed adequate nail biopsy, handled and processed and interpreted properly, can be an important part of a dermatologist's armamentarium in providing excellent comprehensive patient care.[10]

Histopathology of senile changes may explain some pathologic situations and is indispensable for diagnosing uncommon tumors.[11] Histologically, the keratinocytes of the nail plate are increased in size and have an increased number of "pertinax bodies" (remnant of keratinocyte nucleus).[12] The nail bed dermis also shows thickening of the blood vessels and elastic tissue, especially beneath the pink part of the nail.[8]

The aim of the present study is to identify and evaluate the age-related nail changes and disorders in Egyptian elderly people both clinically and histopathologically.

Materials and methods

The present study has been conducted on 400 adult subjects from the attendants of the Dermatology outpatient clinic, Al-Minya University Hospital. Half of them were elderly of 60 years and above (elderly group). Meanwhile, the other half served as a control group with younger ages. Included subjects in both groups gave no history of any dermatological or chronic systemic diseases and were recruited consecutively from accompanying subjects or relative of patients attending the clinic and accepting to be included in the study.

The study was approved by the Dermatology Department Ethical Committee, Faculty of Medicine, Al-Minya University. The studied group was thoroughly subjected to full history taking, general examination (including blood pressure, pulse, and body temperature measurement) as well as routine investigations (complete blood cell count, blood glucose level, renal function tests, liver enzymes, chest X-ray, and electrocardiogram) to detect the possible underlying systemic diseases. Local examination of the nails of both fingers and toes was done, according to the guidelines of care for nail disorders proposed by Drake *et al.*,[9] In all the suspected cases of onychomycosis, we examined a KOH preparation of nail clipping microscopically to detect fungal infection.

Informed consent had been taken from all subjects before examination and photographing, and from 40 subjects representing the common nail changes and disorders and all those who required a biopsy to confirm the diagnosis. A ring block anesthesia to limit the pain was performed at the proximal lateral side of the finger or toe with a 30 gauge needle, avoiding the use of epinephrine.

Punch probes of 3 or 4 mm diameter were used to obtain the nail specimen passing through affected nail plate to nail bed reaching to the periosteum of the distal phalanx. Biopsies were fixed in buffered 10% formalin, embedded in paraffin, sectioned into 5-μm thick sections, and stained with hematoxylin and eosin (H&E) for histopathological examination. A light microscope [Accu-Scope #3025 five headed (A3025-5)-OLYMPUS] with a built-in camera (Digital camera E-330 SLR; Olympus, Japan) was used to examine and photograph the sections.

Sterile dressing was smoothly applied at the site of biopsy. Analgesic (Diclofenac potassium 50 mg twice daily) was prescribed in the first 2 days postoperatively. The frequency of dressings was every 2 days with application of topical fusidic acid ointment. After 1 week no further dressings were needed.

Statistical analysis

The collected data were analyzed and figured using a computer based program, SPSS software package for statistical analysis (SPSS for Windows, Version 16.0, copyright ©; SPSS Inc., Chicago, IL, USA). The data were summarized in the form of mean ± standard deviation (SD). The significance was assessed using dependent (paired) *t*-test to compare between elderly and control groups. Statistical significance for all results was defined as "$P \leq 0.05$".

Results

The elderly group (200 subjects; 60 years and above) included 124 males and 76 females with age ranging from 61 to 91 years with a mean age and standard Deviation (SD) of 69.6 ± 7.51. Meanwhile, the control group included 200 subjects (119 male and 81 female) with age ranging from 19 to 58 years with a mean of 32.12 ± 11.27.

Clinical results

In elderly group, detailed medical history and examination revealed that 20 patients (10%) were suffering from anemia. Others were suffering from systemic diseases such as ischemic heart disease (12%), diabetes mellitus (8%), hypertension (4%), renal troubles (5%), chronic liver disease (6%), and chest troubles (3%). In control group, only 12 patients (6%) were suffering

from mild anemia. Some of them were suffering from systemic diseases such as diabetes mellitus (4%), hypertension (3%), chronic liver disease (2%), and chest troubles (1%).

Nail changes and disorders

In the present study, nail changes were more common in elderly group and affected 88% of subjects in contrast with only 39% of younger subjects in control group. The vast majority of subjects were not aware about their nails' problem or giving them a little attention. These changes affected the color, consistency, surface, and contour of nails. Others included traumatic lesions, infections, growths around and beneath nails and nail changes associated with pre-existing dermatoses.

Pale, dull, opaque, and lusterless nails were the commonest nail change in elderly group and observed in 146 cases (73%). On the contrary, it was only present in 2.5% of subjects in control group ($P < 0.001$). Meanwhile, brittle nails was the second most common change observed in elderly group (67.5%), when compared to control group (5%) ($P < 0.001$).

In elderly group, decreased lunula visibility (49%), onychorrhexis (45.5%), and trachyonychia (20%) were the most common nail surface changes observed and showed highly significant increase ($P < 0.001$) when compared with control group (4%, 11.5%, and 1.5% respectively; Table 1, Fig. 1).

Nail changes associated with skin diseases were diagnosed by examination of the other parts of the body for other signs of the disease and confirmed by histopathologic examination.

In our study, dermatologic disorders were more common in elderly group affecting 22 cases (11%) when compared to only 10 cases (5%) of control group. In elderly group, patients were suffering from psoriasis (3.5%), lichen planus (2.5%), lichen simplex chronicus (2.5%), Darier's disease (1%), and one case (0.5%) of leprosy, morphea and vitiligo. Meanwhile, alopecia areata was the most common disorder in control group (2.5%), followed by vitiligo (1.5%) and only one case of psoriasis and morphea (0.5% for each).

Nail changes associated with psoriasis included pitting, onychauxis, onychomadesis, onycholysis, Beau's lines and nail dystrophy. Opaque and thickened nails were evident in cases of lichen simplex chronicus. Nails of lichen planus showed longitudinal ridges, trachyonychia and twenty-nail dystrophy. The characteristic v-shaped wedge of thumb and ragged cuticle of Darier's disease was observed. Longitudinal dystrophy of nails in morphea and nail atrophy was also recorded (Fig. 1).

Finger nails *vs.* toe nails

In the present study, nail changes and disorders affected the finger nails more than toe nails. Nail pitting, onychomadesis, half and half nails, yellow nails, splinter hemorrhage and subungual warts were observed only in finger nails. Meanwhile, green nails, anonychia and pyogenic granuloma were only observed in toe nails, which is the characteristic site of affection in Pincer's toe, onychocryptosis, onychoclavus, and onychogryphosis.

Histopathological changes

According to histopathologically aided diagnosis, different nail disorders were discovered or confirmed.

The histopathological findings in onychorrhexis were hyperkeratosis, hypergranulosis, acanthosis, papillomatosis, hydropic degeneration of basal cell layer with necrotic keratinocytes and bending of rete ridges (Fig. 2a). Onycholysis was characterized by parakeratosis, focal hypogranulosis and elongation of dermal papillae (Fig. 2b). Meanwhile, decreased thickness of horny layer, thinning of epidermis and flattening of rete ridges were evident in nail atrophy (Fig. 2c).

Psoriatic nails showed parakeratosis, hypergranulosis, acanthosis, and elongation of dermal papillae with dilatation and proliferation of capillaries surrounded by lymphohistiocytic inflammatory infiltrate (Fig. 2d). Longitudinal ridges of nails in lichen planus showed hyperkeratosis, focal hypergranulosis and hydropic degeneration of basal cell layer (Fig. 2e). Opaque and thickened nails of lichen simplex chronicus showed the characteristic histopathological picture of marked orthokeratosis, focal hypergranulosis, and vertical streaks of coarse collagen fibers in the papillary dermis denoting fibrosis (Fig. 2f).

Discussion

Nail changes are common among the elderly; however, they are often not brought to the attention of primary care givers and are thus overlooked. Nail changes among the elderly can either cause serious symptoms, impairing the daily activities of this older population whose activities might already be restricted, or be asymptomatic but associated with substantial cosmetic problems, leading to negative psychological effects.[13]

Table 1 Nail changes in both elderly and control groups (n = 400; 200 subjects/group)

Type of nail changes	Elderly group (% of cases)	Control group (% of cases)	*P*-value
Nail surface			
Decreased lunula visibility	49	4	<0.001**
Onychorrhexis	45.5	11.5	<0.001**
Trachyonychia	20	1.5	<0.001**
Beau's lines	5	1.5	0.05*
Onychoschezia	3	1	0.1
Pitting	2.5	0	0.02*
Nail contour			
Platonychia	10.5	3	0.003*
Koilonychia	7	1.5	0.004*
Transverse overcurvature	1	0	0.16
Clubbing	1	0.5	0.32
Pincer's Toe	2	0.5	0.08
Onychogryphosis	0.5	0	0.32
Nail consistency			
Brittle nails	67.5	5	<0.001**
Onychauxis	5	1.5	0.03*
Onychomadesis	3	0	0.01*
Pachyonychia	2	0	0.04*
Onycholysis	3.5	0	0.008*
Dystrophy	1	0	0.16
Nail color			
Pale, dull, opaque, & lusterless	73	2.5	<0.001**
Leukonychia	8.5	9	0.86
Longitudinal melanonychia	4	0	0.004*
Longitudinal erythronychia	3	0	0.01*
Green nails	1	0	0.16
Half and half nails	1	0	0.16
Yellow nails	1	0	0.16
Traumatic nail changes			
Subungual hematoma	3	2.5	0.66
Splinter hemorrhage	1	0	0.16
Onychocryptosis	1.5	2.5	0.48
Anonychia	0.5	0	0.32
Nail infections			
Paronychia	6	1.5	0.01*
Onychomycosis	1	0.5	0.32
Subungual sepsis	1	0	0.16
Growths			
Periungual warts	2.5	3	0.66
Subungual fibroma	0.5	1	0.32
Pyogenic granuloma	1	0	0.16
Onychoclavus	0.5	0	0.32

$P > 0.05$ = Not Significant.
*$P \leq 0.05$ = Significant.
**$P < 0.001$ = Highly Significant.

Any portion of the nail unit may get affected by various dermatological conditions, systemic diseases, infections, aging process, internal and external medications, vascular insufficiency, physical and environmental agents, trauma, neurological abnormalities, nutritional deficiency and both benign and malignant tumors.[14,15]

History taking can be difficult. Elderly patients often have multiple medical problems and regimens with several medications. The clinical manifestation of skin disorders may differ and may not present as classically as they do in younger populations.[16] Since, no cutaneous examination is complete without a careful evaluation of the nails,[3] awareness of the clinical conditions affecting nails in the geriatric age group and related management options is essential.[4]

In elderly group, systemic diseases such as anemia, ischemic heart disease, diabetes mellitus, hypertension, renal troubles, chronic liver disease, and chest troubles were encountered giving rise to various nail changes such as koilonychia, brittleness, paronychia, onychomycosis, half and half nails and clubbing.

Dermatoses of aged population vary from one country to another.[17] Rao *et al.*,[3] reported higher incidence of nail changes and disorders in up to 98% of elderly in India. To the best of our knowledge, no previous study reported nail changes and disorders in Egyptian elderly people. In the present study, nail changes were also more common in elderly group and affected 88% of subjects in contrast with only 39% of younger subjects in control group. The vast majority of patients were not aware about their nails' problem or giving them a little attention.

The color of the aging nail varies from yellow to gray, with a dull opaque appearance.[5] Other authors have reported that the senile nail may appear pale, dull and opaque, with color varying from white or yellow to brown or gray.[8] Brittle nail is a common finding in the elderly.[5] The lunular size decreased with age and this has been previously noted as an aging-related nail change.[12] Moreover, aging is the commonest cause of onychorrhexis or superficial longitudinal ridges.[18]

In the present study, the commonest age-related nail changes observed were pale, dull, opaque and lusterless nails (73%), brittle nails (67.5%), decreased lunula visibility (49%) and onychorrhexis (45.5%). They were significantly seen more in elderly group than in control group ($P < 0.001$). These results are consistent with the study of Rao *et al.*[3] who reported that prominent longitudinal ridges were the commonest change (85%), followed by rough nails (33%), transverse ridges (Beau's lines) (23%), and lamellar split in 15% of cases.

Splinter hemorrhages, which are most commonly traumatic in the elderly, are black and located in the middle or distal third of the fingernail. In contrast, splinter hemorrhages induced by systemic disorders are red in color and proximal in location.[8]

Figure 1 Different nail changes and disorders associated with aging.

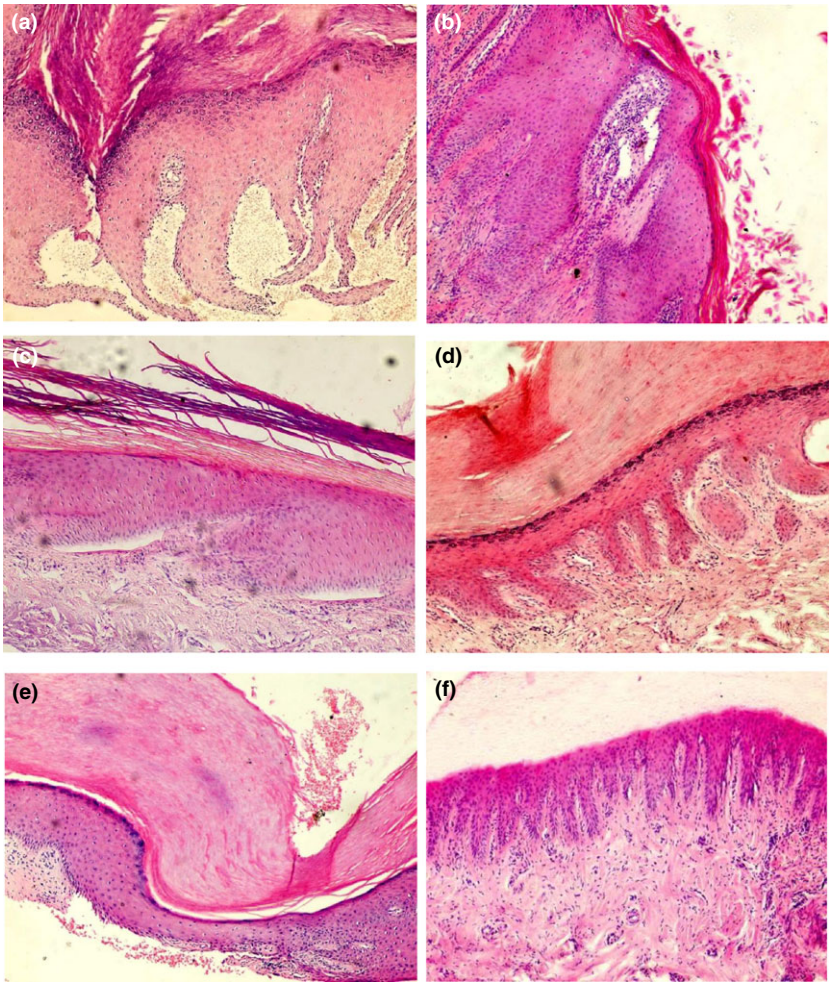

Figure 2 Histopathologic findings of age-related nail changes and disorders in elderly group: Onychorrhexis showing hyperkeratosis, hypergranulosis, acanthosis, papillomatosis, bending of rete ridges, necrotic keratinocytes, and hydropic degeneration of basal cell layer (a). Onycholysis of nails showing parakeratosis, focal hypogranulosis, and elongation of dermal papillae (b). Nail atrophy showing decreased thickness of horny layer with thinning of epidermis (c). Nail psoriasis showing acanthosis, elongated rete ridges with mononuclear inflammatory infiltrate around dilated capillaries in papillary dermis (d). Nails in lichen planus showing hyperkeratosis, focal hypergranulosis, and hydropic degeneration of basal cell layer (e). Lichen simplex chronicus of the nails showing orthokeratosis, acanthosis, and vertical streaks of coarse collagen fibers in the papillary dermis denoting fibrosis (f) (H&E; X200).

In our study, traumatic nail change showed insignificant difference when compared with control group ($P > 0.05$). Subungual hematoma was the commonest change (3%) in elderly, followed by toe nail onychocryptosis (1.5%). Splinter hemorrhage and anonychia were rare. However, traumatic nail disorders were the third most common disorder seen in the study of Rao *et al.*,[3] where subungual hematoma was seen in 3% of cases, nail loss and onycholysis in 2% for each. Meanwhile, splinter hemorrhage was seen in 1% of cases in both studies.

Onychomycosis or fungal infection of nails, particularly toenails, is commonly encountered in the geriatric population.[17] In the study of *Rao et al.*,[3] onychomycosis was seen in 16%, followed by chronic paronychia in 9%. However, in the present study, it was recorded in only 1% of elderly group and 0.5% of control group. Paronychia was the commonest nail infection encountered and affected 6% of cases (finger nails of females), due to prolonged contact with water during house work. Paronychia of big toe in males was observed in 1.5% of subjects of control group. Periungual warts were more common in control group than elderly group.

In most reviews, the prevalence of psoriasis is said to be 2% of the world's population. It is estimated that

over their lifetime, 80–90% of patients with psoriasis will suffer from nail disease.[19] The fingernails are more affected than the toenails. In a survey from the Netherlands, 79% of patients reported involvement of their nails, with 52% experiencing associated pain and 14% major restrictions in daily life due to the nail changes.[20] Nail changes of psoriasis are pitting, onycholysis, subungual hyperkeratosis, nail plate discoloration, uneven nail surface, and splinter hemorrhages.[21] In the present study, we recorded psoriasis in 3.5% of elderly and 0.5% of control group. Pitting was the commonest nail change and affects 2.5% of elderly group, followed by onychauxis, onychomadesis, onycholysis, and transverse ridging.

Nail involvement of one or all the nail component occur in 10% of patient with lichen planus.[22] Nail lichen planus is characterized by thinning, longitudinal ridging and distal splitting of the nail plate.[23] We reported 2.5% of cases in elderly and no cases in control group.

The nail unit is capable of only a limited number of reaction patterns. Therefore, many diseases share similar changes, but correlation of the nail changes helps dermatologist to reach conclusive diagnosis.[24] Biopsy of the nail unit is recommended in many cases when the diagnosis is in doubt or when definitive histopathologic diagnosis is needed before beginning therapy.[25] In our study, histopathologic picture was evident and aid in the diagnosis of various nail changes of aging (as onychorrhexis, onycholysis, and atrophy) and nail disorders (as psoriasis, lichen planus, and lichen simlex chronicus).

In conclusion, the prevalence of nail disorders is high among Egyptian elderly patients, although they are frequently overlooked by health care providers. The cosmetic aspect of the nails is significant even in the elderly, as it may affect social as well as intra-family interactions. Dermatologist should be aware about various nail changes related to aging and those associated with other dermatoses or systemic diseases, since nails are the windows through which one can look into the health of an individual. Meanwhile, histopathologic features of nail biopsy can enhance the accuracy of clinical diagnosis of various nail changes and disorders.

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