

A Cross-Sectional Study of Mucocutaneous Manifestations among Geriatric Patients at a Tertiary Care Centre

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Received: 25-10-2024 / Revised: 23-11-2024 / Accepted: 26-12-2024

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Conflict of interest: Nil

Abstract:

Introduction & Objectives: India has experienced a notable rise in its elderly population since 1991.

With advancing age, individuals face heightened risks of developing various skin disorders, including cancers. Despite global focus on geriatric healthcare, there remains a lack of comprehensive statistical studies on skin diseases in India.

Methods: We conducted a study involving 181 consecutive patients, aged 60 years and above who visited the Dermatology outpatient Department. Each patient provided informed written consent before data collection. A detailed medical history was obtained, followed by thorough cutaneous and systemic examinations. Investigations were carried out wherever necessary, and statistical analysis was performed using the Chi-square test.

Result: Out of the 181 patients, 119 (65.7%) were male and 62 (34.3%) were female, resulting in a male-to-female ratio of 2:1. The most frequently reported complaint among the patients was pruritus, which affected 68.5% of them. Fungal infections were noted in 60 patients (33.1%), followed by eczematous disorders in 35 patients (19.3%). Diabetes mellitus was diagnosed in 105 patients (58%). The most common age-related changes observed were wrinkling (100%) and graying of hair (100%). The prevalence of malignancy was 1%. Alopecia affected 76.2% of the patients. About 20.99% of patients had nail involvement.

Conclusion: The majority of elderly individuals seeking dermatological advice are males in the 60-69 year age group. Dermatoses in this demographic can be either age-related changes or pathological conditions. Given the unique needs of this population, a comprehensive examination is crucial to identify potential indicators of skin or systemic diseases. Prompt recognition and management of senile dermatoses play a pivotal role in enhancing the longevity and quality of life among the geriatric population.

Keywords: Geriatric, Aging, Skin, Eczema, Fungal Infections, Dermatoses.

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Introduction

World's population is aging very fast with 8.5% of current population being 65 years or older and expecting the number to double by 2050. [1] Government of India adopted "National Policy on Older Persons" in January 1999, which defines "senior citizen" or "elderly" as a person who is of 60 years of age or above. [2] Indian elderly population is second largest in the world. [3] As the tempo of aging in developing countries is more rapid than in developed countries, developing countries will have less time than the developed countries to adapt to the consequences of population aging. [4] The aging process is classified into intrinsic aging and extrinsic aging. Intrinsic or chronologic skin aging refers to the unavoidable physiologic changes of the skin that

occur with time and are influenced by genetic and hormonal factors. Extrinsic aging entails the physiological and histological changes caused by environmental factors and are preventable. [5] Aging of skin is characterized by epidermal thinning, reduced blood flow, poor capacity for healing and repair, poor barrier and immunological function and so on. [6] Intrinsic aging manifests as xerosis, pallor, fine wrinkles, decreased elasticity and fragility, whereas extrinsic aging manifests as multiple telangiectases, deep wrinkles, decreased elasticity, fragility, xerosis and dyspigmentation. [5] Exogenous factors influencing aging skin include photo damage, exogenous chemicals, medicaments and acquired immunosuppression/metabolic disorders, etc. Graying of hair, wrinkling, alopecia,

photoaging, pruritus are the common complaints in geriatric population. As individuals age, the skin undergoes changes, becoming thinner and more fragile. This makes the skin more susceptible to micro-injuries, which can serve as entry points for pathogens, leading to infections. Elderly individuals may experience acute bacterial skin infections, which may be associated with systemic symptoms. The compromised skin barrier, along with potential comorbidities, can contribute to the development and severity of these infections. Fungal infections, particularly in the form of chronic and indolent infections, are more common in the elderly. Diabetics who may have compromised immune systems are particularly vulnerable. The reactivation of the varicella-zoster virus (VZV) leading to Herpes zoster is more prevalent in the elderly. Infestations by ectoparasites like scabies are more common in homes for the aged. Chronic skin diseases in elderly can cause not only physical discomfort but also emotional distress. Some reasons why psychological distress may be significant are visible lesions, disfigurement, pruritis, social stigma & embarrassment and many more. [7] Geriatric dermatoses is a challenging job for physicians in terms of diagnosis, management, follow up and even patient satisfaction.⁸ Therefore, it is important to have better idea on age related skin manifestations to give better treatment and increase their quality of life.

Objectives

- To study the frequency, age and gender distribution of geriatric patients presenting to the Dermatology department, Navodaya Medical College Hospital & Research Centre, Raichur.
- To evaluate the clinical pattern of mucocutaneous manifestations in geriatric patients.

Methodology

Study Design: Cross sectional study.

Study Setting: Department of Dermatology, Venereology and Leprosy, Navodaya Medical College Hospital & Research Centre.

Study Duration: 18 months. (July 2022-Dec 2023)

Sample population: Patients 60 years and above, attending dermatology out-patient Department, Navodaya medical college, Hospital & research centre, Raichur with mucocutaneous complaints.

Sample size: With the formula $X = (Z\alpha/2)^2 \times p \times (1-p) / e^2$ where, Z = Critical value of the normal distribution at the required confidence level, i.e 1.96 standard normal variate at 95% confidence level.

p = Sample proportion, (0.68).

e = Margin of error, 10%.

X= sample size

$$X = (1.96)^2 \times 0.68 \times (1-0.68) / (0.1)^2 \\ = 180.78 \sim 181$$

181 geriatric patients attending Dermatology out-patient department with specific complaints were screened for mucocutaneous manifestations.

Inclusion Criterion: Patients aged 60 and above having mucocutaneous complaints and willing to participate in the study.

Exclusion Criterion: Patients not willing to participate in the study.

Patients with following conditions may interfere with chronological aging, hence excluded. They are:

- Albinism
- Premature aging
- Genodermatoses

Materials and Methods

Source of Data Patients 60 years and above, attending Dermatology out-patient Department, Navodaya Medical College, Hospital & Research centre, Raichur with mucocutaneous complaints who are willing to participate in the study.

Method of collection of data: Data was collected after obtaining informed/written consent. A detailed history taken and a thorough clinical examination done. Patient was subjected to relevant laboratory investigations. Data thus obtained is entered into a case record form specially designed for this study. It was entered in Microsoft Excel and was analyzed by SPSS software.

Statistical analysis like mean, standard deviation, standard error, Chi square test and Fisher exact test were used wherever necessary.

Investigations

The following investigations were carried out under the supervision of the guide whenever necessary,

- Complete haemogram
- Fasting blood sugar
- Post-prandial Blood Glucose level
- Liver Function Tests, Renal Function Tests
- VDRL, HIV Test, Tzanck smear
- KOH Mount
- Pus for Culture and sensitivity
- Skin Biopsy and histopathological examination

Results

Table 1: Age Distribution

Age (in years)	No. of cases	Percentage
< 60	44	24.3%
61-65	64	35.4%
66-70	37	20.4%
71-75	22	12.2%
76-80	5	2.8%
> 80	9	5.0%
Total	181	100.0%

In our study most of the patients are less than 65 years of age.

Table 2: Mean Age

	N	Minimum	Maximum	Mean	Std. Deviation
Age (in years)	181	60	90	66.18	6.576

Mean age is 66.8years

Table 3: Gender Distribution

Sex (male/ female)	No. of cases	Percentage
F	62	34.3%
M	119	65.7%
Total	181	100.0%

Males are almost double to females in our study with the ratio 2:1.

Table 4: Age-Gender Wise Distribution

	Female		Male		Total	Total
Age (in years)	Female	Female	Male	Male	No. of cases	
< 60	15	24.2%	29	24.4%	44	24.3%
61-65	23	37.1%	41	34.5%	64	35.4%
66-70	13	21.0%	24	20.2%	37	20.4%
71-75	9	14.5%	13	10.9%	22	12.2%
76-80	0	0.0%	5	4.2%	5	2.8%
> 80	2	3.2%	7	5.9%	9	5.0%
Total	62	100.0%	119	100.0%	181	100.0%

Table 5: Living Conditions: Urban and Rural

Urban/Rural	No. of cases	Percentage
RURAL	124	68.5%
URBAN	57	31.5%
Total	181	100.0%

Most of them belong to rural areas with 68.5%

Table 6: Marital Status

Marital status (Married/Unmarried/Divorced/Widowed)	No. of cases	Percentage
M	132	72.9%
W	49	27.1%
Total	181	100.0%

Majority of the patients were not alone by themselves and lived with their spouse/family i.e 72.9%.

Table 7: Occupation

Occupation	No. of cases	Percentage
Farmer	67	37.0%
Housewife	38	21.0%
Skilled Workers	23	12.7%
Daily wage Labour	17	9.4%
Vendors	13	7.2%
Professionals	12	6.6%
Bussiness/Shopowners	7	3.9%
Other	4	2.2%
Total	181	100.0%

37% were farmers in our study

Table 8: Occupation Associated With Sun exposure

Occupation related to sun exposure (yes/no)	No. of cases	Percentage

N	59	32.6%
Y	122	67.4%
Total	181	100.0%

67.4% were exposed to sun due to their occupation

Table 9: Socio-Economic Status (Class/Kuppuswamy Grade)

Socio-economic status/ kuppuswamy grade	No. of cases	Percentage
Upper class/I	2	1.1%
Upper middle class/II	6	3.3%
Lower middle class/III	27	14.9%
Upper lower class /IV	54	29.8%
Lower/V	92	50.8%
Total	181	100.0%

50.8% belong to lower class, grade V according to kuppuswamy grading scale followed by upper lower, and grade IV with 29.8%

Table 10: Co-Morbidities

Co-morbidities	No. of cases	Percentage
Diabetes Mellitus (DM)	105	58.0%
Hypertension (HTN)	84	46.4%
Cardiovascular disease (CVD)	2	1.1%
Hypothyroidism	1	0.6%
Asthma	1	0.6%
Chronic kidney disease (CKD)	1	0.6%
Tuberculosis	1	0.6%

Most of them are diabetics (58%) and hypertensives (46.4%).

Table 11: Distribution Based on Presenting Complaints

Present complaints	No. of cases	Percentage
Localised Pruritis	90	49.7%
Generalised pruritis	34	18.8%
Pain	14	7.7%
Discharge	13	7.2%
Keloid	6	3.3%
Dryness	6	3.3%
Fissuring	2	1.1%
Others	16	8.8%

Almost half (49.7%) patients had localized pruritis, followed by generalized pruritis (18.8%). Few patients had more than one complaint.

Table 12: Distribution Based On Provisional Diagnosis

Provisional diagnosis	No. of cases	Percentage
Fungal infections	60	33.1%
Eczema	35	19.3%
Senile xerosis	21	11.6%
Parasitic infection	16	8.8%
Physiological aging	9	5.0%
Inflammatory disease	9	5.0%
Viral infection	7	3.9%
Papulosquamous disease	7	3.9%
Bacterial infections	6	3.3%
keloid	5	2.8%
urticaria	2	1.1%
Tumors	2	1.1%
Fissure foot	1	0.6%
Ingrown toe nail	1	0.6%
total	181	100.0%

Most common diagnosis were fungal infections with 33.1% followed by Eczema with 19.3%

Table 13: Types of Infections

Types of infections	No. of cases	Percentage
Fungal	60	87.0%
Parasitic	16	23.2%

Viral	7	10.1%
Bacterial	6	8.7%

Fungal infections are 10 times as common as bacterial infections in our study.

Table 14: Fungal Infections

Fungal infections	No. of cases	Percentage
Tinea corporis	28	15.5%
Tinea cruris	22	12.2%
Tinea manuum	3	1.7%
Candidal intertrigo	2	1.1%
Pityriasis versicolor	2	1.1%
Tinea pedis	2	1.1%
Onychomycosis	1	0.6%

Superficial fungal infections were majority

Table 15: Viral Infections

Viral infection	No. of cases	Percentage
Herpes zoster	3	1.7%
Plantar wart	2	1.1%
post herpetic neuralgia	2	1.1%

Herpes zoster was majority in viral infection

Table 16: Bacterial Infections

Bacterial infections	No. of cases	Percentage
Ecthyma gangrenosum	1	0.6%
Infected sebaceous cyst	1	0.6%
Tuberculosis verrucosa cutis	1	0.6%
Folliculitis	2	1.1%
Pyoderma	1	0.6%

Folliculitis was most common in bacterial infections.

Table 17: Types of Eczema

Eczema		Percentage
Chronic eczema involving extremities	17	9.4%
contact dermatitis	8	4.4%
Photodermatitis	5	2.8%
Other eczemas	5	2.8%

Majority of eczema involving hands & legs 9.4%.

Age Related Changes

Table 18: Body Wise Distribution – Face & Neck

Face & neck	No. of cases	Percentage
Wrinkling	181	100.0%
Achrocordons	140	77.3%
Dermatosis papillosa nigra (DPNs)	112	61.9%
Senile comedones	32	17.7%
Freckles	25	13.8%
Seborrhelic Keratosis	20	11.0%
Filiform Wart	2	1.1%
Papules	2	1.1%
Folliculitis	1	0.6%

Wrinkling is noted in 100% of patients, whereas achrocordons were 77.3% and dermatosis papillosa nigra (DPNs) are 61.9%.

Table 19: Upper Extremities

Upper extremities	No. of cases	Percentage
Wrinkling	181	100.0%
Dryness	19	10.5%
Infection	10	5.5%
Plaques	7	3.9%
Papules	5	2.8%
Macules	3	1.7%
Cherry angiomas	2	1.1%
Patches	2	1.1%

Wrinkling and dryness were most commonly seen on upper extremities

Table 20: Lower Extremities

Lower extremities	No. of cases	Percentage
Wrinkling	181	100.0%
Infection	30	16.6%
Dryness	18	9.9%
Plaques	5	2.8%
Patches	3	1.7%
Papules	3	1.7%
Nodules	3	1.7%
Fissures	1	0.6%
Macules	1	0.6%

Apart from wrinkling, infections of lower limbs were a major findings

Table 21: Trunk

Trunk	No. of cases	Percentage
Dryness	14	7.7%
Infection	7	3.9%
Plaques	4	2.2%
Papules	3	1.7%

Dryness and infections were noted on trunk

Table 22: Back

Back	No. of cases	Percentage
Dryness	14	7.7%
Infection	3	1.7%
Papules	3	1.7%
Plaques	2	1.1%
Patch	2	1.1%

Dryness with 7.7% was the most noted change in the skin of the back

Table 23: Changes in Hair

Hair	No. of cases	Percentage
Canitis	181	100.0%
Diffuse Alopecia	79	43.6%
Androgenetic alopecia	59	32.6%

100% of the patients had grey hair, 43.6% with diffuse alopecia and 32.6% with androgenetic alopecia noted.

Table 24: Changes in Nails

Nails	No. of cases	Percentage
Change in color	29	16.0%
Infection	2	1.1%
Disfigurement	2	1.1%
Pits	2	1.1%
Subungual Hyperkeratosis	2	1.1%
Ingrown nails	1	0.6%

Nail colour change was most common in many patients (16%).

Table 25: Changes in Mucosa

Mucosa	No. of cases	Percentage
Hyperpigmented macules	11	6.1%
Diffuse hyperpigmentation	3	1.7%
Leukoplakia	1	0.6%

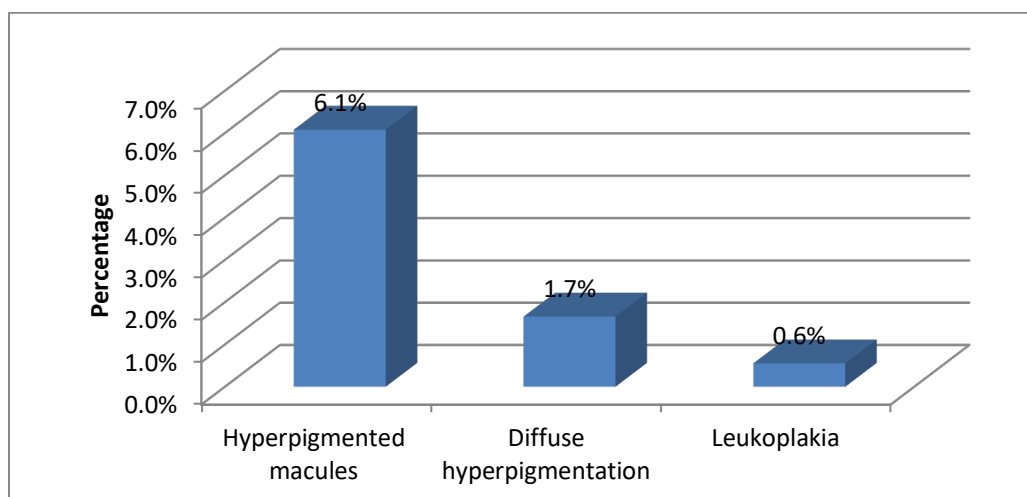


Figure 1: Changes in Mucosa
Table 26: Relation between Diabetes and Skin Disease

DM and skin	No. of cases	Percentage
Eczema	26	24.8%
Tinea cruris and corporis	24	22.9%
Xerosis	18	17.1%
Viral infections	11	10.5%
others	26	24.8%
Total	105	100.0%

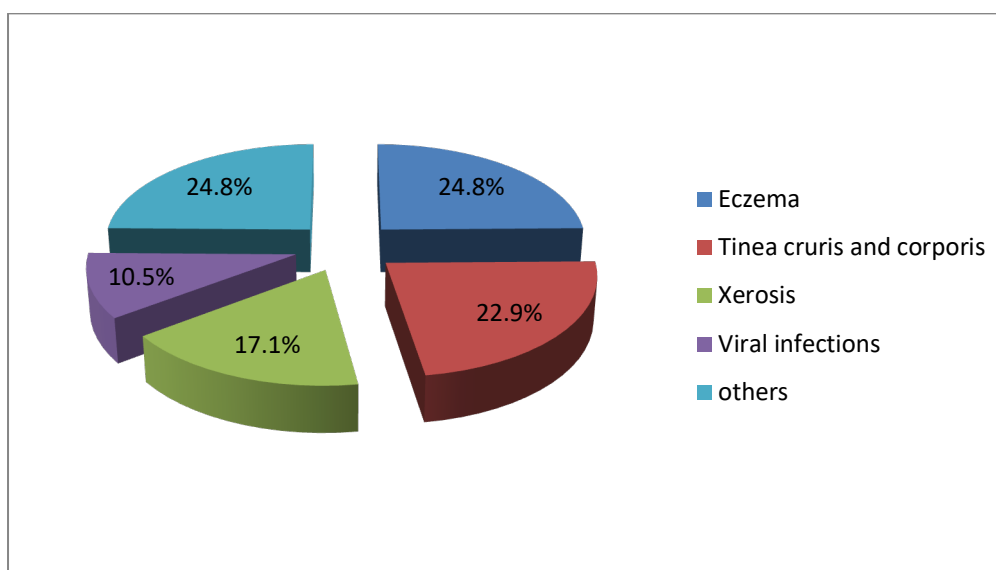


Figure 2: Relation between Diabetes and Skin Disease

Eczema (24.8%) and fungal infections like tinea corporis & cruris (22.9%) were more common in patients having diabetes mellitus.

Discussion

Age distribution: The average age of participants in our study was 66.18 years, ranging from 60 to 90 years.

The largest cohort, comprising 64 patients (35.4% of the sample), belonged to the 61-65 age group. Similar demographic patterns were observed in studies conducted in India and abroad.

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[31,62,63,64]

Gender distribution: 119 (65.7%) patients were males. Male is to female ratio was 2:1. Similar result was observed in another Indian study. [31]

Living conditions and occupational history: Most (132 patients, 72.9%) of our patients were living with spouse/family, while 27.1% were widowed, they either lived alone or in the homes for the elderly.

Most of the patients hailed from rural areas (68.5%). Majority of the patients belonged to lower

class / kuppuswamy grade V (50.8%). [65] In a study [63], majority of the males were engaged in occupations requiring long hours of sun exposure and most had left their occupations at least 10 years ago. Occupational history is crucial for identifying contact and airborne allergens in photodermatoses. Moreover, it can elucidate gender-specific differences in certain dermatoses due to varying occupational exposure.

Presenting complaints: The most frequent complaint among the patients was pruritus. Localized pruritus was observed in 49.7% of cases, followed by generalized pruritus in 18.8%. Localized pruritus may stem from primary dermatological conditions, which can affect both elderly and non-elderly individuals alike. Therefore, many diagnoses might be associated with localized pruritus. Generalized pruritus can occur with or without visible skin lesions, depending on whether there is an underlying dermatosis or if it is essential pruritus due to dry skin (xerosis).

In the elderly, generalized pruritus is most commonly attributed to xerosis, following primary dermatoses. Other potential causes include nutritional deficiencies, metabolic disorders, symptomatic dermatographism, scabies, or delusional parasitosis, which need to be considered and ruled out during diagnosis. The prevalence of essential pruritus and xerosis were similar to the earlier studies. [31,62,66]

Co-Morbidities/Concurrent systemic disease: Among the patients in our study, 66.85% had systemic diseases, a proportion consistent with findings from another study. [67] Diabetes mellitus was the most prevalent comorbidity, affecting 105 patients (58%), which is higher compared to previously reported studies. [31,64] Hypertension was the second most common condition, present in 46.4% of patients. The prevalence of both diabetes and hypertension in our study aligns with similar findings reported in other studies [66,68] Asthma (0.6%), hypothyroidism (0.6%), chronic kidney disease (0.6%), cardiovascular diseases (1.1%), tuberculosis (0.6%) were seen in minimal amounts.

Provisional diagnosis: Most common diagnosis pertaining to primary complaint included infections mainly fungal infections (60 patients, 33.1%) followed by eczematous dermatoses (35 patients, 19.3%) and senile xerosis (21 patients, 11.6%). Parasitic infections (8.8%), inflammatory diseases (5%) were followed.

Infections: Fungal infection comprised 87% of total infection, and ten times the number of bacterial infections. Most common fungal infection in our study was tinea corporis (15.5%) and tinea cruris (12.2%), similar to the study by Bilgili et al. [62]

In our study, the incidence of bacterial infections

was lower compared to others. The lower incidence of bacterial infections compared to others might be attributed to patients having received antibiotics for systemic ailments or using over-the-counter medications, which provided partial relief. Hence didn't seek dermatological advice for their condition.

Eczema

Eczema accounted for 19.3% of cases (35 patients) in our study, making it the second most common dermatosis. This prevalence aligns with findings from other studies where eczema is frequently reported as the most common dermatological condition. Among eczema cases, exudative infective eczema of the lower limbs was notably prevalent, often occurring concurrently with lichen simplex chronicus in many patients. In our study, the prevalence of contact dermatitis was lower at 4.4%, with 8 patients affected, in contrast to the findings reported by Yalcin et al. [69] Additionally, the incidence of atopic dermatitis and asteototic eczema was lower compared to the study conducted by Raveendra L. [67] These differences could potentially be attributed to variations in climatic conditions between the study locations.

Papulosquamous disorder

Psoriasis and lichen planus were most common papulosquamous diseases as in earlier studies. [63,67]

Tumors: Out of 181 patients only one squamous cell carcinoma was diagnosed along with one malignant melanoma. Others were benign tumors which were common in most of the patients. 1.1% had malignant/premalignant disease. When compared to western studies [71,72], the incidence of malignant tumors is very low. This may be due to higher risk of carcinoma in white skin. [73]

Age-related changes: According to Body Site-face & neck, upper & lower extremities, trunk, back. We found that most of the age-related changes in our study are related to sun damage. In our study, wrinkling was seen in 100% patients, similar to other studies. [10,66,70] The incidence of seborrheic keratoses in our study was similar to other studies. [67,70] Acrochordons, dermatosis papulose nigra (DPN) were also common findings followed by freckles, cherry angiomas, senile purpura and senile comedones.

Hair changes: Most common finding was graying of hair/ canities (100%) which was similar to other studies. [66,67,68] Canities is the commonest change in the hair. This was followed by prevalence of diffuse alopecia (43.6%) and androgenetic alopecia (32.6%).

Nail changes: Change in color was the most common finding followed by infections, pits, disfigurements.

In study by Gupta et al [47], prevalence of ony-

chomycosis was between 14.1 to 21.7 % in the elderly.

Changes in oral mucosa: Most of the patients had hyperpigmented macules 6.1% followed by diffuse hyperpigmentation 1.7% and leukoplakia 0.6%. It is important to know the history of usage of tobacco smoking and chewing for any probable malignancy changes in the future. Most common change in oral cavity was hyperpigmentation as in other studies. [31,67]

Diabetes and skin: Eczema, fungal infections and xerosis were most common diagnoses in diabetic patients in our study while there is definitive evidence that diabetics are prone to candidal infections, the same cannot be said for dermatophytic infection. [74]

Nevertheless, both must be promptly and adequately treated to prevent fissuring and secondary infection in the feet and body folds.

Conclusion

Most patients seeking treatment for skin conditions are males, often involved in occupations that expose them to prolonged sunlight. Advising them on sun protection is essential to mitigate its harmful effects. This special population requires thorough examination to uncover clues for both skin and systemic diseases.

A detailed history coupled with clinical correlation is usually sufficient for diagnosis, invasive procedures are seldom necessary. It's crucial to distinguish benign, age-related changes from malignancies.

Mucocutaneous diseases can serve as markers for underlying conditions such as diabetes mellitus, internal malignancies, nutritional deficiencies, metabolic diseases, or drug reactions. Sharp recognition is essential. Patients and their relatives should be advised on simple practices such as proper hygiene, moisturization, and foot care for skin and mucosal health. In conclusion, Prompt recognition and management of senile dermatoses play a pivotal role in enhancing the longevity and quality of life among the geriatric population.

References

- Kandwal M, Jindal R, Chauhan P, Roy S, Skin diseases in geriatrics and their effect on the quality of life: A hospital-based observational study, J Family Med Prim Care 2020 march; 9: 1453-8.
- Jeyalakshmi S, Chakrabarti S, Gupta N. Situation Analysis Of The Elderly in India. Available from: http://mospi.nic.in/mospi_new/upload/elderly_in_india.pdf.
- Mehra A, Dewan A, Meherda A, Bohra D. Pattern of dermatoses in elderly at tertiary care centre, Jaipur, Rajasthan, India. Int J Res Dermatol 2019;5: 493-7.
- Norman RA. The Demographic Imperative. In: Norman RA, editor. Diagnosis of Aging Skin Diseases. London: Springer; 2008. p. 1-3.
- Kerns ML, Chien AL, Kang S. Skin Aging. In Kang S, Ajagaonkar M, Bruckner AL, Enk AH, Margolis DJ, McMichael AJ et al, Eds Fitzpatrick's dermatology, 9th ed New York, McGraw-Hill Education, 2019; 106 ; 1779-93.
- Farage MA, Miller KW, Elsner P, Maibach HI. Functional and physiological characteristics of the aging skin. Aging Clin Exp Res 2008;20: 195-200
- Shah M, Coates M. An assessment of the quality of life in older patients with skin disease. Br J Dermatol 2005; 154:150-3.
- Jafferany M, Huynh TV, Silverman MA, Zaidi Z. Geriatric dermatoses: a clinical re-view of skin diseases in an aging population. Int J Dermatol 2012; 51:509-22.
- Leyden JJ. Clinical features of aging skin. Br J Dermatol 1990; 122:1-3.
- Gilchrest BA, Yaar M. Ageing and photoageing of the skin: observations at the cellular and molecular level. Br J Dermatol 1992; 127:25-30.
- Hatzis J. The wrinkle and its measurement—A skin surface profilometric method. Micron 2004; 35:201-19
- Brannon H. Glogau Classification of Photoaging- Classifying the Severity of Wrinkles. Available from <http://dermatology.about.com/od/wrinkles/a/glogau.htm> Accessed on 20/10/2013.
- Sarin KY, Artandi SE. Aging, graying and loss of melanocyte stem cells. Stem Cell Rev. 2007; 3:212-7
- Millington GW, Graham-Brown RA. Skin and skin disease throughout life. In: Burns A, Breathnach S, Cox N, Griffiths CE, editors. Rook's textbook of dermatology, 8th ed. Oxford: Wiley- Blackwell Publishing; 2010. p. 8.23.
- Abdullah L, Abbas O. Common nail changes and disorders in older people: diagnosis and management. Can Family Phys 2011; 57:173-81
- Quinn AG, Perkins W. Non melanoma skin cancer and other epidermal skin tumors. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology. 8th ed. Oxford: Wiley- Blackwell publication; 2010. p. 52.38-45.
- Mortimer PS, Burnand KG, Neumann HAM. Diseases of the veins and arteries: Leg ulcers. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology. 8th ed. Oxford: Wiley-Blackwell; 2010. p. 47.15.

18. Uihlein LC, Saavedra AP, Johnson RA. Cutaneous Manifestations of Human Immuno-deficiency Virus Disease. In: Goldsmith LA, Katz SI, Gilchrist BA, Paller AS, Leffell DJ, Wolff K, editors. Fitzpatrick's Dermatology in General medicine, 7th ed. New York: McGraw Hill; 2008.p.2451.
19. Swinehart JM, Golitz LE. Scrotal calcinosis: dystrophic calcification of epidermoid cysts. Arch Dermatol 1982; 118:985-8.
20. Rahman SB, Arfan Ul Bari, Mumtaz N. Colloid millium: a rare cutaneous deposition disease. J Pak Med Assoc. 2008; 58:207-9.
21. Anstey AV. Disorders of Skin Colour. In: Burns T, Breathnach S, Cox N, Griffiths C, eds. Rook's Textbook of Dermatology. 8th ed. Oxford: Wiley Blackwell; 2010. p. 5
22. Noblesse E, Nizard C, Cario-Andre M, Lepreux S, Pain C, Schnebert S et al. Skin ultrastructure in senile lentigo. Skin Pharmacol Physiol 2006; 19:32.
23. Cox NH, Coulson IH. Systemic Disease and the Skin. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology, 8th ed. Oxford: Wiley- Black-well publication; 2010. p. 62.31
24. Longshore SL, Taylor JS, Kennedy A, Nurko S. Malignant acanthosis nigricans and endometrial carcinoma of the parametrium: the search for malignancy. J Am Acad Dermatol 2003; 49: 541-3.
25. Morley JE, Mooradian AD, Silver AJ, Heber D, Alfin-Slater RB. Nutrition in the elderly. Ann Intern Med 1988; 109:890-904
26. Cohen KR, Frank J, Salbu RL, Israel I. Pruritus in the elderly: Clinical approaches to the improvement of quality of life. P T. 2012; 37:227-39.
27. Boelsma E, Hendriks HF, Roza L. Nutritional skin care: health effects of micronutrients and fatty acids. Am. J. Clin. Nutr. 2001; 73:853-64
28. Robert RR, Norman RA. The Cutaneous Manifestations of Nutritional Deficiencies. In: Norman RA, editor. Diagnosis of Aging Skin Diseases. London: Springer; 2008. p.195
29. Ryan AS, Goldsmith LA. Nutrition and the skin. Clin. Dermatol 1996; 14:389-406.
30. Jainkittivong A, Aneksuk V, Langlais RP. Oral mucosal conditions in elderly dental patients. Oral Dis 2002; 8:218-23
31. Patange SV, Fernandez RJ. A study of geriatric dermatoses. Indian J Dermatol Venereol Leprol 1995; 61:206-8
32. Samsioe G. Urogenital aging—A hidden problem. Am J Obstet Gynecol 1998; 178:314-5.
33. Nyirjesy P, Leigh RD, Mathew L, Lev-Sagie A, Culhane JF. Chronic vulvovaginitis in women older than 50 years: analysis of a prospective database. J Low Genit Tract Dis 2012; 16:24-9.
34. Singh S, Bunker C. Male genital dermatoses in old age. Age Ageing 2008; 37:500-4
35. Verma CR, Vasudevan B, Pragasam V. Severe cutaneous adverse drug reactions. Med J Armed Forces India 2013; 69: 375-83.
36. Xu F, Schillinger JA, Aubin MR, St. Louis ME, Markowitz LE. Sexually transmitted diseases of older persons in Washington State. Sex Transm Dis. 2001; 28:287-91
37. Vervloet D, Durham S. ABC of allergies: Adverse reactions to drugs. BMJ 1998; 316:1511-4.
38. Routledge PA, O'Mahony MS, Woodhouse KW. Adverse drug reactions in elderly patients. Br J Clin Pharmacol 2003; 57: 121-6.
39. Pretorius RW, Gataric G, Swedlund SK, Miller JR. Reducing the risk of adverse drug events in older adults. Am Fam Physician 2013; 87:331-6
40. Brahma DK, Wahlang JB, Marak MD, Sangma MC. Adverse drug reactions in the elderly. J Pharmacol Pharmacother 2013; 4:91-4.
41. Breathnach SM. Drug Reactions. In: Breathnach SM, Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology, 8th ed. Oxford: Wiley- Black-well publication; 2010.p.75.6
42. Sharma VK, Verma P. Parthenium dermatitis in India: Past, present and future. Indian J Dermatol Venereol Leprol 2012; 78:560-8
43. Seyfarth F, Schliemann S, Antonov D, Elsner P. Dry skin, barrier function, and irritant contact dermatitis in the elderly. Clin Dermatol 2011; 29:31-6.
44. Katsarou A, Armenaka MC. Atopic dermatitis in older patients: particular points. J Eur Acad Dermatol Venereol 2011; 25:8-12
45. Mastrolonardo M, Diaferio A, Vendemiale G, Lopalco P. Seborrheic dermatitis in the elderly: inferences on the possible role of disability and loss of self-sufficiency. Acta Derm Venereol 2004; 84:285-7
46. Kwangstith C, Maibach H I. Effect of age and sex on the induction and elicitation of allergic contact dermatitis. Contact Dermatitis 1995; 33:289-98
47. Gupta G, Dawn G, Forsyth A. The trend of allergic contact dermatitis in the elderly population over a 15-year period. Contact Dermatitis 1999; 41:48-9.
48. Ross JS, Du Peloux Menage' H, Hawk LM, White IR. Sesquiterpene lactone contact sensitivity: clinical patterns of Compositae dermatitis and relationship to chronic actinic dermatitis? Contact Dermatitis 1993; 29: 84-7
49. Laube S, Farrell AM. Bacterial skin infections in the elderly: diagnosis and treatment. Drugs and Aging 2002; 19:331-42.
50. Piérard G. Onychomycosis and other superficial fungal infections of the foot in the elderly.

- ly: a Pan European survey. *Dermatology* 2001; 202:220–4.
51. Scheinfeld NS. Skin Disorders in Elderly Persons: Identifying Fungal Infections
 52. Chang AL, Wong JW, Endo JO, Norman RA. Geriatric dermatology review: major changes in skin function in older patients and their contribution to common clinical challenges. *J Am Med Dir Assoc.* 2013; 14:724–30.
 53. Bansal R, Tutrone WD, Weinberg JM. Viral skin infections in the elderly: diagnosis and management. *Drugs Aging* 2002; 19:503-14
 54. King-fan Loo S, Yuk-ming Tang W. Warts (non-genital). *Clin Evid (online)* 2009; 9: 1–17.
 55. Theodosat A. Skin diseases of the lower extremities in the elderly. *Dermatol Clin* 2004; 22:13–21.
 56. Patel S, Zirwas M, English JC 3rd. Acquired palmoplantar keratoderma. *Am J Clin Dermatol* 2007; 8:1-11.
 57. Farage MA, Miller KW, Berardesca, Maibach HI. Clinical implications of aging skin: cutaneous disorders in the elderly. *Am J Clin Dermatol* 2009; 10: 73-86
 58. Parker SR, MacKelfresh J. Autoimmune blistering diseases in the elderly. *Clin Dermatol.* 2011; 29:69-79
 59. Liverant E. Psychoneurodermatologic Disorders. In: Norman RA, editor. *Diagnosis of Aging Skin Diseases*. London: Springer; 2008. p. 213-4
 60. Ramlah Khan, Hamza Malick, Kevin M. Burningham, Mojahed M. K. Shalabi, Stephen K. Tying. COVID-19 and skin manifestations, *Dermatological Reviews*, 10.1002/der2.221, 5, 1, (2023).
 61. Chavda VP, Mishra T, Kamaraj S, Punetha S, Sengupta O, Joshi Y, Vuppu S, Vaghela D, Vora L. Post-COVID-19 Fungal Infection in the Aged Population. *Vaccines (Basel)*. 2023 Feb 27; 11(3):555.
 62. Bilgili SG, Karadag AS, Ozkol HU, Calka O, Akdeniz N. The prevalence of skin diseases among the geriatric patients in Eastern Turkey. *J Pak Med Assoc* 2012; 62: 535–9.
 63. Darjani A, Mohtasham-Amiri Z, Mohammad Amini K, Golchai J, Sadre-Eshkevari S, Alizade N. Skin disorders among elder patients in a referral center in Northern Iran.. *Dermatol Res Pract* 2013; 2013: 193205.
 64. Sahoo A, Singh PC, Pattnaik P, Panigrahi R. Geriatric dermatoses in southern Orissa. *Indian J Dermatol.*2000; 45:66–8.
 65. Wani RT. Socioeconomic status scales-modified Kuppaswamy and Udai Pareekh's scale updated for 2019. *Family Med Prim Care.* 2019 Jun; 8(6):1846-1849.
 66. Grover S, Narasimhalu C. A clinical study of skin changes in geriatric population. *Indian J Dermatol Venereol Leprol* 2009; 75:305-6
 67. Raveendra L. A clinical study of geriatric dermatoses. *Our Dermatol Online* 2014; 5: 235-239.
 68. Nair PA, Bodiwala N, Arora TH, Patel S, Vora R. A Study of Geriatric Dermatoses at a Rural Hospital in Gujarat. *Journal of the Indian Academy of Geriatrics*, 2013; 9:15- 9.
 69. Yalcin B, Tamer E, Toy GG, Oztas P, Hayran M, Alii N. The prevalence of skin diseases in the elderly: analysis of 4099 geriatric patients. *Int J Dermatol* 2006; 45: 672- 6.
 70. Beauregard SB, Gilchrist BA. A survey of skin problems and skin care regimens in the elderly. *Arch Dermatol* 1987; 123:1638-43.
 71. Adam JE, Reilly S. The prevalence of skin disease in the geriatric age group. *Australas J Dermatol* 1987; 28:72–6.
 72. Verbov J. Skin problems in the older patient. *Practitioner* 1975; 215:612-2.
 73. Roberts WE. Dermatologic problems of older women. *Dermatol Clin* 2006; 24:271– 80
 74. Neilly JB, Martin A, Simpson N, MacCuish AC. Pruritus in diabetes mellitus: Investigation of prevalence and correlation with diabetes control. *Diabetes Care* 1986; 9:273–275.