Dermatology Practical & Conceptual

A Retrospective Review of Chronic Non-Communicable Dermatoses Among Older Adults at a Tertiary Healthcare Facility in Southwestern Nigeria

Atinuke Arinola Ajani[1], Fatai Olatunde Olanrewaju[1], Ademola Enitan[1], Olufikemi Fabusuyi[2], Mufutau Oripelaye[1], Olumayowa Abimbola Oninla[1], Olayinka Olasode[1]

1 Department of Dermatology and Venereology, Obafemi Awolowo University, Ile-Ife, Nigeria

2 Department of Medicine, University of Medical Science Teaching Hospital Complex, Akure, Nigeria

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Corresponding Author: Ajani Atinuke Arinola, Consultant Dermatologist & Genitourinary Physician, Department of Dermatology and Venereology, Obafemi Awolowo University, Ile-Ife, Phone: +2348025559295 Email: daraolu@yahoo.com

ABSTRACT

Introduction: Aging is a ubiquitous human trait that predisposes older persons to chronic diseases. Compared with systemic non-communicable diseases, a significant gap exists in literature on the burden of non-communicable dermatoses (NCDs) amongst older adults particularly in low and middle-income countries.

Objectives: The aim of this study was to document the epidemiology and clinical pattern of non-communicable skin diseases among older adults at a tertiary healthcare facility in Southwestern Nigeria.

Methods: We conducted a retrospective review of medical records of ambulant adults aged ≥60 years referred for dermatological care at a teaching hospital in ile-ife, South-Western Nigeria between February 2017 and February 2022. The frequency and pattern of NCDs were recorded for descriptive statistical analysis using SPSS 20 statistics software. The level of statistical significance was set at 0.05.

Results: A total 553 medical records were reviewed with a female: male ratio of 1.3:1 The mean age of the study population was 68.85 ±7.87. Six out of every 10 patients (60.6%) had at least one chronic NCD. The incidence of chronic NCDs declined with increasing age. Chronic eczemas (22.4%), pigmentary dermatoses (9.4%) and skin tumors (8.7%) were the most frequent chronic

non-communicable dermatoses recorded. Older males had a significantly higher incidence of chronic eczemas while chronic urticarias and skin tumors demonstrated significant female preponderance.

Conclusions: There is a high burden of chronic NCDs with significant gender disparities among older adults with skin problems in Nigeria. Pre-emptive planning and resource allocation towards specialist geriatric-dermatology services are needed to address skin-health needs of the growing geriatric population.

Introduction

The human population is experiencing a major demographic shift with an unprecedented growth in the number of older adults (60 years and older) [1,2]. This change in the world population characteristic is most profound in lower- and middle-income countries where majority of the world's older adults reside [3]. Currently, over 1 billion adults are 60 years or older. It is expected that this figure will double by 2050 and by then, 80% of older adults will be resident in less developed countries [2,3].

Although longevity is desirable, it comes with social, economic and health consequences. As such, the gains of increased life expectancy are overshadowed by additional years of poor health and dependency [2]. This can be attributed to inevitable, age-related non-linear decline in the human body. As one ages, the structural and functional integrity of various organ-systems are gradually compromised. Physiological and immunological processes progressively become less efficient, and there is a corresponding increase in susceptibility to a wide variety of diseases, particularly non-communicable diseases.

Studies have demonstrated an increasing burden of chronic diseases with increasing age and an evolution of the pattern of these diseases over time [4–6]. Chronic morbidities in older adults tend to be multiple with over 30% of older persons having co-morbid chronic health problems[4–6]. Additionally, adults with chronic health problems have significantly worse health-related quality of life, higher costs and increased risk of death when compared with adults without chronic health conditions [7,8].

Chronic dermatological conditions contribute to the burden of non-communicable diseases in the older adults [9–12]. A significant association has been demonstrated between chronic inflammatory skin diseases such as psoriasis, atopic dermatitis and immunobullous skin diseases and long standing systemic and psychiatric disorders including cardiovascular diseases, renal diseases, metabolic problems as well as extra-cutaneous malignancies [11–14]. Unfortunately, compared with systemic non-communicable diseases, a significant gap exists in literature on the burden of non-communicable dermatoses amongst older adults. Studies evaluating chronic health problems of older persons rarely report on the burden of skin diseases in them[4–6,15,16]. Nevertheless, there is a high burden of non-communicable dermatoses (NCDs) in lder adults with significant impact on morbidity, mortality and quality of life [11,17–21].

Objectives

We conducted a 5-year review of the medical records of all new patients aged 60 years and above attending the dermatology outpatient clinic to determine the frequency and distribution of chronic, non-communicable dermatoses across various age sub-groups of older adults with skin complaints.

Methods

This sub-study is the retrospective arm of a larger study investigating dermatoses of senescence among adults at a tertiary health care facility in Southwestern Nigeria. A review of the health records of older adult who received care at the outpatient dermatology clinic of Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria between February 2017 and February 2022 was conducted with approval from the institutional ethics and research committee. The medical records of all new patients aged 60 years and older seen during the study period were retrieved and information regarding their age, sex and clinical diagnosis were recorded in a data proforma for subsequent transfer to a digital data spread sheet for coding and analysis. Only case records with conclusive clinical diagnosis were documented while those with inconclusive diagnosis were excluded from the study. All documented dermatologic diagnosis were made by a consultant dermatologist after appropriate clinical and laboratory evaluation.

Grouping and Categorization of Skin Diseases

Cases with a clinical diagnosis of non-communicable (non-infectious) dermatoses were selected for further categorization and analysis. The NCDs were sub-categorized as

acute or chronic NCDs, based on the duration of presenting complaints and/or clinical propensity for relapse. Chronic NCDs were defined as non-relapsing dermatoses of non-infectious etiology with a duration of symptoms greater than or equal to six months or non-infectious dermatosis with a chronic remitting and relapsing course lasting greater > 3 months. As such, subjects with acute NCDs such as irritant contact dermatitis, acute adverse drug reactions and acute urticaria were eventually excluded from the final data analysis.

Patients presenting with multiple chronic NCDs conditions were noted with each diagnosis coded separately under each case for further analysis as multiple response set. Those who developed new co-morbid chronic non-communicable diagnosis at a separate time during the period under review were included separately as new cases.

Statistical analysis was performed using IBM SPSS Statistics (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0). Continuous variables are presented as means ± standard deviation (SD). Comparison of means was done using Student T test. Categorical variables are presented as tables and charts and comparison between groups done with chi square test. The level of statistical significance was set at 0.05.

Ethical Consideration

The study protocol complied with the Declaration of Helsinki. The study was approved by the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex with a national registration number: NHREC/17/03/2021 and an international registration number: IRB/IEC/0004553. The need for informed consent for the retrospective arm of the study was waived by institutional ethics and research committee as this arm of the study did not require direct contact with patients and the clinical data used was anonymized.

Results

Five hundred and fifty-three patients comprising of 316 females (57.1%) and 237 males (42.9%) within the age range of 60-98 years were treated for skin problems during the period of review. More than half (58.2%) of the study population were in their 7th decade, with a mean age of 68.85 ±7.87 years. The male patients were significantly older than the females in this study (P = 0.00) and had a significantly lower incidence of non-communicable dermatoses compared with females *(P = 0.011)*.

Three hundred and sixty-four (60.6%) patients had at least one non-communicable dermatosis (NCD), majority (92.0%) of whom had chronic NCDs. Most patients with chronic NCDs were in their 7th decade while those with acute NCDs were significantly older and predominantly in their 8th decade of life (Table 1). A progressive decline in proportion of chronic NCDs was observed with advancing age. Conversely, an up-ward trend occurred in the incidence of acute NCDs with age (Figure 1). Female sex was significantly associated with a diagnosis of chronic NCDs. Though no gender differences occurred in the incidence of acute NCDs, females with acute NCDs were significantly older than those with chronic NCD (P < 0.05) (Table 1).

Frequency of Chronic NCDs Amongst Study Subjects

A diverse spectrum of chronic NCDs (Tables 2-5) was recorded in the study population. Eczemas (22.4%) constituted the highest overall burden of chronic NCDs followed rather remotely by pigmentary disorders (9.4%) and skin tumors (8.7%). The three most common diagnosis in females were eczemas, pigmentary dermatoses and skin tumors while in males, eczemas, cutaneous pain syndromes and papulo-squamous disorders were most frequent. The

Table 1. Age and sex comparison of NCDs in the study population.

	Acute NCDs N (%)	Chronic NCDs N (%)	NCDs[a] N= 553 (%)	P value
Gender				
Female	18(3.25)	204 (36.9)	222 (40.1)	0.534
Male	11(2.0)	131(23.7)	142 (25.7)	
Total	29 (5.2)	335(60.6)	364(65.8)	
Mean age				
Female	72.94 ±11.86	68.04 ±7.85	68.44 ±8.32	0.02
Male	73.00 ±5.53	70.20 ±7.56	70.42 ±7.44	0.14
Total	72.97 ±9.82	68.89 ±7.80	69.21 ±8.04	0.037

NCD =[†] = Non communicable dermatoses

[a]NCDs[‡] = includes both acute and chronic NCDs

proportion of males with eczemas was significantly more than females (P < 0.05) (Table 2). Unlike eczemas, Chronic urticaria/reactive inflammatory skin diseases and skin tumors demonstrated significant female preponderance (P < 0.05). Chronic urticaria occurred 4.9 times more frequently in females than males. The disparity in incidence of skin tumors widened between both sexes with increasing age (Figure 2). The incidence of co-morbid communicable skin diseases was 8.1% and was mainly due to fungal infections in females and parasitic and viral diseases in male (Figure 3).

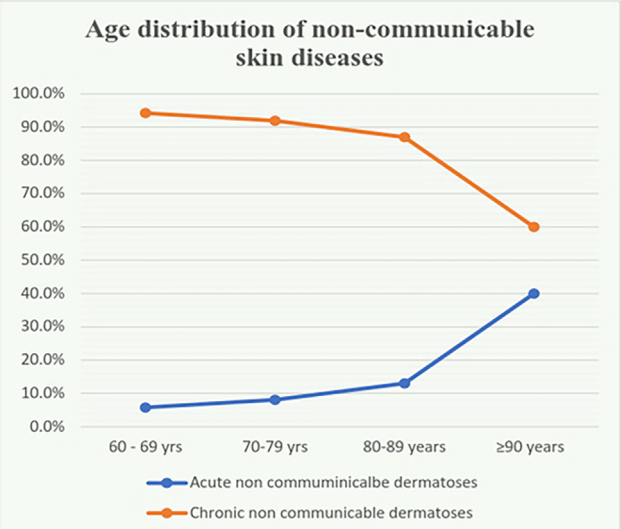

Figure 1. Incidence of acute and chronic non communicable dermatoses. The incidence of acute non communicable dermatoses (blue line) increased with age while chronic non communicable (red line) diseases showed progressive decline with advancing age. Linear by linear association = 6.44, P = 0.011.

Conclusions

The skin is not immune to the impact of aging on health and in fact, may be the first or most severely affected organ by the consequences of aging. The spectrum of cutaneous manifestations in the aging skin is wide, with diverse pathophysiological mechanisms. In this study, we documented a high incidence (65.8%) of non-communicable skin diseases (NCDs) in older adults with dermatological complaints in the hospital setting. This is similar to an incidence of 61.38% reported by Jha in Nepal[22]. Although communicable dermatoses have been previously reported as the most frequent dermatologic problem in developing and tropical countries [23–27], a closer look at many of these studies reveals that the incidence of NCDs is higher when comparison is done as a collective group. In addition, many recent studies corroborate a predominance of NCDs in older adults as well as the general population adult population both in developing and developed economies [28–32].

Chronic NCDs (60.6%) occurred 11.5 times more frequently than acute NCDs and were significantly more frequent in older females in this study. The true incidence of chronic NCDs as a collective group of dermatoses in older adults is unknown. Nevertheless, a similarly high prevalence can be inferred from previous works on individual dermatoses that constitute this spectrum in older adults [18,33–36]. In a study by Gaber et al. [32], four out of the five most frequent groups of skin diseases in elderly patients were chronic non communicable skin diseases, diagnosed in 56.5% of the study population [32, 40].

Table 2. Gender differences in the incidence of various groups of chronic NCDs in older adults.

	% of total population[a] N = 553	Total NCDs[b] N = 335 (%)	Female N = 204 (%)	Males N = 131 (%)	P value
Eczemas	124(22.4)	124(37.0)	66 (32.4)	58 (44.3)	0.03
Pigmentary	52(9.4)	52(15.5)	37(18.1)	15(11.5)	0.10
Skin tumours	48(8.7)	48(14.3)	37(18.1)	11(8.4)	0.02
Papulosquamous dermatoses	34(6.1)	34(10.1)	19(9.3)	15(11.5)	0.53
Chronic cutaneous pain syndromes	31(5.6)	31(9.3)	15(7.4)	16(12.2)	0.14
Miscellaneous	18(3.1)	18(5.4)	11(5.4)	7(5.3)	0.96
Chronic Urticaria/ reactive dermatoses	17(3.1)	17(5.1)	15 (7.4)	2(1.5)	0.02
Erythroderma	14(2.5)	14(4.2)	7(3.4)	7(5.3)	0.40
Cutaneous manifestation of systemic disorders	11(2.0)	11(3.3)	4(2.0)	7(5.3)	0.09
Autoimmune & Immunobullous dermatoses	8(1.4)	8(2.4)	5(2.5)	3(2.3)	0.61
Multiple skin diseases	45(8.1)	45(13.4)	26 (12.7)	19 (14.5)	0.65

NDCs = non communicable dermatoses.

[a]total population of older adults seen during the period of review[b]total number of adults with chronic non communicable dermatoses

Table 3. Comparison of non communicable dermatoses across different age groups.

Diagnostic Group	60-69 years N = 194 (%)	70-79 years N = 91 (%)	≥80 years N = 50 (%)	P value
Eczemas	64 (33.0)	38 (41.8)	22(44.0)	0.20
Pigmentary dermatoses	30(15.5)	16(17.6)	6(12.0)	0.68
Skin tumours	29 (14.9)	12 (13.2)	7(14.0)	0.92
Papulosquamous disorders	18(9.3)	11(12.1)	5(10.0)	0.76
Chronic cutaneous pain syndromes	19(9.8)	6(6.6)	6(12.0)	0.94
Miscellaneous	13(6.7)	3(3.3)	2(4.0)	0.29
Chronic urticaria and reactive dermatoses	13 (6.7)	4 (4.4)	0(0.0)	0.06
Erythroderma	6(3.1)	4(4.4)	4(8.0)	0.14
Cutaneous manifestation of systemic disorders	7(3.6)	3(3.3)	1(2.0)	0.60
Autoimmune & Immunobullous dermatoses	5(2.6)	2(2.2)	1(2.2)	0.79
Multiple skin diseases	22(11.3)	16(17.6)	7(14.0)	0.351

Linear by linear association used to test association between variables when Chi^2 assumptions were violated.

Table 4. Spectrum of chronic inflammatory non communicable dermatoses in study population.

Diagnosis	No of patients	Percentage (%) (N= 335)
Inflammatory NCDs	197	‘58.8
Eczemas	124	37.1
Asteatotic eczema	35	10.4
Seborrheic dermatitis	27	8.1
Lichen simplex	20	6.0
Atopic dermatitis	10	3.0
Chronic hand and foot eczema	9	2.7
Photodermatitis	5	1.5
Stasis eczema	4	1.2
Nummular eczema	4	1.2
Prurigo nodularis	4	1.2
Allergic contact dermatitis	3	0.9
Periorbital dermatitis	2	0.6
Pompholyx	1	0.3
Autoimmune & Immunobullous dermatoses	8	2.4

Diagnosis	No of patients	Percentage (%) (N= 335)
Bullous pemphigoid	3	0.90
Cutaneous lupus	2	0.60
Bechets disease	1	0.30
Scleroderma	1	0.30
Vasculitis	1	0.30
Papulo-squamous disorders	34	10.1
Psoriasis	21	6.3
Lichen planus	12	3.6
Lichen sclerosus et atrophicus	1	0.3
Chronic urticaria and reactive dermatosis	17	5.1
Chronic urticaria	12	3.6
Pyoderma gangrenosum	2	0.6
Papular urticaria	2	0.6
Erythema nodosum	1	0.3
Erythroderma	14	4.2

NCDs = non communicable dermatoses.

The high incidence of chronic NCDs in older adults can be attributed in part to age-related deterioration in the skin functional and structural integrity caused by intrinsic and extrinsic aging as well as age-related co-morbid systemic conditions. Intrinsic aging is characterized by decreased skin thickness, increased permeability to chemical substances and diminished vascular support [37]. These changes lead to increased skin susceptibility to injury, irritation, inflammation, along with reduced propensity for repair and regeneration therefore, establishing a foundation for the

Table 5. Spectrum of chronic non-inflammatory non communicable dermatoses in study population.

Diagnosis	No of patients	Percentage (%) (N = 335)
Non inflammatory NCDs	160	47.8
Pigmentary skin diseases	52	15.5
Vitiligo	33	9.9
Idiopathic guttate hypomelanosis	8	2.4
Exogenous ochronosis	6	1.8
Other pigmentary disorders	5	1.5
Cutaneous manifestations of systemic disorders	11	3.3
Pruritus due to systemic disorders	7	2.1
Paraneoplastic dermatoses	2	0.6
Other cutaneous manifestations of systemic disorders	2	0.6
Cutaneous dysesthesias	31	9.3
Post-herpetic neuralgia	26	7.8
Cutaneous sensory disorders	5	1.5
Skin tumors	48	14.3
Benign skin tumors	*41*	*12.2*
Dermatofibroma	2	0.6
Cherry angioma	1	0.3
Acrochordon	3	0.9
Keloids	14	4.2
Syringoma	4	1.2
Seborrheic keratosis	16	4.8
Pre-malignant and malignant skin tumors	*7*	*2.1*
Actinic keratosis	2	0.6
Squamous cell carcinoma	1	0.3
Melanoma	1	0.3
Other malignant skin tumors	3	0.9
Miscellaneous	18	5.4
Hair disorders	2	0.6
Chronic adverse cutaneous drug reactions	6	1.8
Keratoderma	5	1.5
Chronic ulcer	3	0.9
Nutritional dermatosis	1	0.3
Sarcoidosis	1	0.3

NCDs = non communicable dermatoses.

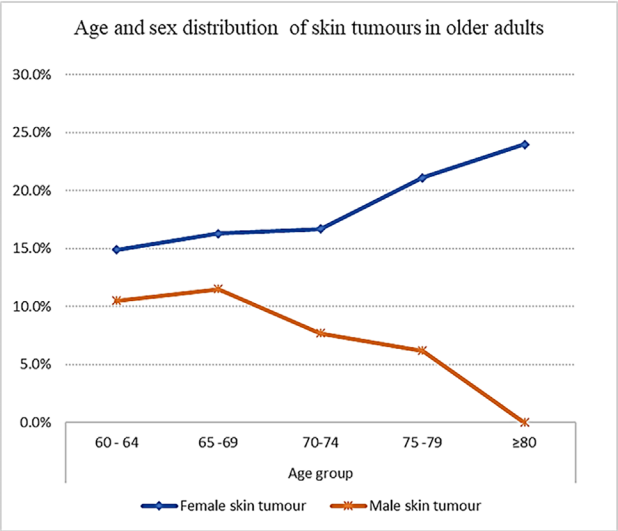

Figure 2. Incidence of skin tumors in female and male patients. The incidence of skin tumors increased with age in females in contrast to the decline observed in males. The difference in incidence of skin tumors widened with increasing age between the two sexes.

pathogenesis of most chronic NCDs. Extrinsic aging, mainly due to ultraviolet exposure also plays a significant role in the pathogenesis of NCDs in advanced age. Chronic ultraviolet exposure causes cellular DNA damage, accelerates intrinsic skin aging [37,38] increases skin fragility [37], and depletes the skin cutaneous immune cell population predisposing to skin tumorigenesis [37,38]. In addition, hormonal factors, diet, psychosocial problems, systemic co-morbid conditions and treatments for these conditions also contribute to the pathogenesis of chronic non-communicable skin diseases in old age.

Inflammatory NCDs affect about 20 – 25% of the world population[39]. The incidence amongst older adults in this study was higher (35.6%). Chronic inflammatory dermatoses especially eczemas are often reported as one of the most frequent skin findings in older adults [18,32,40]. Eczemas (37.0%) were the most frequently diagnosed chronic NCDs amongst older adults in this study. A similar finding of high prevalence of eczemas amongst older persons was reported by Wang et al [41] in China as well as several other researchers in different geographical regions [18,22,35,42–44]. The etiology of inflammatory NCDs including eczemas in older persons is multifactorial. Age-related physiological deterioration in epidermal barrier function with corresponding decline in skin barrier homeostasis, stratum corneum hydration and increased skin pH appear to play a central role [41,45]. Impaired epidermal barrier function is associated with increased cutaneous cytokine expression and chronic low grade cutaneous and systemic inflammation [45–48]. Other endogenous factors including, reduced epidermal synthesis of natural moisturizing factors, lipids and

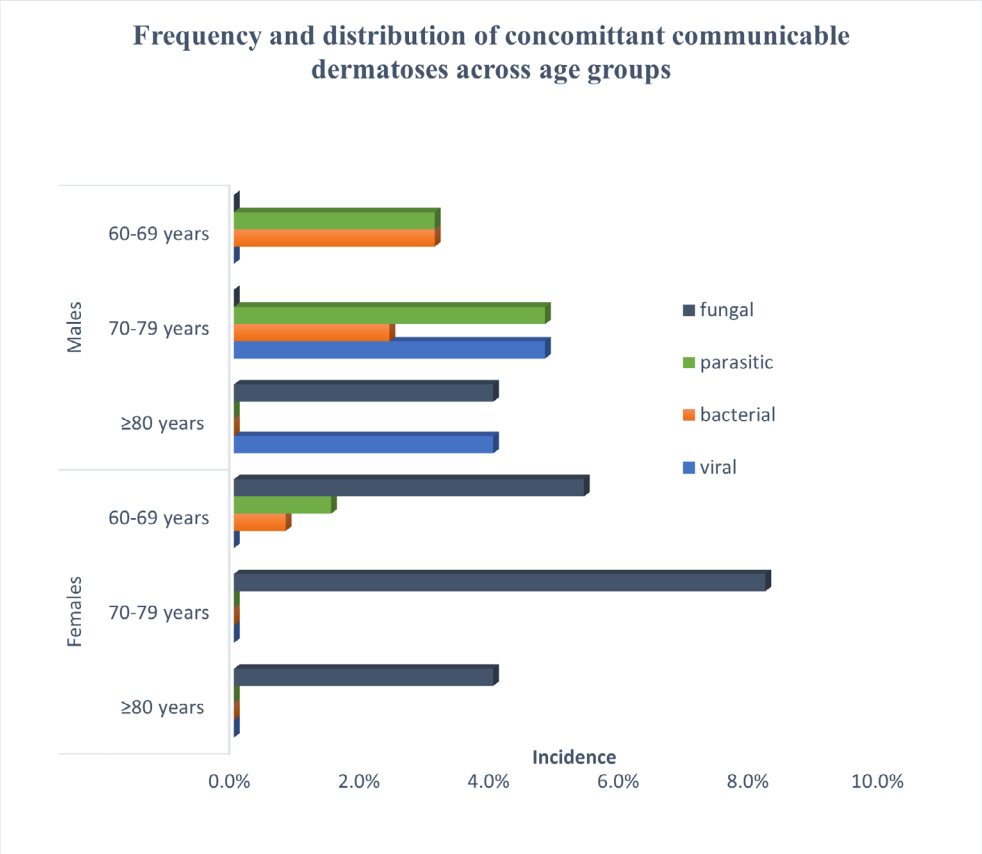

Figure 3. Co-morbid infectious dermatoses in the study population. The incidence of concomitant infectious dermatoses was highest in the seventh decade. Fungal skin infections followed by parasitic skin diseases were the most frequent in female and male patients respectively.

sebum as well as exogenous factors such as drugs contribute to the pathogenesis of eczemas and cutaneous inflammation in the elderly [49,50].

Given that the deterioration in epidermal barrier function progresses relative to age [51,52], the substantial male preponderance of eczemas in this study may be due to the significant age difference between male and female patients in the study. Age-related decline in epidermal barrier function may also be responsible for the observed increase in incidence of acute NCDs (comprising predominantly of acute eczemas such as contact dermatitis) with advancing age in this study.

Cutaneous aging is associated a variety of divergent pigmentary changes ranging from mottled hyperpigmentation in sun-exposed areas to hypopigmented macules of guttate hypomelanosis in relatively less exposed skin. Pigmentary dermatoses consisting predominantly of vitiligo and idiopathic guttate hypomelanosis occurred in 9.4% of older adults and were the second largest group of chronic non communicable dermatoses in this study. Vitiligo (9.9%) was the most frequent pigmentary disorder. A similar finding was reported by Raveendra in India [53]. Overall, vitiligo in older adults is not uncommon. However, there are racial and geographical differences in the incidence of late-onset vitiligo as well as age-related differences in the etiopathogenesis, morphological variant and clinical course of the disease. In Nigeria, older adults account for 5.8% of dermatology consultations for vitiligo [54], while in Singapore and Kuwait, up to 14% of subjects with vitiligo have late onset vitiligo [55,56]. Lower incidences were reported in India [20,57], Egypt [32] and Tanzania [18]. Vitiligo with onset in late adult hood is often more rapidly progressive and tends to be frequently associated with other autoimmune disorders [58,59].

Other pigmentary disorders occurred infrequently in our study population. We documented a much lower incidence of idiopathic guttate hypomelanosis (2.4%) compared with values as high as 9 - 70% reported in previous studies [26,53,60]. It is known that genetics and environmental factors play major roles in the pathogenesis of idiopathic guttate hypomelanosis with the disease being more frequent in individuals with lighter ethnic skin tones. The low incidence of idiopathic guttate hypomelanosis among older adults in this study may therefore be related to the predominantly darker skin tone of our study population.

Skin tumors were the third most frequent group of chronic NCDs diagnosed in the study. The overall incidence

of skin tumors (14.3%) is similar to findings by Otike-Odibi et al in the south-southern part of the country[61] but lower than reports from other countries [62,63]. There was a significant gender disparity in the frequency of skin tumors with a higher incidence in females compared to males. The gender gap in skin tumors widened with increasing age (Figure 2) due to a steep increase in the proportion of females with skin tumors with age. Although a higher prevalence of skin tumors in older adult females compared with males has been previously documented [63,64], this opposing trend in incidence as well as a statistically significant gender difference in incidence of skin tumors has not been previously reported.

Seborrheic keratosis was the most common skin tumor diagnosed in 4.8% of the patients and comprised of 33.3% of all skin tumors in this study. This incidence is lower than reports from other parts of the world [62,63,65] most likely due to differences in skin phototype of the population studied. Studies from other parts of Africa report Kaposi sarcoma[18] and keloids[66] as the most frequent skin tumors encountered in older adults. In our study, keloids (4.2%) ranked second highest in the tumor category constituting less than a third of the total number of skin tumors. The differences in incidence and pattern of skin tumors in various studies may be related to genetic factors, other prevailing co-morbid conditions such as HIV infection, as well as the influence of environmental and cultural factors on perception of skin diseases. Although seborrheic keratoses are benign in nature and often considered a cutaneous manifestation of extrinsic skin aging, they are worth mentioning particularly in older adults as their occurrence may herald more sinister diagnosis of internal malignancies particularly when eruptive [37,67].

Other frequently diagnosed chronic NCDs amongst older adults in this study were: papulo-squamous dermatoses, cutaneous dysesthesias and urticaria/reactive dermatoses in decreasing order of frequency. Erythroderma was the least frequently diagnosed group of chronic NCDs in the study population. It has been found to occur most frequently in adults after the age of 50 and often demonstrates male preponderance [68–70]. We documented a higher incidence of erythroderma in males and over a 2-fold higher frequency in subjects ≥ 80 years compared with those in their 7^{th} decade. Most reported cases of erythroderma in literature are secondary to exacerbation of pre-existing skin diseases [68–71]. As such, erythroderma is often considered a severe manifestation of pre-existing inflammatory dermatological disorders rather than a diagnostic entity. However, in 3.9%-25% of cases, no underlying cause is found [68–71]. In this study, patients categorized as having erythrodermas were those in whom no primary cause could be identified after extensive clinical evaluation and investigations (Chronic idiopathic erythroderma; CIE). Those with identifiable diagnosis were grouped under their respective causes. The true incidence of chronic idiopathic erythroderma in older adults is unknown, however, a significant preponderance in elderly men has been previously documented [72]. We found a higher incidence of CIEs in males that was not statistically significant ($P > 0.05$).

The incidence of co-morbid communicable dermatoses was surprisingly low (8.1%) in the study population. The spectrum of infectious dermatoses was dominated by fungal infections in females and parasitic and viral infections in males.

This was a healthcare facility-based study, and as such findings of this research reflect predominantly chronic skin conditions in older adults warranting specialist care. Older adults with minor or less severe skin conditions that may otherwise present to the general practitioner or remain untreated are therefore not captured by this study.

This study establishes a high burden of chronic non communicable dermatoses with significant gender disparities among older adults receiving dermatological care at a tertiary healthcare facility in Southwestern Nigeria. With increasing longevity, a corresponding rise in the prevalence these chronic skin conditions is foreseeable, and the demand for specialist geriatric skin care is bound to grow. Healthcare providers therefore need to be proactive in planning and allocating resources, to ensure that specialized geriatric skin care services are available to meet the skin health needs of the growing elderly population.

References

1. Luebberding S, Krueger N, Kerscher M. Skin physiology in men and women: In vivo evaluation of 300 people including TEWL, SC hydration, sebum content and skin surface pH. Int J Cosmet Sci 2013;35:477–83.
2. World Health Organization (WHO). Aging and health 2022. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health (accessed September 27, 2022).
3. World Health Organization (WHO). UN Decade of Healthy Ageing 2022. https://www.who.int/initiatives/decade-of-healthy-ageing (accessed September 1, 2022).
4. Boersma P, Black LI, Ward BW. Prevalence of Multiple Chronic Conditions Among US Adults, 2018. Prev Chronic Dis 2020;17.
5. da Silva DSM, de Assumpcao D, Fransisco PM, Yassuda MS, Neri AL, Borim FS. Chronic non-communicable diseases considering sociodemographic determinants in a cohort of older adults. Rev Bras Geriatr Gerontol 2022;25:e210204.
6. Nwani PO, Isah AO. Chronic diseases and multimorbidity among elderly patients admitted in the medical wards of a Nigerian tertiary hospital. Journal of Clinical Gerontology and Geriatrics 2016;7:83–6. https://doi.org/10.1016/J.JCGG.2015.10.001.
7. Maresova P, Javanmardi E, Barakovic S, Barakovic Husic J, Tomsone S, Krejcar O, et al. Consequences of chronic diseases and other limitations associated with old age – a scoping review. BMC Public Health 2019;19. https://doi.org/10.1186/s12889-019-7762-5.

8. Rizzuto D, F Melis RJ, Angleman S, Qiu C, Marengoni A. Effect of Chronic Diseases and Multimorbidity on Survival and Functioning in Elderly Adults. J Am Geriatr Soc 2017;65:1056–60. https://doi.org/10.1111/jgs.14868.
9. Yamanaka K. Special Issue: "Skin Disease and Comorbidities." J Clin Med 2021;10:5754. https://doi.org/10.3390/jcm10245754.
10. Kwa MC, Silverberg JI. Association Between Inflammatory Skin Disease and Cardiovascular and Cerebrovascular Co-Morbidities in US Adults: Analysis of Nationwide Inpatient Sample Data. Am J Clin Dermatol 2017;18:813–23. https://doi.org/10.1007/S40257-017-0293-X.
11. Försti A-K, Jokelainen J, Timonen M, Tasanen K. Risk of Death in Bullous Pemphigoid: A retrospective Database Study in Finland. Acta Derm Venereol 2016;96:758–61. https://doi.org/10.2340/00015555-2347.
12. Wang L, Bierbrier R, Drucker AM, Chan A-W. Noncutaneous and Cutaneous Cancer Risk in Patients With Atopic Dermatitis. A Systematic Review and Meta-analysis. JAMA Dermatol 2020;156:158–71. https://doi.org/10.1001/jamadermatol.2019.3786.
13. Farzanfar D, Dowlati Y, French LE, Lowes MA, Alavi A. Inflammation: A Contributor to Depressive Comorbidity in Inflammatory Skin Disease. Skin Pharmacol Physiol 2018;31:246–51. https://doi.org/10.1159/000490002.
14. Vaengebjerg S, Skov L, Egeberg A, Dyrberg N. Prevalence, Incidence, and Risk of Cancer in Patients With Psoriasis and Psoriatic Arthritis. A Systematic Review and Meta-analysis. JAMA Dermatol 2020;156:421–9. https://doi.org/10.1001/jamadermatol.2020.0024.
15. Ekpenyong CE, Udokang NE, Akpan EE, Samson TK. Double Burden , Non-Communicable Diseases And Risk Factors Evaluation In Sub-Saharan Africa : The Nigerian Experience . European Journal of Sustainable Development 2012;1:249–70.
16. Chang AY, Gomez-Olive F, Payne C, Rohr JK, Manne-Goehler J, Wade AN, et al. Chronic multimorbidity among older adults in rural South Africa. BMJ Glob Health 2019;4:e001386. https://doi.org/10.1136/bmjgh-2018-001386.
17. 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;9. https://doi.org/10.4103/jfmpc.jfmpc_1188_19.
18. Mponda K, Masenga J. Skin diseases among elderly patients attending skin clinic at the Regional Dermatology Training Centre, Northern Tanzania: a cross-sectional study. BMC Res Notes 2016;9:119. https://doi.org/10.1186/s13104-016-1933-6.
19. Papadopoulos I. Comparative Study of Dermatological Diseases of the Elderly in Relation to the Rest Population. Clin Cosmet Investig Dermatol 2020;13. https://doi.org/10.2147/CCID.S242294.
20. Alam MN, Husain MA, Siddiqua A, Babar ZUM, Hasan MR. The prevalence of skin and venereal diseases among the geriatric patients attending in a tertiary care hospital in Dhaka, Bangladesh. Bangladesh Journal of Medical Science 2019;18. https://doi.org/10.3329/bjms.v18i1.39563.
21. Ansorge C, Miocic JM, Schauer F. Skin diseases in hospitalized geriatrics: a 9-year analysis from a University Dermatology Center in Germany. Arch Dermatol Res n.d.;314:427–37. https://doi.org/10.1007/s00403-021-02244-9.
22. Jha HK. Study of clinical spectrum of geriatric dermatoses in patients attending a multi-specialty hospital. Journal of Chitwan Medical College 2020;10:77–80. https://doi.org/10.54530/jcmc.191.
23. Ayanlowo O, Okesola O. Pattern of Skin disorders across age groups. Res J Health Sci 2017;5:148. https://doi.org/10.4314/rejhs.v5i3.4.
24. Gibbs S. Skin diseases and socioeconomic conditions in rural Africa: Tanzania. Int J Dermatol 1996;35:633–9. https://doi.org/10.1111/J.1365-4362.1996.TB03687.X.
25. Badame AJ. Incidence of Skin Disease in Rural Jamaica. Int J Dermatol 1988;27:109–11. https://doi.org/10.1111/J.1365-4362.1988.TB01283.X.
26. Kumar D, Das A, Bandyopadhyay D, Chowdhury S, Das N, Sharma P, et al. Dermatoses in the elderly: Clinico-demographic profile of patients attending a tertiary care centre. Indian J Dermatol 2021;66. https://doi.org/10.4103/ijd.IJD_245_20.
27. Hay RJ. Skin disease in the tropics and the lessons that can be learned from leprosy and other neglected diseases. Acta Derm Venereol 2020;100:235–41. https://doi.org/10.2340/00015555-3469.
28. Aman S, Nadeem M, Mahmood K, Ghafoor MB. Pattern of skin diseases among patients attending a tertiary care hospital in Lahore, Pakistan. J Taibah Univ Med Sci 2017;12:392–6. https://doi.org/10.1016/J.JTUMED.2017.04.007.
29. Ukonu AB, Eze EU. Pattern of Skin Diseases at University of Benin Teaching Hospital, Benin City, Edo State, South-South Nigeria: A 12 Month Prospective Study. Glob J Health Sci 2012;4:148–57. https://doi.org/10.5539/gjhs.v4n3p148.
30. Akinboro AO, Mejiuni AD, Akinlade MO, Audu BM, Ayodele OE. Spectrum of skin diseases presented at LAUTECH Teaching Hospital, Osogbo, southwest Nigeria. Int J Dermatol 2015;54:443–50. https://doi.org/10.1111/IJD.12693.
31. Sharma H, Kumar Chawla R, Pruthi S, Resident S. The pattern of dermatological disorders among patients attending OPD of dermatology department At a Tertiary Care Hospital, Mathura. Indian Journal of Clinical and Experimental Dermatology 2019;5:154–7. https://doi.org/10.18231/j.ijced.2019.033.
32. Gaber M, Hasanin AZ. Skin diseases in elderly. Menoufia Medical Journal 2020;3:272–6.
33. Bilgili SG, Karadag AS, Ozkol HU, Calka O, Akdeniz N. Original Article The prevalence of skin diseases among the geriatric patients in Eastern Turkey. J Pak Med Assoc 2012;62:5–9.
34. Robinson MK. Racial differences in acute and cumulative skin irritation responses between Caucasian and Asian populations. Contact Dermatitis 2000;42:134–43.
35. Yavuzcan G. Prevalence of skin disorders among geriatric patients in the black sea region of Turkey. J Exp Clin Med 2022;39:327–33. https://doi.org/10.52142/omujecm.39.2.4.
36. Landis ET, Davis SA, Taheri A, Feldman SR. Top dermatologic diagnoses by age. Dermatol Online J 2014;20. https://doi.org/10.5070/d3204022368.
37. Jafferany M, Huynh T V, Silverman MA, Zaidi Z. Geriatric dermatoses : A clinical review of skin diseases in an aging population. Int J Dermatol 2012;51:509–22. https://doi.org/10.1111/j.1365-4632.2011.05311.x.
38. Mesa-Arango AC, Flórez-Muñoz SV, Sanclemente G. Mechanisms of skin aging. IATREIA 2017;30:160–70. https://doi.org/10.17533/UDEA.IATREIA.V30N2A05.
39. Ujiie H, Rosmarin D, Schon M, Stander S, Boch K, Metz M, et al. Unmet medical needs in Chronic, Non-communicable Inflammatory skin diseases. Front Med (Lausanne) 2022;9.
40. Uprety S, Paudel S, Thapa P. Pattern of Skin Diseases in Geriatric Population: Our Year Long Experience from Nepal. Indian Dermatol Online J 2021;12:888–91. https://doi.org/10.4103/idoj.IDOJ_65_21.

41. Wang X, Li LF. Clinical features of eczema and dermatitis in the elderly: A cross-sectional study in mainland China. Eur J Inflamm 2022;20. https://doi.org/10.1177/20587392211069758.
42. Yew YW, Kuan AHY, George PP, Zhao X, Tan SH. Prevalence and burden of skin diseases among the elderly in Singapore: a 15-year clinical cohort study. Journal of the European Academy of Dermatology and Venereology 2022;36:1648–59. https://doi.org/10.1111/JDV.18205.
43. Bains P. Skin disorders among elderly population without comorbidities: a hospital based study. International Journal of Research in Dermatology 2019;5. https://doi.org/10.18203/issn.2455-4529.intjresdermatol20190441.
44. Polat M, İlhan MN. Dermatological complaints of the elderly attending a dermatology outpatient clinic in Turkey: A prospective study over a one-year period. Acta Dermatovenerologica Croatica 2015;23.
45. Wang Z, Man MQ, Li T, Elias PM, Mauro TM. Aging-associated alterations in epidermal function and their clinical significance. Aging 2020;12. https://doi.org/10.18632/aging.102946.
46. Troy T-C, Arabzadeh A, Lariviè Re NMK, Enikanolaiye A, Turksen K. Dermatitis and Aging-Related Barrier Dysfunction in Transgenic Mice Overexpressing an Epidermal-Targeted Claudin 6 Tail Deletion Mutant. PLoS One 2009;4:e7814. https://doi.org/10.1371/journal.pone.0007814.
47. Hu L, Mauro TM, Dang E, Man G, Zhang J, Lee D, et al. Epidermal Dysfunction Leads to an Age-Associated Increase in Levels of Serum Inflammatory Cytokines. Journal of Investigative Dermatology 2017;137:1277–85. https://doi.org/10.1016/J.JID.2017.01.007.
48. Velarde MC. Epidermal Barrier Protects against Age-Associated Systemic Inflammation. Journal of Investigative Dermatology 2017;137:1206–8. https://doi.org/10.1016/J.JID.2017.02.964.
49. Joly P, Corven-Benoit C, Baricault S, Lambert A, Hellot M, Josset V, et al. Chronic eczematous eruptions of the elderly are associated with chronic exposure to calcium channel blockers: Results from a Case-Control study. Journal of Investigative Dermatology 2007;127:2766–71.
50. Shevchenko A, Valdes-Rodriguez R, Yosipovitch G. Causes, pathophysiology, and treatment of pruritus in the mature patient. Clin Dermatol 2018;36. https://doi.org/10.1016/j.clindermatol.2017.10.005.
51. Hahnel E, Blume-Peytavi U, Trojahn C, Kottner J. Associations between skin barrier characteristics, skin conditions and health of aged nursing home residents: A multi-center prevalence and correlational study. BMC Geriatr 2017;17. https://doi.org/10.1186/s12877-017-0655-5.
52. Wilhelm KP, Cua AB, Maibach HI. Skin aging. Effect on transepidermal water loss, stratum corneum hydration, skin surface pH, and casual sebum content. Arch Dermatol 1991;127:1806–9.
53. Raveendra L. A clinical study of geriatric dermatoses. Our Dermatology Online 2014;5. https://doi.org/10.7241/ourd.20143.59.
54. Onunu AN, Kubeyinje EP. Vitiligo in the Nigerian African: A study of 351 patients in Benin City, Nigeria. Int J Dermatol 2003;42:800–2. https://doi.org/10.1046/j.1365-4362.2003.01908.x.
55. Kong Y, Ching V, Chuah S, Thng T. Retrospective study on the characteristics and treatment of late-onset vitiligo. Indian J Dermatol Venereol Leprol 2017;83:625. https://doi.org/10.4103/IJDVL.IJDVL_650_16.
56. Al-Mutairi N, Al-Sebeih KH. Late onset vitiligo and audiological abnormalities: Is there any association? Indian J Dermatol Venereol Leprol 2011;77:571–6. https://doi.org/10.4103/0378-6323.84059.
57. Simin MK, Sasidharanpillai S, Rajan U, Riyaz N, Simin MK, Sasidharanpillai S, et al. Dermatoses among patients aged 60 years and above attending a tertiary referral center: A cross-sectional study from North Kerala. Journal of Skin and Sexually Transmitted Diseases 2021;3:166–72. https://doi.org/10.25259/JSSTD_52_2020.
58. Thng S, Chuah SY, Gan EY. Age and Vitiligo: Childhood, Pregnancy and Late-Onset Vitiligo. In: Picardo M, Taïeb A, editors. Vitiligo, Springer, Cham; 2019, p. 141–51. https://doi.org/10.1007/978-3-319-62960-5_14.
59. Dogra S, Parsad D, Handa S, Kanwar AJ. Late onset vitiligo: A study of 182 patients. Int J Dermatol 2005;44:193–6. https://doi.org/10.1111/J.1365-4632.2004.01948.X.
60. Brown F, Crane JS. Idiopathic Guttate Hypomelanosis. Dermatological Cryosurgery and Cryotherapy 2022:407–11. https://doi.org/10.1007/978-1-4471-6765-5_84.
61. Otike-Odibi B. Scope of Skin Diseases in the Geriatric Population of an Urban Dermatology Clinic in Port Harcourt , Nigeria. Central African Journal of Public Health 2022;8:69–73. https://doi.org/10.11648/j.cajph.20220802.17.
62. Darjani A, Alizadeh N, Rafiei E, Moulaei M, Naseri Alavi SH, Eftekhari H, et al. Skin Diseases among the Old Age Residents in a Nursing Home: A Neglected Problem. Dermatol Res Pract 2020;2020. https://doi.org/10.1155/2020/8849355.
63. Bıyık Özkaya D, Erfan G, Okuturlar Y, Tosuner Z, Demircioğlu D, Timurkaynak Ö. Skin Biopsy Results of Geriatric Patients Over a 5-year Period and the Frequency of Skin Diseases Before and After COVID-19 Pandemic. Med J Bakirkoy 2022;18:189–94. https://doi.org/10.4274/BMJ.galenos.2022.2022.3-13.
64. Makrantonaki E, Steinhagen-Thiessen E, Nieczaj R, Zouboulis CC, Eckardt R. Prevalence of skin diseases in hospitalized geriatric patients. Z Gerontol Geriatr 2017;50. https://doi.org/10.1007/s00391-016-1084-3.
65. Cvitanović H, Knežević E, Kuljanac I, Jančić E. Skin disease in a geriatric patients group in outpatient dermatologic clinic Karlovac, Croatia. Coll Antropol 2010;34.
66. Saka B, Mouhari-toure A. Cutaneous pathology in the elderly in dermatology at Lomé subject, Togo: Study of 325 cases. Pan Afr Med J 2014;18. https://doi.org/10.11604/pamj.2014.18.151.3066.
67. Wollina U. Recent advances in managing and understanding seborrheic keratosis. F1000Res 2019;8. https://doi.org/10.12688/F1000RESEARCH.18983.1.
68. César A, Cruz M, Mota A, Azevedo F. Erythroderma. A clinical and etiological study of 103 patients. J Dermatol Case Rep 2016;10:1. https://doi.org/10.3315/JDCR.2016.1222.
69. Hoxha S, Fida M, Ritjona M, Vasili E. Erythroderma: A Manifestation of Cutaneous and Systemic Diseases. EMJ Allergy Immunol 2020. https://doi.org/10.33590/emjallergyimmunol/19-00182.
70. Li J, Zheng HY. Erythroderma: a clinical and prognostic study. Dermatology 2012;225:154–62. https://doi.org/10.1159/000342365.
71. Khaled A, Sellami A, Fazaa B, Kharfi M, Zeglaoui F, Kamoun. Acquired erythroderma in adults: a clinical and prognostic study. J Eur Acad Dermatol Venereol 2010;24:781–8. https://doi.org/10.1111/J.1468-3083.2009.03526.X.
72. Ohga Y, Bayaraa B, Imafuku S. Chronic idiopathic erythroderma of elderly men is an independent entity that has a distinct TARC/IgE profile from adult atopic dermatitis. Int J Dermatol 2018;57:670–4. https://doi.org/10.1111/IJD.13976.